

IMPROVING THE EFFECTIVENESS AND IMPLEMENTATION OF PHYSICAL ACTIVITY INTERVENTIONS DELIVERED IN CHILDCARE

Meghan Finch

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School of Medicine and Public health

Faculty of Health

The University of Newcastle

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STATEMENT OF ORIGINALITY

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THESIS BY PUBLICATION

I hereby certify that this thesis is submitted in the form of a series of published papers of which I am a joint author. I have included as part of the thesis a written statement from each co-author; endorsed by the Faculty Assistant Dean (Research Training), attesting to my contribution to the joint publications. The University of Newcastle Thesis by Publication Guidelines, are included in Appendix I1.

Signed:

Name: Meghan Finch

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SUPERVISORS

Associate Professor Luke Wolfenden
Hunter New England Population Health
School of Health and Medicine
Faculty of Medicine and Public Health
University of Newcastle, Australia

Professor John Wiggers
Hunter New England Population Health
School of Health and Medicine
Faculty of Medicine and Public Health
University of Newcastle, Australia

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Meghan Finch reports no conflict of interest.

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This thesis is presented as a series of five papers. All of these papers have been published in peer reviewed journals.

Chapter 2

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Chapter 3

Finch M, Jones J, Yoong SL, Wiggers J, Wolfenden L. Effectiveness of centre based-childcare interventions in increasing child physical activity: a systematic review and meta-analysis for policy makers and practitioners. Obesity Reviews 2016. 17: 412–428.

Chapter 4A

Finch M, Wolfenden L, Morgan PJ, Freund M, Wyse R, Wiggers J. A cluster randomised trial to evaluate a physical activity intervention among 3-5 year old children attending long day care services: study protocol. BMC Public Health 2010, 10:534.

Chapter 4B

Finch M, Wolfenden L, Morgan PJ, Freund M, Jones J, Wiggers J. A cluster randomized trial of a multi-level intervention, delivered by service staff, to increase physical activity of children attending center-based childcare. Preventive medicine 2014; 58:9-16. doi: 10.1016/j.ypmed.2013.10.004.

Chapter 5

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CO-AUTHOR STATEMENT FOR CHAPTER 2

I attest that Research Higher Degree candidate Meghan Finch contributed to the paper/publication entitled:

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in the following ways :

- Contributing to the development of the research question
- Contributing to the research design and study methodology
- Determining the measures to be used
- Developing data collection tools
- Conducting service recruitment
- Overseeing data collection and data entry
- Cleaning the data

Full name of Co-author	Signature of Co-author	Date
Colin Bell		24/10/2016
Luke Wolfenden		12/10/2016
Michael Fitzgerald		02/11/2016
Phillip J Morgan		24/10/2016
Jannah Jones		12/10/2016

CO-AUTHOR STATEMENTS

CO-AUTHOR STATEMENT – CHAPTER 2 continued

Megan Freund

24/10/2016

John Wiggers

12/10/2016

Signature of Assistant Dean (Research Training) (ADRT)

Full Name of ADRT: Robert Callister

Date: 30/11/16

CO-AUTHOR STATEMENT – CHAPTER 3

I attest that Research Higher Degree candidate Meghan Finch contributed to the paper/publication entitled:

Effectiveness of centre-based childcare interventions in increasing child physical activity: a systematic review and meta-analysis for policy makers and practitioners

in the following ways :

- Screening abstracts and titles
- Assessing full text articles for eligibility
- Piloting the data extraction form
- Extracting data regarding study characteristics from all included studies
- Extracting data regarding risk of bias from all included studies
- Combining the extraction forms from the independent reviewers
- Contributing to data analysis and interpretation
- Leading the writing of the manuscript

Full name of Co-author	Signature of Co-author	Date
Jannah Jones		12/10/2016
Sze Lin Yoong		12/10/2016
Luke Wolfenden		12/10/2016
John Wiggers		12/10/2016

CO-AUTHOR STATEMENT – CHAPTER 3 continued

Signature of Assistant Dean (Research Training) (ADRT)

Full Name of ADRT: Robert Callister

Date: 30/11/16

CO-AUTHOR STATEMENT – CHAPTER 4A

I attest that Research Higher Degree candidate Meghan Finch contributed to the paper/publication entitled:

A cluster randomised trial to evaluate a physical activity intervention among 3-5 year old children attending long day care services: Study protocol

in the following ways :

- Contributing to the development of the research question
- Contributing to the research design and study methodology
- Determining the measures to be used
- Leading the writing of the manuscript

Full name of Co-author	Signature of Co-author	Date
Luke Wolfenden		12/10/2016
Phillip J Morgan		24/10/2016
Megan Freund		24/10/2016
Rebecca Wyse		24/10/2016
John Wiggers		12/10/2016

Signature of Assistant Dean (Research Training) (ADRT)

Full Name of ADRT: Robert Callister

Date: 30/11/16

CO-AUTHOR STATEMENT – CHAPTER 4B

I attest that Research Higher Degree candidate Meghan Finch contributed to the paper/publication entitled:

A cluster randomized trial of a multi-level intervention, delivered by service staff, to increase physical activity of children attending center-based childcare

in the following ways :

- Contributing to the research question and study methodology
- Determining the measures to be used
- Developing data collection tools
- Overseeing the development of intervention resources
- Overseeing the delivery of the intervention
- Conducting service recruitment
- Overseeing data collection and data entry
- Cleaning the data
- Leading the data analysis
- Leading the writing of the manuscript

Full name of Co-author	Signature of Co-author	Date
Luke Wolfenden		12/10/2016
Phillip J Morgan		24/10/2016
Megan Freund		24/10/2016
Jannah Jones		12/10/2016

CO-AUTHOR STATEMENTS

CO-AUTHOR STATEMENT – CHAPTER 4B continued

John Wiggers

12/10/2016

Signature of Assistant Dean (Research Training) (ADRT)

Full Name of ADRT: Robert Callister

Date: 30/11/16

CO-AUTHOR STATEMENT – CHAPTER 5

I attest that Research Higher Degree candidate Meghan Finch contributed to the paper/publication entitled:

Impact of a population based intervention to increase the adoption of multiple physical activity practices in centre based childcare services: a quasi- experimental, effectiveness study

in the following ways:

- Contributing to the research, question, design and study methodology
- Overseeing the development of intervention resources
- Overseeing the delivery of the intervention
- Contributing to the development of data collection tools
- Overseeing data collection
- Cleaning the data
- Leading the data analysis
- Leading the writing of the manuscript

Full name of Co-author	Signature of Co-author	Date
Luke Wolfenden		12/10/2016
Maryann Falkiner		11/10/2016
Danielle Edenden		13/10/2016
Nicole Pond		11/10/2016

CO-AUTHOR STATEMENT – CHAPTER 5 continued

Louise Hardy 24/10/2016

Andrew Milat 24/10/2016

John Wiggers 12/10/2016

Signature of Assistant Dean (Research Training) (ADRT)

Full Name of ADRT: Robert Callister

Date: 30/11/16

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International:

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2. Yoong SL, **Finch M**, Nathan N, Leathelinais C, Dodds P, Jones J, Wiggers J, Wolfenden L. Childcare services' adoption of obesity prevention policies and practices- a longitudinal study. *International Society of Behavioural Nutrition and Physical Activity Conference*. Edinburgh, Scotland, June 2015.
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National:

1. **Finch M**, Yoong SL, Jones J, Wolfenden L, Wiggers J. Effectiveness of childcare physical activity interventions: Systematic review. 3rd *Biennial Australian Implementation Conference*. Melbourne, October 2016.
2. Wolfenden L, Jones J, Wyse R, **Finch M**, Yoong SL, Dodds P, Pond N, Falkiner M, Marshall J, Gillham K, Freund M, McElduff P, Wye P, Thomson R, Seward K, Wiggers J. Improving implementation of evidence-based obesity prevention policies and practice in childcare services: findings from a series of RCTs conducted by the Hunter New England Population Health Research Group. 4th *Annual NHMRC Symposium on Research Translation*. Sydney, October 2015.

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4. **Finch M**, Wolfenden L, Falkiner M, Pond N, Hardy L, Milat AJ, Wiggers J. Impact of a population based intervention to increase the physical activity promoting practices of childcare services: learnings for large-scale implementation in childcare. *2nd Biennial Australian Implementation Conference*. Sydney, September 2014.
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International:

1. **Finch M**, Jones J, Yoong SL, Wiggers J, Wolfenden L. A systematic review of physical activity interventions in centre based childcare: meta- analysis of outcome effects for

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2. Yoong SL, **Finch M**, Wiggers J, Guerra P, Jones J, Nathan N, Sutherland R, Wolfenden L. How effective are childcare-centre and school-based physical activity interventions when delivered under real-world conditions? *Australasian Cochrane Symposium*. Melbourne, Australia, November 2015.
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GLOSSARY OF COMMON ABBREVIATIONS

BMI	Body mass index
CATI	Computer assisted telephone interview
CI	Confidence interval
EPAO	Environment and policy assessment and observation
FMS	Fundamental movement skills
ICC	intra class correlation
MVPA	moderate-vigorous physical activity
NSW	New South Wales
PA	physical activity
RCT	randomised controlled trial
sd	standard deviation
TDF	Theoretical Domains Framework
US	United States

THESIS ABSTRACT

BACKGROUND AIMS, AND METHODS

Internationally and in Australia low levels of physical activity are associated with the most prevalent causes of mortality and morbidity. Further, adequate physical activity in early childhood is associated with a number of health benefits. Despite this, many preschool age children are not meeting physical activity guidelines. Evidence from experimental studies and descriptive research suggests that there is considerable potential to improve child physical activity levels through interventions delivered in childcare services. There is however a need for research to confirm this potential. Specifically there is a need to comprehensively examine the policies and practices in the childcare setting that are associated with child physical activity whilst in childcare, and to determine the effectiveness of pragmatic interventions in increasing child physical activity in childcare. To address these research needs, the first broad aim of the thesis was to identify effective interventions that can feasibly be delivered in the context and resources of routine childcare service delivery. This aim was addressed through the conduct of three studies:

1. A study to identify associations between childcare policies and practices and children's physical activity behaviours in the Australian context.

A cross-sectional study was conducted with 328 children aged three to five years attending childcare services in the Hunter Region of New South Wales (NSW), Australia. The physical activity of children was assessed using pedometers and centre characteristics and staff attitudes and physical activity practices were assessed using surveys, interviews and an observational audit. The associations between children's activity (step counts) in childcare and

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centre characteristics and practices were tested using a linear regression model within a Generalized Estimating Equation (GEE) framework.

2. The conduct of a systematic review and meta-analysis examining the impact of childcare based physical activity interventions according to intervention and trial design characteristics including whether the trials were pragmatic (those most likely to approximate effects in real world settings) or non-pragmatic (those conducted under more tightly controlled research conditions).

The review involved a systematic search of the Cochrane Central Register of Controlled trials (CENTRAL), MEDLINE, EMBASE, PsycINFO, ERIC, CINAHL SCOPUS and SPORTDISCUS. Studies selected included randomized controlled trials conducted in centre-based childcare including an intervention to increase objectively measured physical activity in children aged less than six years. Data were converted into standardized mean difference and analysed using a random effects mode. A total of 17 trials were included in the review with 16 included in the meta-analysis.

3. A study to determine the impact on children's physical activity levels of a pragmatic staff delivered physical activity intervention delivered in childcare.

This randomised controlled trial sought to assess the impact of a four-month intervention delivered by service staff on children's physical activity. Participants in the trial were 459 children aged three to five years recruited through 20 childcare services in the Hunter region of NSW, Australia. Child physical activity was measured using pedometers at baseline and six months after baseline. Intervention implementation was assessed via observation of staff physical activity practices and audits of the service environment and policies.

ABSTRACT

In the context of limited or no knowledge regarding the effectiveness of interventions aiming to support routine implementation of evidence-based physical activity promoting policies and practices by childcare settings (reach), the second aim of the thesis was to assess the effectiveness of a population-based intervention in increasing the implementation of physical activity promoting policies and practices by childcare.

This aim was addressed through the conduct of a quasi-experimental trial evaluating the effectiveness of an intervention in increasing the implementation of physical activity promoting policies and practices in a population of childcare services. A three-month intervention was offered to all childcare services (n=338) located within the Hunter New England region of NSW, Australia. A random sample of childcare services in the remainder of the state of NSW served as the comparison group (n=164). The primary outcomes were childcare service manager reported implementation of targeted physical activity promoting policies and assessed by a telephone survey at baseline and follow-up occurring between six and 12 months after the initiation of the intervention.

RESULTS

In regard to the first aim, findings from the cross-sectional study assessing childcare physical activity practices and service environmental and organisational characteristics showed a number of significant associations between children's activity and childcare policies and practices. The systematic review, found that childcare physical activity intervention effectiveness varied according to intervention and trial design characteristics and that there was evidence suggesting pragmatic trials may be ineffective. Further, in a pragmatic a cluster

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randomised controlled trial, the thesis found no improvement in child physical activity following receipt of a pragmatic staff delivered physical activity intervention.

In regard to the second aim, the large quasi-experimental study conducted with 392 childcare services in New South Wales (NSW), Australia found significantly greater increases in the proportion of services implementing two of eight targeted physical activity practices relative to the comparison region. Specifically the services in the experimental group were more likely to implement a physical activity policy (including the policy referring to placing limits on small screen recreation) and have staff trained in physical activity.

CONCLUSION

This thesis provides new evidence to inform the both the future effectiveness of pragmatic physical activity interventions delivered in childcare and the routine implementation of evidence-based physical activity promoting policies and practices. Firstly, the findings indicate that there is a need for additional pragmatic trials evaluating interventions that may be effective in increasing children's physical activity. Secondly, the findings suggest that additional evidence is required to improve the effectiveness of strategies aiming to improve implementation of evidence-based physical activity promoting policies and practices by childcare services.

PERSONAL CONTRIBUTION STATEMENT

I was the sole PhD student and project manager of these studies and was intricately involved in all aspects of the study conceptualisation, design, development, implementation, and evaluation. I was the contact person for childcare services and parents throughout the study and was responsible for managing all enquiries. A summary of the various contributions I made to the studies reported in this thesis is provided below:

- Acquisition of funding
- Program design and development
- Ethics approval and clinical trial registry
- Study measures
- Service and child recruitment
- Data management
- Program implementation
- Data cleaning and analysis
- Presentation of study results

CHAPTER 1

THESIS INTRODUCTION

SECTION 1: HEALTH AND ECONOMIC BURDEN OF PHYSICAL INACTIVITY IN ADULTS

INTERNATIONALLY

Low levels of physical activity are associated with the most prevalent causes of mortality and morbidity. In 2013, the Global Burden of Diseases, Injuries, and Risk Factors Study identified that 2.1 million deaths were attributed to physical inactivity, representing 4% percent of global deaths annually and representing the fourth leading behavioural risk factor for mortality.¹ Physical inactivity was also responsible for 45 million disability-adjusted life years (DALYs) per annum and was the sixth largest behavioural factor contributing to the overall global burden of disease.¹ In high income countries specifically, physical inactivity was found to contribute to 3% of the overall burden of disease and was the fourth leading contributing behavioural risk factor to the burden of disease after diet, tobacco and alcohol/drugs disease.¹ Physical inactivity in such countries was associated with a 20-30% increased risk of all-cause mortality² and accounted for 21–25% of the disease burden for breast and colon cancers, 27% for diabetes and 30% for ischaemic heart disease.² A review of international studies (published between 1986-2009) reporting the total healthcare costs attributed to physical inactivity from six high income countries (United States, Holland, United Kingdom, Australia, Canada and Switzerland) found that physical inactivity accounted for between 1% to 2.6% of total healthcare costs to these nations.³

IN AUSTRALIA

The 2013 Global Burden of Diseases, Injuries, and Risk Factors Study identified physical inactivity as the third leading cause of death (after diet and tobacco), accounting for 5.8% of all deaths in Australia.¹ Data from the 2011 Australian Burden of Disease Study estimated that 5% of the combined non-fatal and fatal disease burden in the country was attributable to physical

inactivity, the 4th highest behavioural risk factor overall.⁴ Data from the same study indicated that physical inactivity was responsible for 6.4% of the burden of disease for cancer, 21.2% for cardiovascular disease and 29.7% for endocrine disease.⁴ The direct cost of physical inactivity in Australia is considerable and in 2006 was estimated at almost \$1.5 billion.⁵

SECTION 2: HEALTH BENEFITS OF PHYSICAL ACTIVITY IN PRESCHOOL AGE CHILDREN

While physical activity reduces the risk of a number of non-communicable diseases, participation in physical activity in early childhood is associated with a number of immediate health benefits. This section provides a summary of the evidence supporting such health benefits among preschool age children (three to five years). Evidence presented in this section was synthesised from studies included in a recent (published in 2012) comprehensive systematic review examining the relationship between physical activity and health indicators (adiposity, bone and skeletal health, motor and movement skills, cardio-metabolic health and cognitive and psychological health and development)⁶ and a targeted search of subsequently published literature. Targeted searches were conducted in June 2016 in Medline, Embase, PsycINFO, and SportDiscus and the search strategy included filters for ‘physical activity’, ‘population’ (preschool age children) and ‘health outcomes’. The process is described in Figure 1.1.

Studies were included if they were (a) a trial of an intervention to increase activity (with or without components targeting other health behaviours such as diet) and included a parallel comparison group, or were (b) longitudinal studies (including prospective cohort or any study that included a follow-up period). Cross sectional studies were not included given their limited capacity for causal attribution. Publications were excluded if: they did not report a measure of

physical activity; did not address at least one of the identified six health outcomes (listed above and in Table 1.1) for children aged three to five years; included samples restricted to groups with diagnosed diseases or health problems; were not published in English; or were not peer reviewed. The search identified 40 studies for inclusion. A detailed description of each included study is included in Appendix 1.1. The following section summarises the findings for each of the six health outcomes.

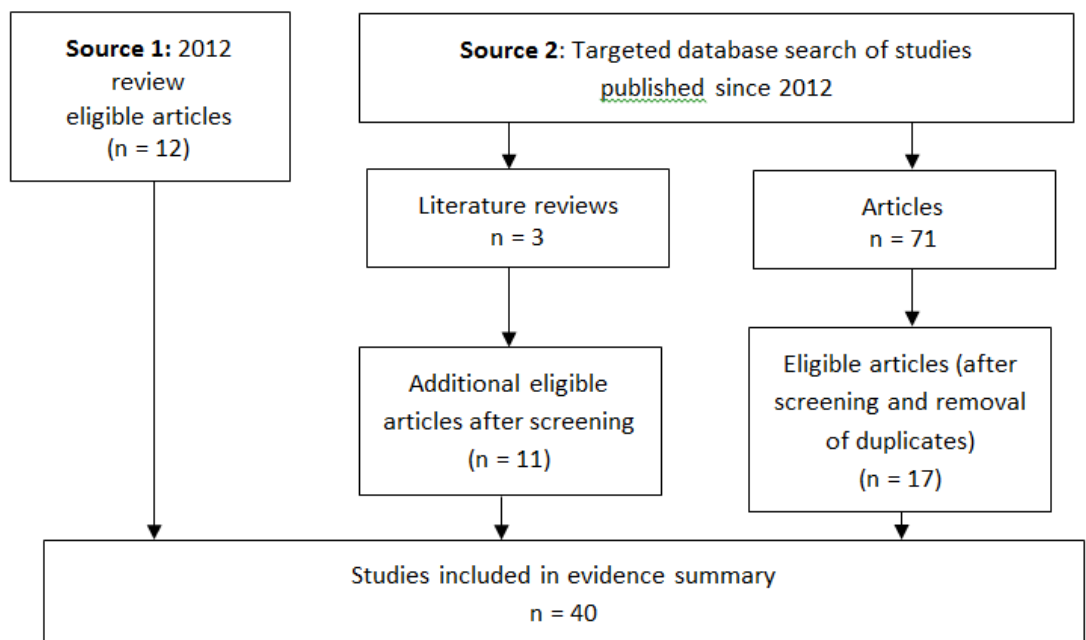


FIGURE 1: Process for study identification

Table 1.1: Summary of evidence for health benefits of participation in physical activity in preschool age

CONDITIONS / HEALTH BENEFIT	RANDOMISED CONTROLLED TRIAL		NON-RANDOMISED		LONGITUDINAL	
	# of studies	Evidence of effect	# of studies	Evidence of effect	# of studies	Evidence of association
Adiposity	12	-	1	-	6	✓
Bone and skeletal health	2	✓	0	N/A	2	✓
Motor and movement skills	7	-	1	-	1	✓
Cardiovascular health	0	N/A	0	N/A	3	✓
Cognitive development	1	✓	3	✓	1	✓
Psychosocial health and development	1	-	1	✓	1	✓

✓majority (greater than 50%) of studies report significant positive effect or association/ correlation for measures of physical activity

- majority report no significant effect, or findings for included studies are equivocal

MEASURES OF ADIPOSITY

Evidence of an inverse association between physical activity and adiposity was equivocal. Four of the 12 included Randomised Controlled Trials (RCT) of physical activity interventions reported significant increases in physical activity outcomes among children exposed to the intervention.⁷⁻¹⁰ However, in only two of these trials, significant reductions in at least one measure of adiposity occurred.^{8,9} The only non-randomised trial identified found no change in child physical activity attributable to the intervention.¹¹ Four of the five longitudinal observational studies¹²⁻¹⁵ investigating the relationship between physical activity and adiposity, reported inverse associations between physical activity and measures of adiposity.¹² These associations were consistent across a variety of measurements of adiposity including body fat, body mass index (BMI), and skinfold thickness.

BONE AND SKELETAL HEALTH

Findings from the included studies investigating bone and skeletal health suggested physical activity in preschool age children may stimulate bone diameter growth and contribute to increases in bone density. The two papers describing outcomes from a single RCT reported significant improvements in both physical activity and bone health outcomes among children exposed to the physical activity intervention relative to control.^{16,17} Similarly, the papers that described the findings of a single large longitudinal study of 333 children reported positive associations between measures of physical activity and bone mineral content over six years.^{19,19}

MOTOR AND MOVEMENT SKILLS

There is emerging evidence that participation in physical activity in preschool age is associated with improvements in motor and movement skills. Six of the seven included RCTs of physical activity interventions reported significant increases in motor skills measures among children exposed to physical activity interventions relative to children in the control groups.²⁰⁻²⁵ Two of these studies reported significant increases in both outcomes among children exposed to the physical activity intervention^{20,22} and one reported no significant improvements in either motor/movement skills or physical activity.²⁶ Findings from the one non-randomised trial were consistent with those of the RCTs in reporting significant improvements in child motor skills but not in physical activity levels after exposure to an obesity prevention intervention including a physical activity component.¹¹

CARDIOVASCULAR HEALTH

There is some association evidence that participation in physical activity in preschool age may have benefits for cardiovascular health. While no RCTs or non-controlled trials were located,

findings from three longitudinal studies all found that activity of at least moderate intensity was associated with significant and favourable changes in measures of cardiovascular health.²⁷⁻

²⁹ These associations were consistent across a variety of measurement methods for cardiovascular health including metabolic score, total cholesterol, HDL/total cholesterol ratio, and triglycerides.

COGNITIVE DEVELOPMENT

There is emerging evidence that participation in physical activity in preschool age is associated with immediate and possibly sustained positive cognitive outcomes. The only included RCT that investigated cognitive development reported, relative to control, significant increases in physical activity and cognition function (free word recall) among children allocated to the intervention at follow-up.³⁰ These findings are consistent with outcomes reported in two non-randomised studies, both reporting increases in physical activity and improvements in cognitive outcomes among children following a physical activity intervention.^{31,32}

Similarly, a longitudinal study of 245 children followed over nine months found that physical activity was associated with significant and favourable changes across several measures of cognitive development including attention and working memory.³³

PSYCHOSOCIAL HEALTH AND DEVELOPMENT

Evidence regarding the benefits for psychosocial health associated with participation in physical activity in preschool age is limited. Findings from the one included RCT reported no effect for either physical activity or psychosocial outcomes among children exposed to an activity intervention.²³ This is in contrast to findings from the one non-randomised trial reporting significant increases in both physical activity and psychosocial outcomes attributable to participation in a physical activity intervention,³⁴ and one longitudinal study reporting more

active preschoolers as being more outgoing and less socially withdrawn over a four year follow-up.³⁵

SECTION 3: PHYSICAL ACTIVITY GUIDELINES FOR PRESCHOOL CHILDREN

Recognition of the early years as a critical period in the establishment of physical activity behaviours that track into adulthood,³⁶ and evidence of associated health benefits of physical activity in childhood has led to a number of high income countries producing specific physical activity guidelines for preschool aged children.³⁷ Such guidelines provide guidance regarding the amount of time young children should spend being physically active to accrue health benefits.^{38,39} The guidelines also provide a benchmark against which to assess population physical activity levels among young children, and the effectiveness of government initiatives aimed at increasing physical activity in early childhood.^{38,39} This section describes these guidelines and summarises their recommendations for physical activity participation among preschool age children.

In the United States (US) the National Association for Sport and Physical Education (NASPE) was the first organisation to develop physical activity recommendations for children of preschool age. The guidelines recommend daily participation in a minimum of 120 minutes of physical activity accumulated in at least 60 minutes of structured physical activity and at least 60 minutes of unstructured physical activity.⁴⁰ The guidelines were initially released in 2002 and updated in 2009 and have been utilised globally by academics and researchers in the field.³⁷

In 2009, the Australian Department of Health and Ageing released guidelines on physical activity for children aged under five which were informed by a systematic review of

evidence.^{41,42} Similar to the Canadian and United Kingdom guidelines, the Australian Department of Health and Ageing recommends that children aged three to five participate in 180 minutes of physical activity over the day. The guidelines do not include a specific recommendation for time spent in any particular activity intensity.⁴²

In 2011, Canada was the first country to develop official government guidelines with the release of the Physical Activity Guidelines for the Early Years (aged 0–4 years).⁴³ The guidelines specify daily accumulation of at least 180 minutes of physical activity at any intensity spread throughout the day, and were informed by a systematic review of evidence, the findings of which were published in 2012.⁶ Most recently, the United Kingdom Government released similar guidelines recommending at least 180 minutes of daily activity spread throughout the day. The guidelines were based on a review of evidence by the Australian Health Department, conducted as part of the development of Australian National guidelines.^{41,441}

SUMMARY

A summary of international and Australian physical activity guidelines for preschool age children is provided below in Table 1.2.

Table 1.2 Summary of guidelines for physical activity in preschool age children

COUNTRY	GUIDELINE
US 2009 ⁴⁰	<p>Each day Preschoolers (3-5 years) should:</p> <ul style="list-style-type: none"> ▪ Accumulate at least 60 minutes of structured physical activity ▪ Engage in at least 60 minutes of unstructured physical activity ▪ Not be sedentary for more than 60 minutes at a time, except when sleeping ▪ Be encouraged to develop competence in fundamental motor skills that will service as the building blocks for future motor skillfulness and physical activity ▪ Have access to indoor and outdoor areas that meet or exceed recommended safety standards for performing large muscle activities
Canada 2011 ⁴³	<p>Preschoolers (aged 3-4 years) should:</p> <ul style="list-style-type: none"> ▪ Accumulate at least 180 minutes of physical activity at any intensity spread throughout the day, including: <ul style="list-style-type: none"> • A variety of activities in different environments • Activities that develop movement skills • Progression toward at least 60 minutes of energetic play by 5 years of age
United Kingdom 2012 ⁴⁴	<p>Early years (Under 5s)</p> <ul style="list-style-type: none"> ▪ Children of preschool age who are capable of walking unaided should be physically active daily for at least 180 minutes (3 hours), spread throughout the day ▪ All children under 5 should minimise the amount of time spent being sedentary (being restrained or sitting) for extended periods (except time spent sleeping)
Australia ⁴² 2009	<ul style="list-style-type: none"> ▪ Preschoolers (3-5 years) should be physical active every day for at least three hours (180 minutes) ▪ Infants, toddlers, and preschoolers should not be sedentary for more than one hour at a time during the day, except when sleeping

SECTION 4: PROPORTION OF PRESCHOOL CHILDREN MEETING PHYSICAL ACTIVITY GUIDELINES

Following the development of physical activity guidelines by governments researchers have investigated the proportion of children meeting guideline recommendations. Such research is important not only for establishing population level prevalence of adequate physical activity but also in enabling policy makers and practitioners to evaluate the effectiveness of physical activity promoting programs and interventions.⁴⁵ The findings of a review of studies conducted in the United States (US), Scotland, Finland, Australia, Chile, Estonia, Belgium, and Portugal reporting on adherence to the United States guidelines (120 minutes of structured and unstructured play per day) are presented below. The findings of studies conducted in the US, United Kingdom, Canada and Australia reporting adherence to recommendations for 180 minutes of activity are also presented.

ADHERENCE WITH US GUIDELINES

The proportion of preschool age children meeting US NAPSE recommendation of engaging in at least 60 minutes of unstructured physical activity and 60 minutes of structured physical activity has been reported in a systematic review and a further two studies.

Authors of the review describing adherence to the NAPSE guidelines interpreted them as recommending 60 minutes of physical activity and up to several hours of unstructured active play per day. The review reported on the proportion of children aged two to six years engaging in at least 60 minutes of moderate to vigorous physical activity (MVPA).⁴⁶ The review included studies assessing physical activity variously measured via proxy-report (parent, teacher) accelerometer, pedometer, heart rate monitor, direct observation, and the doubly labelled water technique among children aged two to six. Studies were not included where: they were not published in English; utilised qualitative methodologies; results were not representative of

preschoolers (included older children); the sample was comprised of preschoolers with a specific ailment; physical activity measurement was conducted after an intervention only; or there was no reporting of physical activity level. Results identified 39 relevant studies published between 1986–2007 representing a total of 10,316 participants from seven countries (US, Scotland, Finland, Australia, Chile, Estonia, Belgium).⁴⁶ Of these studies, 21 (54%) reported that children were at least moderately physically active for a minimum of 60 minutes per day.⁴⁶ No differences in physical activity level based on measurement methods were observed.

In two additional studies adherence with the recommendation of 120 minutes of physical activity per day was operationalised as participation in at least 120 minutes of total daily activity at any intensity above sedentary (light, moderate and vigorous combined), assessed using accelerometry and applying two sets of cut points including those proposed by Sirard, and Pate (ref Bornstein, Beets et al. 2011) The first study conducted in Portugal among a randomly selected sample of children aged 3.5–6.0 years recruited from kindergartens located in the metropolitan area of Porto, reported that 74% and 59% of 245 children, participated in at least 120 minutes of daily activity on weekdays and weekends respectively.⁴⁷ The second study, using the same definition and measure of activity, was conducted in Belgium and found that among 76 four to five year-old children, recruited from a random sample of five preschools, 26% met the guideline.⁴⁸ Currently there is no universally agreed set of cut points to determine physical activity intensities for the preschool population (Bornstein, Beets et al. 2011). Beets and colleagues have reported on the prevalence of compliance with 120 minutes of total activity using four different accelerometer cut points commonly applied in preschool age. Findings from their sample of 397 three- to five-year-old children from Columbia, South Carolina, demonstrated prevalence estimates ranging from 45.7 percent to 99.9 percent

(Beets MW, Bornstein D et al. 2011). Specifically, when using the same cut points (Pate et al) as the study conducted in Portugal, described above, 99.5 percent of both boys and girls in the South Carolina sample were determined to have been meeting the guideline. When using the cut points applied (sirard cut points), in the Belgium study, also described above, children in the South Carolina sample demonstrated prevalence estimates of 13.5 percent for girls and 17.5 percent for boys (Beets MW, Bornstein D et al. 2011).

ADHERENCE WITH 180 MINUTES OF PHYSICAL ACTIVITY

The proportion of preschool age children meeting the guideline for participation in at least 180 minutes of physical activity (as recommended by the United Kingdom, Canadian and Australian guidelines) has been reported in four international studies, one using parent report and four using accelerometry.

A study conducted in the US reported on the proportion of children meeting 180 minutes of physical activity among a sample of 164 parents of two to five year old children recruited through social networking sites and family- and centre-based childcare facilities in Oregon. The findings indicated that 50% of children met the guideline during the week and 65% during the weekend based on number of parent reported hours children spent participating in active play (such as climbing, jumping, running, and skipping) using the Physical Activity and Exercise Questionnaire for Children (PAEC-Q).⁴⁹

Three studies have reported on the proportion of children meeting 180 minutes of physical activity operationalised as participation in at least 180 minutes of total activity at any intensity above sedentary (light, moderate and vigorous combined), assessed using accelerometry. The first study conducted among a nationally representative sample of 459 three to four year olds recruited from private households in Canada reported that 84% of children were meeting the

guideline.⁴⁵ In Portugal a sample of 607 children aged four to six years recruited from kindergartens located in a metropolitan area of Porto reported that 96.2% of girls and 99.4% of boys met the three hour activity recommendation using the same cut points as the study described earlier from Portugal.⁵⁰ Finally in the United Kingdom, a population-based study was conducted among a sample of 593 four year olds, recruited as part of a birth cohort from General Practices in Southampton. The study reported that all children met the guideline of 180 minutes of activity per day.⁵¹ The cut points used for this study, broadly aligned with preschool-specific cut points used previously (Sirard, Pate), but were lower than those applied in the studies conducted in Portugal and Belgium (Vale 2010, 2013, Cardon 2008), and so were more likely to report higher levels of activity. Unlike the previous studies (Vale 2010⁴⁷, 2013⁴⁸, Cardon 2008⁵⁰) the accelerometers were worn continuously (24 hours each day), and likely to have captured more of children's daily activity.

Based on the findings described above, levels of adherence to physical activity guidelines were found to vary across guidelines, countries and measurement approach, with objective measurement reporting higher proportions.^{37,52} Further, while objective monitoring (e.g. accelerometry) is considered to be the gold standard when measuring physical activity, further variability was also evident based on the selection of different cut-off points to quantify intensities of physical activity.⁵³

IN AUSTRALIA

Four studies have reported on Australian children's adherence to the recommendation of 180 minutes of physical activity daily. Two studies assessed physical activity using parent report and two used accelerometry.

Parent report data from a cross-sectional sample of children aged between two and four years

collected as part of the nationally representative Australian Health Survey showed that in 2011/12, 72% of two to four year-old children met the guideline for participation in at least 180 minutes every day.⁵⁴ These results were broadly consistent with findings from a second study of 266 parents sampled from 20 childcare services in Wollongong, New South Wales, and 15 in Brisbane, Queensland. The study reported that 56% of children met the guideline each day on weekdays and 79% met the guideline on weekends.⁵⁵

These findings of these two studies however, are higher than the prevalence estimates reported in two Australian studies reporting compliance using accelerometers, both using the same cut points (sirard) operationalised as participation in at least 180 minutes of total daily activity at any intensity above sedentary (light, moderate and vigorous combined),. Hinkley and colleagues (2011), from a sample of 704 preschool age children, recruited from preschools and childcare services in low, medium and high socio-economic areas of metropolitan Melbourne, Victoria, reported that 5% of children achieved the recommendation.⁵⁶ Dwyer and colleagues (2011) reported that 32% of preschool children met the guideline in a subsample of 76 children recruited from metropolitan Melbourne and Sydney, and, regional Victoria and NSW.⁵⁷

SUMMARY

Based on the findings described above levels of adherence to physical activity guidelines vary across guidelines and countries. While objective monitoring (e.g accelerometry) is considered to be the gold standard when measuring physical activity, variability is likely evident due to the selection of different cut-off points to quantify intensities of physical activity.⁵³

In contrast to the findings of studies in other countries, studies conducted in Australia utilising

both parent report and objective measures of physical activity where the two studies having broadly consistent methods (accelerometer, wear time and applied cut points) suggest that many preschool age children are not meeting national guidelines. Such results indicate that preschool children are not sufficiently active to accrue the health benefits of physical activity, suggesting there is a need for interventions aiming to increase physical activity to recommended levels.

SECTION 5: CHILDCARE AS AN OPPORTUNE SETTING TO INCREASE PHYSICAL ACTIVITY LEVELS OF PRESCHOOL AGE CHILDREN

For a number of reasons childcare services represent a promising setting for the delivery of interventions to increase the physical activity levels of preschool age children. Firstly, in developed countries, a large proportion of the preschool age population spend time in such services, often for prolonged periods. For example, in two thirds of all Organisation for Economic Cooperation and Development (OECD), countries 70% of children aged three to five years were enrolled in formal childcare or preschool programs (childcare) in 2014.⁵⁸ In the US, 2011 census data show that 32.9% of all children under five years attend childcare, with this increasing to 51% among the three to four year age group.⁵⁹ Children in the US also spend more time accessing childcare compared to other non-centre-based care arrangements with children of non-working mothers spending an average of 25 hours per week and children of working mothers spending 33 hours.⁵⁹ In Canada, in 2014, 335 children aged four and under attended childcare with 60% attending at least 30 hours a week⁶⁰ whilst in the United Kingdom in 2015, 34% of children under five were reported to access such care.⁶¹ In Australia, childcare services offer extended care for up to 12 hours per day⁶² and in 2014 were attended by 84% of children aged between five to six⁶³ Given such a high prevalence of use, interventions that are

able to be successfully implemented in this setting, even if only moderately effective, have the potential to positively impact on the physical activity, and hence health of large numbers of children.

Secondly, childcare services provide an organisational environment amenable to the implementation of policies and practices to increase physical activity.^{64,65} For example, childcare services have existing infrastructure which have been suggested to facilitate child physical activity.^{65,66} Importantly, childcare educators view enhancing children's physical activity as part of their role.⁶⁷⁻⁶⁹ Furthermore in the US⁷⁰ and Australia⁷¹ childcare regulations and accreditation requirements (Australian Children's Education and Care Quality Authority 2012) incorporate standards relevant to the promotion of physical activity. For example, US State Child Care Licensing regulations refer to requirements for children to participate in gross motor and daily outdoor activity time, and participation in vigorous play activity, and quantify the time children should spend in physical activity during their time in care.⁷⁰ In Australia, accreditation requirements require childcare services to implement programs that promote the health, safety and physical development of children in their care, and the national childcare regulatory authority requires childcare services to embed physical activity within the service program for children.⁷¹

Thirdly, in recognition of the role that childcare can play in the promotion of physical activity, governments and private organisations in both the US and Australia have developed specific recommendations regarding the policies and practices such services should implement to increase physical activity levels among children attending care. For instance, researchers from the University of North Carolina first published physical activity guidelines for childcare services in 2009. These guidelines were developed based on research evidence and the expert opinion of a national panel of physical activity researchers and a group of North Carolina public

health and childcare professionals.⁷² More recently, the Institute of Medicine, the National Resource Centre for Health and Safety in Child Care and Early Education, the American Academy of Pediatrics, and the American Public Health Association published national US standards for physical activity promoting practices in childcare.⁷³ In Australia, recommended practices for promoting physical activity in childcare were released by the Australian government in 2010 as part of healthy eating and physical activity guidelines for the setting, which were subsequently updated in 2013.⁷⁴

Fourthly, as is the case for physical activity generally, evidence suggests that physical activity levels among preschoolers whilst attending childcare internationally and in Australia is low.^{75,76} A systematic review published in 2010 described findings from 13 studies conducted in the United Kingdom, US, Belgium and Sweden reported on preschool children's physical activity levels while attending childcare.⁷⁶ The review concluded that children's activity levels in care were consistently low with all studies measuring physical activity using accelerometry and three of the four studies employing direct observation methods reporting that children participated in less than 60 minutes MVPA a day.⁷⁶ Findings from a recent study of 426 children attending 42 preschools in Denmark were consistent with these results.⁷⁵ The study measured mean time spent in MVPA in care and reported that overall boys spent 15% of time in MVPA and girls spent 12.2%, representing around one hour of the total average accelerometer wear time.⁷⁵ Similarly, the results of a study conducted with 89 preschool age children attending ten childcare centers in Brisbane Australia, reported that children spent on average 6% of their time in MVPA representing 24 minutes of their childcare day.⁷⁷ Such findings suggest that there is scope to improve children's physical activity levels during care and suggests that current childcare policies and practices may not be adequately supporting children's physical activity participation.

SECTION 6: IMPROVING THE IMPACT OF PHYSICAL ACTIVITY INTERVENTIONS DELIVERED IN CHILDCARE

The population impact of childcare-based physical activity interventions is suggested to be a function of their effectiveness in modifying the physical activity behaviours of children, and the number of childcare services that implement effective interventions (reach).^{78,79} To determine the extent to which a population impact can be achieved, the following sections provide a summary of research evidence regarding the effectiveness of such intervention in modifying children's physical activity, and the extent of current implementation of childcare physical activity interventions. Based on this summary, existing gaps in evidence are identified.

EFFECTIVENESS OF CHILDCARE INTERVENTIONS IN INCREASING CHILDREN'S PHYSICAL ACTIVITY: EVIDENCE FROM SYSTEMATIC REVIEWS

The findings of systematic review evidence regarding the effectiveness of childcare based interventions in improving child physical activity are equivocal.⁸⁰⁻⁸² Four systematic reviews have narratively described the effectiveness of such interventions. The first review, included a variety of research designs (randomised control, quasi experimental, single group).⁸⁰ Eight studies reporting child physical activity outcomes were included, of which six RCTs and two utilised a single group before and after design. The eight studies were conducted in the US (n=6), Israel (n=1) and Scotland (n=1). Four (50%) of these studies reported significant positive findings, of which two were RCTs and two before/ after studies.⁸⁰ The review concluded that the findings provided encouragement that regularly provided structured physical activity programs could increase the amount and intensity of children's physical activity. It also concluded that childcare settings provide multiple opportunities for intervention beyond such structured activity programs, and that additional studies were needed to explore such opportunities.⁸⁰

The second review described the effectiveness of interventions with a physical activity component delivered in childcare settings.⁸¹ The review included RCTs, quasi-experimental, before/after, pilot and feasibility studies. A total of 23 studies were included, of which 15 were RCTs, one a quasi-experimental study, one case control and six either single group or before/after studies. Seventeen of the studies were conducted in the US, four in Europe (two in Belgium, one in Switzerland, one in Scotland), one in Australia and one in Israel. Significant positive changes in children's physical activity levels were reported in fourteen (61%) studies, of which seven were RCTs, one case control and six before/after studies.⁸¹ The review concluded that physical activity-specific in-service teacher training may be a potentially effective intervention strategy and that more intensive multilevel and multicomponent interventions were required.⁸¹

The third systematic review examined the effectiveness of preschool based interventions to promote physical activity. The review involved studies conducted between 2002 and 2014 of any research design in which preschool age children (aged three to five years) were included. Studies that included older age ranges, or were conducted in school early childhood educational settings were included if they also involved preschool age children. Studies conducted in the community, solely with families or in clinics were excluded. The review included a total of nine studies conducted in preschool or childcare settings that reported outcomes of child physical activity, of which six were RCTs and three before/after studies. Five of the studies were conducted in the US, two in Belgium, one in the United Kingdom, and one in Australia. Significant positive effects were reported in three (33%) such studies, one of which was a RCT and two were pre/post studies.⁸² The review concluded that interventions involving manipulation of the playground markings, or equipment, and goal setting and reinforcement may be effective. The review concluded that more research was needed to

establish the ability of interventions to promote physical activity in preschool children.⁸²

The fourth review examined the relationship between childcare educators' practices and preschoolers' physical activity whilst attending childcare through a narrative synthesis of both correlational and intervention studies.⁸³ The review included studies assessing the effectiveness of childcare educators' practices on preschoolers' healthy eating and physical activity behaviours, however excluded interventions for which the study results could not be explained solely by the educators' practices (for example those which involved parents, modifications to the built environment).⁸³ Six interventions were included in the review, including all of which assessed children's physical activity using objective measures (accelerometers and direct observation). Four of these six studies assessed the effects of the same intervention in different samples and five of the six studies reported a positive effect on children's MVPA. Of the included studies, three were cluster RCTs, and three were quasi-experimental studies.⁸³

IDENTIFYING MODIFIABLE POLICIES AND PRACTICES OF CHILDCARE SERVICES THAT MAY IMPACT ON CHILD PHYSICAL ACTIVITY

Given the equivocal findings of systematic reviews, trials seeking to increase children's physical activity analysis of both controlled trials, experimental and epidemiological studies was undertaken to identify opportunities for interventions to improve child physical activity in the childcare setting. Table 1.3 provides a summary of identified epidemiological (cross sectional and associations studies) and experimental (controlled trials) studies that examined specific modifiable physical activity policies and practices of childcare services and the impact of such policies and practices on children's physical activity. The studies were identified from two recent systematic reviews.

The first review examined the relationship between childcare educators' practices and

preschoolers' physical activity whilst attending childcare⁸³ and included quantitative study designs, but excluded interventions for which the study results could not be explained solely by the educators' practices (for example, those which involved parents or modifications to the built environment). The review included ten studies of which six assessed the effectiveness of interventions, and four assessed correlations between educators' behaviours and children's physical activity. All studies assessed children's physical activity using objective measures (accelerometers and direct observation).

The second systematic review specifically examined cross sectional studies reporting correlates of physical activity and among children attending childcare and included quantitative studies that used an objective measure (such as accelerometers or direct observation).⁸⁴ The review included 27 studies. Intervention studies were excluded.

The findings of the experimental studies included in the Ward et al. review⁸³ suggested that educator-led or structured interventions that required staff to: provide lessons on motor skills; actively participate in children's physical activities; and use various methods of encouraging children to be active, such as positive comments, prompts and/ or feedback had a positive effect on child MVPA.^{83,84} Experimental evidence regarding the effectiveness of providing active opportunities through recess, providing indoor space for physical activity, and policies or staff physical activity training or qualifications was found to be lacking with no identified studies targeting these policies or practices.

TABLE 1.3: Summary of evidence for childcare policies and practices that promote child physical activity in care by study type based on studies included in two recent systematic reviews

CHILDCARE POLICY / PRACTICE	EXPERIMENTAL STUDIES		CROSS-SECTIONAL / CORRELATIONAL	
	# of studies	Evidence of effect	# of studies	Evidence of Association
Provision of active opportunities (recess, indoor space for physical activity)	0	N/A	5	✓
Physical activity policy	0	N/A	2	-
Structured educator led formal physical activity lessons or sessions	5	✓	0	N/A
Staff involvement or joining in children's active play	1	✓	0	N/A
Staff encouragement of child physical activity (positive comments, prompts and/or feedback)	4	✓	7	-
Availability and quality of portable play equipment	1	✓	13	-
Educator qualifications and training in physical activity	N/A	N/A	8	-

✓ majority (greater than 50%) of studies report significant positive effect or association/ correlation for measures of physical activity

- majority report no significant effect association or, or findings for included studies are equivocal

Further, despite showing positive effects, experimental evidence for staff involvement or joining in children's active play, and provision of portable play equipment was similarly found to be limited with only one study identified to have targeted each of these practices. The findings of the identified cross-sectional or correlational studies suggested that provision of opportunities for physical activity (recess, indoor space for physical activity) was positively associated with increased physical activity among children whilst attending care. Evidence of association between all other childcare policies and practices and child physical activity was inconclusive.

THE EFFECTIVENESS OF PRAGMATIC APPROACHES TO IMPROVE CHILD PHYSICAL ACTIVITY IN CHILDCARE

As described above, regular structured programs requiring staff to instruct physical activity or motor skills lessons, training of childcare staff, and the use of various methods of staff encouraging children to be active, have been identified as promising approaches in controlled efficacy study conditions to improve child physical activity in childcare. It is unclear however whether such interventions are capable of achieving improvements in child physical activity when implemented under real world childcare service delivery conditions. One explanation for the equivocal findings of past systematic reviews has been that such reviews comprise a mix of both efficacy or explanatory studies conducted in highly controlled 'ideal' circumstances, and effectiveness or pragmatic studies delivered under more 'real world' conditions.⁸⁵ Evidence from reviews of community based obesity and lifestyle interventions suggest that intervention outcomes may differ according to such design characteristics.^{86,87} For example, a subgroup analysis of the effect on BMI of child obesity prevention interventions conducted in community settings such as school and childcare services, in a recent Cochrane review, reported that the effect sizes of pragmatic interventions were half those of explanatory interventions.⁸⁷

The effects of pragmatic interventions are of most interest to policy makers and practitioners as they represent interventions that are more suitable to implement (to maximise reach) and whose effects are more likely to approximate what would occur under real world conditions.⁸⁸ Despite this, examining factors that enhance the effectiveness of childcare services interventions to improve physical activity of young children has not been previously investigated.⁸⁹

SUMMARY AND THESIS AIMS

Evidence from experimental studies and descriptive research suggests that there is considerable potential to improve child physical activity levels through interventions delivered in childcare services. There is however a need for research to confirm this potential.⁹⁰ The review of the literature described in the preceding sections has demonstrated a need to comprehensively examine the policies and practices in the childcare setting that are associated with child physical activity whilst in childcare, and to determine the effectiveness of pragmatic interventions in increasing child physical activity in childcare. To address these research needs, the first broad aim of the thesis is to: Identify effective interventions that can feasibly be delivered in the context and resources of routine childcare service delivery.

This aim will be addressed through the conduct of three studies:

1. A study to identify associations between childcare policies and practices and children's physical activity behaviours in the Australian context. This research question will be addressed through a cross-sectional study encompassing measures of physical activity for children aged three to five, childcare staff practices and service environmental and organisational characteristics.
2. The conduct of a systematic review and meta-analysis describing the effectiveness of physical activity interventions. The review will examine the impact of childcare based physical activity interventions according to intervention and trial design characteristics including whether the trials were pragmatic (those most likely to approximate effects in real world settings) or non-pragmatic (those conducted under more tightly controlled research conditions).
3. A study to determine the impact on children's physical activity levels of a pragmatic staff delivered physical activity intervention delivered in childcare. This research question will be addressed through the conduct of a cluster RCT.

SECTION 7: IMPROVING THE REACH OF EVIDENCE BASED PHYSICAL ACTIVITY PROMOTING POLICIES AND PRACTICES IN CHILDCARE

As described above, to maximise public health impact, not only are childcare based interventions required that are effective in increasing children's physical activity, but also evidence of strategies that are effective in supporting such interventions to be implemented with sufficient reach and fidelity to achieve health improvements at the population level.^{79,91}

A number of factors have been identified that may impede the implementation of evidence based interventions by service providers. For example, theoretical frameworks of professional practice change suggest that interventions that are: overly complex; time consuming or intensive to deliver; reliant on staff skills not common in the setting; require ongoing resources beyond those available; and not consistent with organisational priorities, values or culture are less likely to be widely implemented.⁹²⁻⁹⁵ Similarly, in relation to the childcare setting specifically, findings from empirical studies report that: lack of time and facilities; safety and other workplace policies are barriers to the promotion of children's physical activity by childcare staff.^{96,97} Strategies are therefore required to overcome such practice impediments if the implementation of effective physical activity promoting practices by a large number of childcare services is to be achieved.⁹⁸

THE EFFECTIVENESS OF STRATEGIES TO IMPROVE IMPLEMENTATION OF EVIDENCE BASED INTERVENTIONS

Limited evidence exists regarding the effectiveness of strategies to improve the implementation of interventions to improve physical activity, both in non-clinical settings generally,^{99,100} and in childcare services specifically.⁹⁸ To the authors knowledge only two systematic reviews have described the effectiveness of strategies to improve the implementation of interventions in non-clinical settings.^{101,102} The first review examined the

effectiveness of strategies to improve the implementation of policies, practices or programs to promote children's healthy eating, physical activity and/or obesity prevention in childcare.¹⁰¹

This Cochrane review included ten studies, four of which evaluated interventions to increase implementation of both healthy eating and physical activity practices, four evaluated interventions targeting the implementation of nutrition practices only and two evaluated studies targeting the implementation of physical activity practices, both of which are included in this thesis (Chapters 4 and 5). The review reported that none of the interventions improved the implementation of all policies and practices targeted by the implementation strategies relative to a comparison group and concluded that current research provides weak and inconsistent evidence of the effectiveness of such strategies in improving the implementation of targeted policies and practices in the childcare setting.¹⁰¹ The second review aimed to identify such evidence for community based interventions designed to reduce behavioural risk factors for cancer.¹⁰² Of the 25 included studies, only one was childcare based. This single study evaluated the effectiveness of an enhanced web-site for the dissemination of theory-based educational information to support sun-protection practices among childcare directors and the study failed to produce an effect.¹⁰² The review concluded that insufficient evidence was available to inform successful population-wide implementation of cancer prevention interventions in community settings.

In the absence of sufficient evidence from the childcare setting, evidence from clinical settings suggests a range of possible strategies that are effective in improving the professional practice of clinicians that may have relevance for increasing such practices in childcare. For example, Forsetlund and colleagues conducted a review of RCTs investigating the effectiveness of educational meetings (including courses, conferences, lectures, workshops, seminars) in improving various forms of professional practice.¹⁰⁴ Eighty-one trials were included in the

review, which concluded that educational meetings alone or combined with other interventions improved professional practice.¹⁰⁴ Ivers and colleagues similarly conducted a review of randomised trials investigating the effectiveness of audit and feedback strategies in changing the professional practice of clinicians.¹⁰⁵ Based on the findings of 140 included trials, the review concluded that audit and feedback leads to small but potentially important improvements in practice outcomes.¹⁰⁵ Finally, Giguère and colleagues reported in a systematic review of the effectiveness of printed educational materials on clinical practice that such materials had a small beneficial effect on professional practice outcomes.¹⁰⁶ Further evidence is therefore required regarding the effectiveness of such strategies in changing the professional practices of staff in community settings generally,¹⁰¹ and in child care settings specifically.¹⁰²

In the context of limited or no knowledge regarding the effectiveness of interventions aiming to support routine implementation of evidence-based physical activity promoting policies and practices by childcare settings, the second aim of the thesis was to:

4. Conduct a study to test the effectiveness of a population based intervention in increasing the implementation of physical activity promoting policies and practices by childcare. This aim was addressed through the conduct of a quasi-experimental trial evaluating the impact of a physical activity intervention disseminated to all childcare services across the Hunter New England Region of New South Wales.

STRUCTURE OF THESIS

The thesis was conducted in the context of a part-time candidature spanning eight years and represents a body of work related to the promotion of physical activity among preschool age children attending centre-based childcare addressed by four distinct and novel research

questions falling under two broad aims. The thesis comprises six chapters, four of which have been written in the style of a journal article in accordance with the University of Newcastle rules regarding ‘submission by publication’ (Appendix I1) including five published papers. Each of the included studies were conducted independently and address a specific and novel research question in their own right. As such the sequence in which they are presented in the thesis aligns to the broad aims not to the chronology of the study conduct or publication. The final chapter (chapter 6) provides a discussion integrating the findings of the studies in relation to the broad aims. Figure 2 provides a summary of the chronology and relationship between the five published papers

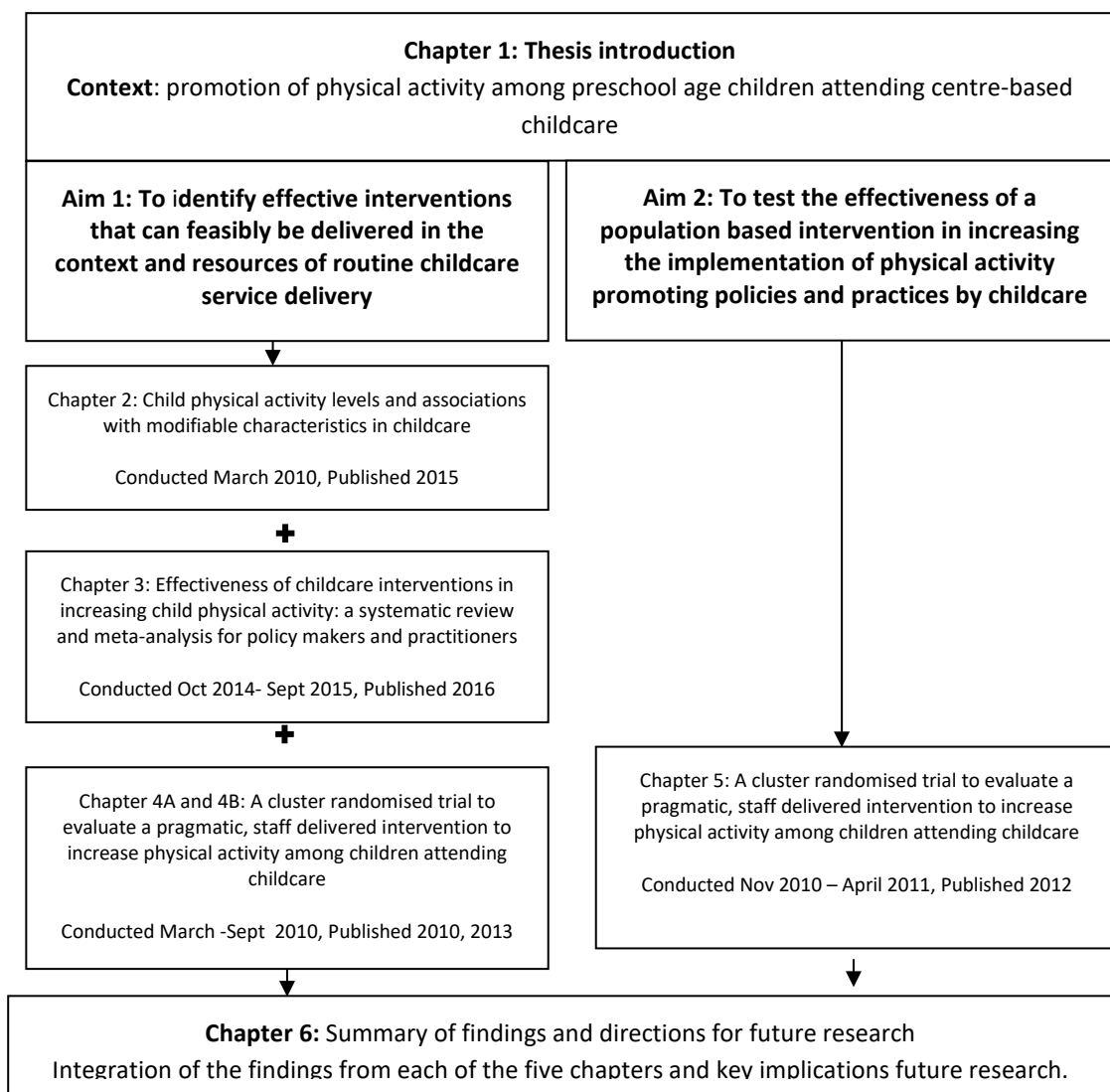


FIGURE 1.2: Chronology of publication and relationship between papers.

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CHAPTER 2

CHILD PHYSICAL ACTIVITY LEVELS AND ASSOCIATIONS WITH MODIFIABLE CHARACTERISTICS IN CHILDCARE

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ABSTRACT

Objective. To describe children's physical activity levels during childcare and associations with modifiable characteristics.

Methods. A cross-sectional study of 328 preschool children (43% girls; age 3-5 years) and 145 staff from 20 childcare services in the Hunter Region of New South Wales (NSW), Australia. Pedometers assessed child physical activity levels. Service characteristics and staff attitudes and behaviours towards children's physical activity were assessed using surveys, interviews and observational audit. Results were analysed using descriptive statistics and linear regression.

Results. Over the measurement period, average step count of children was 15.8 (SD= 6.8) steps/minute. Four-year olds had the highest step counts (16.4, SD= 7.1, $p=0.03$) with no differences by sex. Step counts were significantly higher in services that had a written physical activity policy (+3.8 steps/minute, $p=0.03$) and where staff led structured physical activity (+3.7 steps/minute, $p<0.001$) and joined in active play (+2.9 steps/minute, $p=0.06$).

Conclusions. Written physical activity policy, structured staff-led physical activity and staff joining in active play were associated with higher levels of physical activity.

Implications. Future childcare physical activity interventions should consider including strategies to encourage written physical activity policies and support structured staff led physical activities.

INTRODUCTION

Health benefits of physical activity for children include improved blood lipids and blood pressure, greater bone mineral density, less depression, and lower risk of overweight and obesity.¹ Preschool aged children (three to five years) require opportunities to participate in physical activity to establish healthy behaviours at an early age and avoid the health consequences of inactivity that are known to track into adulthood.^{2, 3} There is growing evidence that preschool age children are not sufficiently physically active.^{4, 5} As described in Chapter 1, studies conducted in Australia utilizing both parent report and objective measures of physical activity consistently suggest that many preschool age children are not meeting national guidelines that recommend preschool aged children participate in 180 minutes of physical activity daily.⁶⁻⁹

Childcare is a key setting in which to promote child physical activity¹⁰⁻¹³, as it is accessed by large numbers of preschool age children.¹⁴ However, as outlined in Chapter 1, in order to maximise the potential health impact of interventions conducted in this setting there is need to identify modifiable policies and practices that are associated with increased child physical activity.¹⁵ In Australia little is known about specific characteristics that may contribute to increasing children's physical activity across the childcare day. Further, to our knowledge, objective measures of physical activity (such as step counts) have not previously been used to describe and determine environmental associations with physical activity levels of children in childcare in an Australian context¹⁶. The aims of this study therefore were to describe children's levels of physical activity in childcare as assessed by step counts and to describe associations between physical activity levels and modifiable characteristics of the childcare environment.

METHODS

Ethical approval for this study was obtained from the Hunter New England Area Human Research Ethics Committee (approval No.06/07/26/4.04) and University of Newcastle Human Research Ethics Committee (approval No.20100038) (Appendix 2.1).

DESIGN AND SETTING

The study involved an examination of baseline data collected as part of a randomised controlled trial, for which a detailed protocol has been described elsewhere.¹⁷ The study was set in three local government areas of the Hunter Region of NSW, Australia. These areas encompass non-metropolitan ‘major cities’ and ‘inner regional’ areas as described by the Australian Standard Geographic Classification system and have lower socio-economic status than the New South Wales state average.¹⁸ There are approximately 14,061 children aged three to five years in this region.¹⁴

Long daycare centres (referred to as childcare services) in NSW provide care for eight or more hours per day for five days per week and enrol children from six weeks old to six years.¹⁴ There were a total of 85 services in the study region. We invited randomly selected services to participate in the study until 20 services, with at least 25 enrolled children aged three to five years, agreed to (Appendix 2.2). Children were eligible to participate in the study if they were enrolled to attend the service on the day of the week nominated by the Authorised Supervisor (managers) for data collection. Written consent was obtained at services from parents of all eligible children who participated (Parent information letter and consent form Appendix 2.3).

DATA COLLECTION PROCEDURES AND MEASURES

Physical activity was assessed using pedometers (model Yamax SW200 and SW7000)¹⁹⁻²¹, worn over a six-hour measurement period from 9 am to 3 pm (the period over which most children were in attendance) in March 2010. Pedometers have been demonstrated to be a valid and reliable method of measuring physical activity levels in preschool aged children.^{15,21,22} The measurement period was one day to minimise respondent burden and based on evidence that one day of monitoring yields a valid representation of steps per day.²³ Data collection was rescheduled in three instances where weather conditions disrupted usual service routines and prevented children from using outdoor space. The procedures for fitting participants with pedometers followed protocols utilised in previous studies of young children^{20,24} (See study training manual Appendix 2.4).

Parents reported demographic and physical activity measures on the participant consent forms including child age, Aboriginal and/or Torres Strait Islander status, sex, postcode of residence and parental education. Parents were also reported the usual number of days their child spends at childcare each week and the usual amount of time their child spends being physically active (≤ 30 minutes, 31-60 minutes, 61-120 minutes, 121-180 minutes, >three hours) and participating in small screen recreation during weekdays outside of care hours (≤ 30 minutes, 31-60 minutes, 61-120 minutes, 121-180 minutes, >three hours) (Appendix 2.3). All demographic and physical activity measures were based on those used in other population-based surveys of preschool age Australian children.¹⁸

On the day of pedometer testing, information on service characteristics was collected via an Environment and Policy Assessment Observation (EPAO) instrument (Appendix 2.5).²⁵ The EPAO has reported high inter-observer agreement (87.3%)²⁵ and included: (1) observation of

children's physical activity and interaction with staff, (2) an audit of service documents, and (3) an Authorised Supervisor interview. All other service staff self-completed a staff questionnaire. The EPAO and Authorised Supervisor interview included data on the number of children enrolled to attend on the day of collection; number of staff; presence of a written policy on physical activity (yes/no); outdoor play area (m²); number of types of fixed (from a list of 11 different types) outdoor equipment; portable (from a list of 17 different types) indoor or outdoor play equipment; television observed (yes/no); computer/video game system available for use by children (yes/no); time available for playing computer/video games, time for seated activities (minutes), outdoor play or staff led structured physical activity (minutes); long daycare provision of physical activity training for staff (yes/no); observation of staff leading structured physical activity for children (yes/no); number of times staff prompted children to be active (divided into two groups at the median) or joined in active play (divided into two groups at the median).

The staff questionnaire collected data on educational attainment (University or Australian Technical and Further Education (TAFE) qualifications or no formal training), whether or not staff were confident in encouraging children to meet physical activity guidelines or saw a role for themselves in ensuring children meet physical activity recommendations while in care (strongly disagree/disagree/agree/strongly agree), and frequency of joining in with children in free active play or prompting children to increase physical activity (rarely/some of the time/most of the time/all of the time)(Appendix 2.6).

ANALYSIS

Step counts per minute were used for all association analyses to control for different wear times over the observation period.²⁶ Participants with step counts less than five steps/minute

were excluded from the analysis as step counts this low were deemed not feasible.²⁷ Descriptive statistics were used to describe daily step counts and service characteristics. Bivariate associations (one way ANOVA) between steps/minute and child characteristics, characteristics of the childcare environment and staff training, attitudes and behaviours were tested using ANOVA. Independent associations of significant ($p < 0.05$) correlates of step counts were tested by fitting a linear regression model within a GEE framework to adjust for the clustering of children within childcare services. The number of types of fixed and portable equipment were divided into two groups at the median to make a clear distinction between services with low and high equipment availability. All statistical analyses were performed using SAS software Version 9.2 (SAS Institute Inc., Cary, NC, USA).

RESULTS

Twenty childcare services agreed to participate in the study representing a 54% response rate from 37 invited eligible services. A total of 328 children participated in the study out of 537 eligible participants from the 20 services, representing a response rate of 61%. Most children were four years old (58%, $n=191$), and 57% were boys ($n=186$). Almost 4% ($n=12$) were Aboriginal or Torres Strait Islander. Three-quarters of the parents surveyed had either a TAFE (24%) or University (51%) education and 73% lived in locations that fell within the upper half of the state of NSW with respect to socio-economic status. Based on parent-proxy report, most children obtained less than two hours (75%) of physical activity outside of care. Twenty-seven percent of children watched more than one hour of television or used other forms of electronic media outside of care. An additional 42% spent between 31 and 60 minutes in these sedentary activities.

The observational period was six hours in most services in line with the period of maximum child attendance. Average step count was 5,466 (SD 2,383) and the average number of steps/minute was 15.8 (SD 6.8). Mean step counts and step/minute by age were: 5298 (SD 2248), and, 15.4 (SD 6.4) for three year olds; 5670 (SD 2509) and 16.4 (SD 7.1) for four year olds; and 4862 (SD 2901) and 14.3 (SD 8.5) for five year olds. Four year olds took significantly more steps/minute than three year olds ($p=0.03$) and this difference was also reflected in total step counts ($p=0.04$). There were no significant differences in total step count or steps/minute by gender with males at 5684 (SD 2610) and 16.5 (SD 7.4), and females at 5248 (SD 2156) and 15.2 (SD 6.2). Likewise for Aboriginal or Torres Strait Islander status with a mean total count of 5467 (SD 2448) and steps/minute of 16.8 (SD 6.6).

Characteristics of childcare services are shown in Table 2.1. Of the 20 services participating most staff (84%) had University or TAFE qualifications, 15 (75%) had no written policy on physical activity. The average size of service outdoor play areas was 389m². The mean number of fixed pieces of outdoor play equipment was three and the mean types of portable playground equipment was eight. Only one service had a television present and viewing time on the survey day was less than five minutes so this variable was excluded from further analysis.

Table 2.1: Characteristics of childcare services

CHARACTERISTIC	VARIABLE	CLASS	Service (n=20*)
Staff qualifications (n=145)	Type of qualification	University Trained - n (%)	31 (22)
		TAFE** trained - n (%)	89 (62)
		No formal training - n (%)	23 (16)
Children on survey day	Number of children enrolled on survey day	mean (sd)	28.9 (8.46)
	Number of children in class observed	mean (sd)	19.8 (6.2)
Staff on survey day	Number of staff working on survey day	mean (sd)	3.1 (0.7)
Policy	Written policy on physical activity	Yes- n (%)	5(25)
		No- n (%)	15 (75)
Space and equipment available to promote physical activity or sedentary behaviour	Outdoor play area size (m ²)	mean (sd)	389 (176)
	Types of fixed play equipment** (indoor or outdoor)	mean (sd)	3.3 (1.7)
	Types of portable play equipment*** (indoor or outdoor)	mean (sd)	8.3 (2.6)
	Television observed	Yes- n (%)	1 (5)
		No- n (%)	19 (95)
	Computer/video games observed	Yes- n (%)	3 (15)
		No- n (%)	17 (85)

CHARACTERISTIC	VARIABLE	CLASS	
Time available for indoor or outdoor physical activity or sedentary activities	Total minutes of computer/video or games (n=3)	mean (sd)	65.3 (8.7)
	Total minutes seated	mean (sd)	35.2 (35.2)
	Total minutes of outdoor play	mean (sd)	95.7 (45.9)
	Total minutes of staff led structured physical activity (n=19)	mean (sd)	21.3 (16.7)
Staff training and participation in, and leadership and prompting of physical activity	Service provides physical activity training for staff	Yes- n (%)	10 (50)
		No- n (%)	10 (50)
	Staff leadership of structured physical activity	Yes- n (%)	19(95)
		No - n (%)	1 (5)
	Number of times staff prompted children to increase physical activity	mean (sd)	9.7 (10.4)
	Number of times staff joined in active play	mean (sd)	5.1 (4.7)

*Unless stated other

**Fixed play equipment includes balancing surfaces (balance beams, boards etc.), basketball/netball hoop, climbing structures, sandpit, see-saw, slides, swinging equipment (swings, rope etc.), tricycle or bike track, tunnels, trampoline or vegetable garden

***Portable play equipment includes ball play equipment, climbing structures (ladders, frames), floor play equipment (tumbling mats, carpet squares), jumping play equipment (skipping ropes, hula hoops), parachute, push/pull toys that require the children to stand when playing (wagon, scooters, prams), riding toys (tricycles, cars), rocking and twisting toys (rocking horse), sand/water play toys (buckets, scoops, shovels), slides, twirling play equipment (ribbons, scarves, batons), batting equipment (foam bats, light weight cricket bats), foot prints (stones, bricks, tiles, wood blocks), aiming equipment (goals, poles with baskets, targets), mini trampolines, balancing equipment, trucks and cars

Most staff (98%) agreed or strongly agreed with the statement 'I am confident in my ability to encourage children to meet physical activity recommendations while in care' and all staff agreed with the statement 'I have a role to play in ensuring children meet physical activity recommendations while in care'. Most (97%) also reported joining in free active play with the children and, of these staff, 60% reported joining in most or all of the time. Almost all staff (99%) reported providing verbal prompts to increase children's physical activity, with 76% reporting providing prompts most or all of the time.

Results of bivariate analysis of associations between child, service, and staff characteristics with children's step counts while in care can be seen in Table 2.2. No significant associations were observed with the size of the outdoor play area; number of types of fixed or portable play equipment; total minutes of outdoor play; total minutes children were seated; physical activity training for staff; or frequency of staff prompting physical activity. With respect to staff characteristics, if staff at the service reported prompting children to increase their physical activity most or all of the time, this was significantly associated with a higher step count ($p=0.0019$). The presence of a written physical activity policy ($p=0.034$); structured staff-led physical activity at the service ($p<0.0001$); and staff joining children in active play more than three times per day ($p=0.0576$) were significant, independent correlates of higher step counts while children were in care, after adjusting for clustering by service using the GEE analysis framework.

Table 2.2: Results of bivariate and generalized estimating equation (GEE) analysis of associations between child, service and staff characteristics with children's step counts while in care

INDEPENDENT VARIABLE	CLASS	BIVARIATE (n=328)		GEE (n=324)	
		Unadjusted estimate (steps/minute)	p value	Adjusted estimate (steps/minute)	p value
Child characteristics					
Gender	Male	0.8493	0.2563		
Age, years	3	-	-		
	4	1.552	0.0307	1.573	0.0274
	5	-0.238	0.9197	-0.201	
Aboriginal or Torres Strait Islander origin	Yes*	1.794	0.1507		
Low physical activity at home (≤60minutes)	Yes*	0.0349	0.9410		
High small screen recreation at home (≥60minutes)	Yes*	1.307	0.1146		
Long Day Care characteristics					
Written policy	Yes*	4.5333	0.0090	3.8544	0.0339
Large outdoor play area (>400m ²)	Yes*	1.536	0.3401		
At least three types of fixed play equipment available	Yes*	-0.1296	0.9226		
At least eight types of portable play equipment available	Yes*	0.835	0.5790		
Total outdoor play (minutes)		0.017	0.3158		
Total minutes children were seated (minutes)		-0.0516	0.0678		
Service provides physical activity training for staff	Yes*	-1.515	0.3390		
Staff leadership of structured physical activity	Yes*	5.609	<0.0001	3.6838	<0.0001
Staff join children in active play (>3times)	Yes*	3.2932	0.0200	2.480	0.0576
Staff prompt children to increase physical activity (>7times)	Yes*	-1.0510	0.5147		
Staff characteristics					
Number of staff confident in ability to encourage children to meet physical activity recommendations while in care (mean)		1.5680	0.6974		
Any staff report joining children in active play most or all of the time	Yes*	-0.1974	0.9494		
Any staff report prompting children to increase physical activity most or all of the time	Yes*	2.7288	0.0019		

-Referent category, *No was the referent category for all yes/no questions

DISCUSSION

This study aimed to describe children's levels of physical activity in childcare and associations with modifiable characteristics of the childcare environment. Step counts were significantly higher in childcare services that had a written policy on physical activity and where staff led children in structured physical activity and joined children in active play at least three times during the day.

There are no current recommendations for the number of steps preschool children should take per day, or while in care, although for maintaining a healthy weight, optimal cut points have been reported as 12,000 steps/day for Australian boys aged five to 12 years and 10,000 steps/day for Australian girls in the same age range.²⁸ Two other studies have reported step counts in preschool settings. In a study of four preschools in North Carolina, US and Sweden²⁹, children aged three to years ($n=58$) took an average of 16.1 (SD=6.8) steps/minute, comparable to the 15.8 (SD=6.8) steps/minute observed in our study. Similar to our study (excluding our small sample of five year olds), they also observed that older children had higher step counts, with an average steps/minute of 12.3 (SD=3.0) in three year olds, 15.8 (SD=6.0) in four-year-olds and 20.9 (SD=8.8) in five year olds. Interestingly, the US/Sweden study observed a significant 4.7 steps/minute difference ($p < 0.004$) between boys 18.5 (SD=7.6) and girls 13.8 (SD=5.0) that was not observed in our study (1.3 steps/minute difference).

Given that our study had a larger number of participants, a possible explanation for the similarity in step counts between boys and girls in our study may be that there was little difference in the type of activities boys and girls engaged in while in care. In a study comparing various measures of physical activity in preschool children ($n=129$ children aged four to five

years), Cardon et al¹³ also found no difference in daily step counts between boys (10,121 SD=2,836) and girls (9,867 SD = 2,422). Based on the step counts observed in our study we believe both boys and girls may need to be more active while in care.³⁰ Physical activity guidelines for children three to five years in Australia recommend at least three hours of physical activity each day and no more than one hour of watching television or using other electronic media (DVDs, computer and other electronic games).⁶ We found that most children obtained less than two hours of physical activity outside of care implying that most children need to obtain at least an hour of physical activity while in care to meet the current recommendations.

Childcare environments are known to exert a substantial influence on children's physical activity behaviour³⁰, and previous studies have identified various policy, space, equipment, time-structuring and staff characteristics that may account for this influence.¹³ Of the characteristics investigated in our study, having a written physical activity policy was associated with producing the highest step count (+3.85 steps/minute), suggesting that policy may be particularly important for children's physical activity in childcare. In a previous study³¹, we found that only 48% of childcare services had a written physical activity policy and in this study, only 25% had such a policy. A study conducted in 20 childcare services in North Carolina, 11 found physical activity policy to be weakly related to mean activity levels and the time children were observed to spend sedentary or engaged in moderate to vigorous physical activity (MVPA). This may, however, reflect differences in policy implementation and enforcement.

We found that structured staff-led physical activity was an important correlate predictor of children's step counts suggesting that teacher involvement is an important stimulus of

children's activity. This is consistent with a number of trials demonstrating positive effects for structured teacher-led structured physical activity interventions.³²⁻³⁵ Our additional finding that children had higher step counts in childcare services where staff joined in physical activity experiences (+2.480 steps/minute) with children supports this. However, unlike the Bower et al study we did not find a significant association with time available for activity. This may have been because children may not have been active in the time available for activity (i.e. they may have sat and played in a sandbox).

No significant association was observed between the size of the outdoor play area and step counts. This may have been because the size and suitability of the outdoor play space did not vary as widely (from 78m² to 806m²) between childcare services as was observed in a Swedish study (from 280m² to 11, 871m²).³⁶ Two studies^{11,12} found that portable (positively) and fixed (negatively) equipment were significantly related to the proportion of time children spent in moderate to vigorous physical activity. While the number of types of fixed and portable equipment was not significantly associated with step counts in our study, the same differential association was observed. In our study the negative association between types of fixed equipment and step counts may be because some equipment did not encourage steps (eg sitting and playing in a sandbox) as has been observed in other studies.³⁷ It could also be because the equipment 'crowded' the space available for physical activity³⁸, or that the activity they encouraged was not picked up by the spring-levered pedometers used to measure physical activity (eg slow walking, or possibly sliding or swinging).³⁹ Certain types of portable equipment (eg riding toys where children are pulled along) may also be associated with decreased physical activity⁴⁰, explaining the lack of association with portable play equipment in our study. The lack of association may also be because all services had sufficient equipment to

promote physical activity with median number of types of portable equipment at eight compared to a median of one piece in the Dowda et al study.¹²

In terms of staff characteristics and behaviour, Dowda et al in a 2004 study found that children were more active on the playground in preschools where teachers were college educated.⁴¹ In our study 84% of staff had a college education (University and TAFE) perhaps accounting for the lack of such an association. Interestingly, physical education training for staff was not associated with higher step counts for children in our study or higher MVPA in Dowda's 2009 study.¹² It may be that training is necessary but not sufficient for promoting physical activity for children in care, as has been observed in primary school-based research.⁴² As a composite variable, Bower et al¹¹ found that staff behaviour (interactions between staff and children that may promote or discourage physical activity behaviour; includes restricting active play, joining in activity, positive statements about physical activity) was correlated with children's MVPA. Our study adds to this finding by showing that of these components, staff joining in with children is particularly important.

This study has two main strengths. Firstly, our models exploring correlates of physical activity in care included estimates of children's physical activity behaviour and sedentary activity outside of care allowing adjustment for potential confounding. Secondly, we used an objective measure of physical activity. The study also has several limitations. Because weight and height were not measured, we were unable to adjust for children's weight status, which is known to influence children's physical activity levels.⁴³ Secondly, child step counts were assessed on one day, which while shown to give a valid representation of steps per day relative to a whole week in population studies of children²³, represent the minimum standard for reliability. Craig et al as part of a large nationally representative survey of pedometer-determined physical

activity in youth including children aged from five to 19 years, reported that one day of pedometer monitoring yielded a valid representation of steps per day relative to the whole week in terms of both reliability (ICC = 0.79) and validity (relative absolute percent error [APE] = <10%).²³ This information in combination with strong findings of non-reactivity²³, evidence that younger children demonstrate smaller variation in physical activity levels⁴⁴ and that variability is less during week days⁴⁵ suggest that one day of data collection was sufficient to reliably assess young children's physical activity during a weekday in childcare. None-the-less, the internal validity of the findings would have been improved with the addition of multiple days.⁴⁶ Thirdly, pedometers do not measure type or intensity of physical activity and it is possible that some of the service and staff characteristics we looked at influenced the type of activity children engaged in or intensity. Fourthly, it is possible that authorised supervisors selected a day for the evaluation when children were particularly active or staff promoted physical activity more than usual which may affect the external validity of findings. Finally, the cross-sectional nature of the data means conclusions cannot be reached about causality.

Internationally, there is a clear need in childcare for interventions that promote physical activity.³¹ To implement effective interventions however, those aspects of the childcare environment that have the biggest influence on children's activity levels need to be targeted. We found that written physical activity policy, structured staff-led physical activity and staff joining in active play were associated with higher levels of physical activity. Also, coupled with the lack of association with space and play equipment we think space and equipment are probably more than adequate for promoting physical activity in Australian childcare services and that what really matters is having an adult join with the children in physical activity. Based on these findings we recommend further trials on these influences and that interventions

support childcare services to develop and implement written physical activity policies and encourage staff to lead structured physical activity and join in with active play.

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CHAPTER 3

EFFECTIVENESS OF CHILDCARE INTERVENTIONS IN INCREASING CHILD PHYSICAL ACTIVITY: A SYSTEMATIC REVIEW AND META- ANALYSIS FOR POLICY MAKERS AND PRACTITIONERS

A version of this chapter was published as a paper in Obesity Reviews

Finch M, Jones J, Yoong SL, Wiggers J, Wolfenden L. Effectiveness of centre-based childcare interventions in increasing child physical activity: a systematic review and meta-analysis for policy makers and practitioners. *Obesity Reviews*. 2016;17: 412–428.

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ABSTRACT

Context. The review describes the effectiveness of physical activity interventions implemented in centre-based childcare services and: i) examines characteristics of interventions that may influence intervention effects; ii) describe the effects of pragmatic interventions and non-pragmatic interventions; iii) assesses adverse effects; iv) describe cost effectiveness of interventions

Methods. Data sources were Cochrane Central Register of Controlled trials, MEDLINE, EMBASE, PsycINFO, ERIC, CINAHL, SCOPUS, SPORTDISCUS. Studies selected included randomized controlled trials conducted in centre-based childcare including an intervention to increase objectively measured physical activity in children aged less than six years. Data were converted into standardized mean difference and analysed using a random effects model.

Results. Overall, interventions significantly improved child physical activity (SMD =0.44; 95% CI: 0.12-0.76). Significant effects were found for interventions that included structured activity (SMD 0.53; 95% CI: 0.12-0.94), delivery by experts (SMD 1.26, 95% CI: 0.20-2.32) and used theory (SMD 0.76, 95% CI: 0.08- 1.44). Non-pragmatic (SMD 0.80, 95% CI: 0.12-1.48), but not pragmatic interventions (SMD 0.10, 95% CI:-0.13-0.33), improved child physical activity. One trial reported adverse events and no trials reported cost data.

Conclusions. Intervention effectiveness varied according to intervention and trial design characteristics. Pragmatic trials were not effective and information on cost and adverse effects was lacking. Evidence gaps remain for policymakers and practitioners regarding the effectiveness and feasibility of childcare-based physical activity interventions.

INTRODUCTION

Participation in adequate physical activity is associated with lower prevalence of overweight and obesity in preschool age children and may contribute to sustaining a healthy body weight in later childhood. A number of cross sectional studies conducted with preschool age children have reported positive associations between child participation in physical activity and lower levels of body fat and Body Mass Index (BMI).¹⁻⁵ In addition, longitudinal studies have found that participation in adequate physical activity during preschool years can protect against development of overweight and obesity in later childhood.^{1, 6, 7}

Guidelines internationally, including those in Australia and the United Kingdom, recommend a minimum of three hours of physical activity across the day.^{8, 9} In the United States (US) guideline recommendations suggest that preschool age children should engage in two hours of physical activity per day with 60 minutes being structured and at least 60 minutes unstructured.¹⁰ Despite such guidelines, a systematic review of 39 studies from seven countries found that only 54% of children aged two to six years engaged in 60 minutes of Moderate to Vigorous Physical Activity (MVPA) each day.¹¹

Centre-based childcare (including preschool early education programs, infant classes, reception classes, nurseries, and day care centres)¹² represents an opportune setting in which to deliver public health interventions to increase young children's physical activity.¹³ In high income countries, childcare services provide access to a significant proportion of the population aged less than five years, often for prolonged periods. In two thirds of all Organization for Economic Cooperation and Development (OECD) countries, 70% of children aged three to five years are enrolled in formal childcare or preschool programs.¹⁴ In Australia

95% of children attend either a full-day preschool or long daycare services in the year before commencing formal schooling.¹⁵ As such, effective physical activity interventions delivered in this setting have the potential to positively impact on the health of large numbers of children.^{16, 17}

Research indicates that young children are not sufficiently active during attendance at childcare.¹⁸⁻²¹ In order to address this, evidence-based initiatives to improve physical activity among children in childcare are required.²² Research evidence synthesised in systematic reviews and meta-analyses are recognised as important tools for informing policy decisions to improve community health and well-being.²³ Despite their potential to influence policy and practice, systematic reviews often fail to report information needed by policy makers and practitioners to guide such decisions.²⁴ For example, systematic reviews rarely report effects of health interventions of various intensities, delivered by differing intervention personnel, or using various intervention delivery modalities.^{25, 26} Furthermore policy makers are interested in the cost of program delivery, and need to weigh the potential benefits of an intervention against any potential for harm²⁷, yet less than 15% of systematic reviews of child obesity prevention interventions report cost or adverse event outcomes.²⁸

Compared with the findings of interventions delivered under tightly controlled research conditions ('explanatory' or 'efficacy' trials), the impact of an intervention delivered under 'real world' conditions ('pragmatic' trials) are likely to be of particular interest to policy makers and practitioners as they are more likely to provide a better approximation of the effect of intervention when delivered on a routine basis in the absence of research support and expertise.²⁹ Effectiveness or pragmatic trials tend to include broader sampling; more flexibility with intervention delivery and implementation within the context of usual setting

routines.³⁰ In contrast, efficacy or explanatory trials are characterised by less representative and more motivated samples with more rigid intervention delivery protocols.³⁰

However, systematic reviews typically combine both ‘pragmatic’ and ‘explanatory’ trials when synthesising trial effects. As the effectiveness of explanatory interventions may be greater than pragmatic interventions^{25, 31, 32}, pooling of data may over estimate the likely impact of interventions when they were delivered in the ‘real world’.³⁰ Isolating the effectiveness of pragmatic trials in systematic reviews has the potential to improve the relevance and utility of systematic reviews for practitioners and policy makers.²⁵

To our knowledge, no previous systematic reviews of childcare-based physical activity interventions have included an examination of the impact of interventions according to their intervention or trial design characteristics, or examined intervention costs and adverse effects. To address this evidence gap, a systematic review of randomized controlled trials of interventions to improve physical activity among children aged zero to six years attending childcare was conducted. The broad aim of the review was to assess the effectiveness of such interventions, in addition we sought to examine:

- i) the extent to which intervention characteristics influence intervention effects on child physical activity
- ii) the effects of pragmatic interventions (as opposed to non-pragmatic) on child physical activity
- iii) any unintended adverse effects on childcare services, services staff or children
- iv) cost or cost effectiveness

METHODS

For the purpose of this review, the term “childcare” refers to public or privately operated facilities that are provided outside the home in licensed childcare services attended by children aged zero to six years before commencing formal schooling. Services can be full or part time and are commonly referred to as childcare (including preschool early education programs, infant classes, reception classes, nurseries, and daycare centres).¹⁴ “Physical activity” was defined as any bodily movement produced by skeletal muscles that require greater energy expenditure than resting which is distinct from the definitions and terms of physical fitness and exercise.³³ This review has been reported in accordance with PRISMA guidelines³³ and has been registered with PROSPERO (CRD42015019096) (Appendix 3.1).

INCLUSION CRITERIA

To be included in this review, trials must have fulfilled the following criteria:

(a) include children aged under six years with no diagnosed diseases or health problems; (b) assess the effects of interventions carried out in centre-based childcare with at least one component/ strategy aimed at increasing the physical activity level of attending children (including educational, experiential, health promotion and/or structural or environmental interventions); c) use an objective measure to assess physical activity (including pedometer or accelerometer); (d) employ a randomized study design (including cluster-randomized controlled trials); (f) be published in a peer reviewed journal in English. No limit was set on date of publication. See Appendix 3.2 for the search strategy and detailed search terms.

SEARCH METHODS

A computer based literature search was carried out on 10th -12th September 2014. The search was conducted in the following electronic data-bases: the Cochrane Central Register of Controlled Trials (CENTRAL) in the Cochrane Library, MEDLINE (1946 to 2014), EMBASE (1947

to 2014), PsycINFO (1950 to 2014), ERIC (up to 2014), and CINAHL (up to 2014), SCOPUS (up to 2014), SPORTDISCUS (up to 2014). The Medline search strategy included filters used in other published systematic reviews for 'physical activity'³⁵, 'population' (childcare services)³⁶ and 'interventions'.³⁷ Reference lists of previous reviews were searched by MF for potential studies missed in the initial literature searches. Author MF screened abstracts and titles. Full texts manuscripts obtained for potentially eligible trials were independently assessed for eligibility by authors MF and JJ against the inclusion criteria. In instances where the eligibility of studies was not resolved via consensus, a decision was made by a third reviewer (LW).

DATA EXTRACTION

Trial data were extracted using a standardized data-extraction form (Appendix 3.3) based on the Cochrane Public Health Group Methods Manual³⁷, which was piloted prior to initiation of the review. Authors MF and JJ, not blind to author or journal information, independently extracted the data. Multiple attempts were made to contact authors to source relevant data when it was not available in the publication. Discrepancies between reviewers in data extraction were resolved by consensus or if required via a third reviewer (LW). Where available, the following information was extracted:

- Descriptive information: authors; year of publication; country; target population; setting; number of participants; participants' age; gender, ethnicity, and socioeconomic or geographical status.
 - Information on other intervention characteristics: Intervention strategies/components, duration, delivery personnel, and theoretical basis for the intervention.
 - Information to enable intervention classification as pragmatic (or non-pragmatic).
- Trials were assessed and scored using the pragmatic-explanatory continuum indicator

summary tool (PRECIS-2)³³ (Appendix 3.4). The PRECIS-2 tool was developed by a group of international researchers and methodologists and has been previously applied in a number of systematic reviews.^{25, 31, 39, 40} Each trial was scored across nine domains using a five-point Likert scale (1: very explanatory, 2: rather explanatory, 3: equally pragmatic and explanatory, 4: rather pragmatic, 5: very pragmatic). Scoring was completed according to definitions and criteria set by the tool developers (Table 3. 1).⁴¹

- Information on the trial physical activity outcome measure: Assessment method, assessment periods, and length of follow up. Measures of physical activity could include pedometer steps or step rates, accelerometer counts or count rates, minutes of MVPA, time in MVPA or percent time in MVPA.
- Information on adverse events: Adverse event outcomes including any reported unintended adverse consequences of an intervention such as any physical, behavioural, psychological or financial impact on the child, parent or family, or to the service or facility where an intervention may have been implemented.
- Information on intervention costs: Cost outcomes included any estimates of absolute costs or any assessment of the cost effectiveness of included interventions.

Trial descriptive and outcome data were transcribed and included in study tables by Author MF.

Table 3.1: Description of domains and scoring based on the PRECIS-2

DOMAIN	DESCRIPTION	EXAMPLE SCORING
1 Participant eligibility criteria	Are participants in the trial similar to those who would receive this intervention if it was part of usual care?	5 for very pragmatic, identical to those in usual care; 1 for a very explanatory approach with lots of exclusions.
2 Participant recruitment	How much effort is made to recruit participants over and above what would be used in a usual care?	5 for recruitment through usual methods; 1 for a very targeted approach
3 Setting	How different is the setting of the trial and from usual care?	5 where settings is identical to usual care; 1 for approach with only a single or specialised centre
4 Organisation of intervention	How different are the resources, expertise and the organization of care delivery in the intervention from usual care?	5 where identical to usual care; 1 if the trial increases staff levels or requires additional training and resources
5 Flexibility of intervention (delivery)	How much flexibility is there in how the intervention is delivered compared to usual care	5 for identical flexibility to usual care; 1 if there is a strict protocol and measures to improve compliance
6 Flexibility of intervention (participant adherence)	How different is the flexibility in how participants must adhere to the intervention compared to usual care?	5 involving no more than usual encouragement to adhere to the intervention; 1 where exclusion is based on adherence, and there are measures to improve adherence
7 Follow-up	How different is the intensity of measurements and follow-up of participants in the trial compared to usual care?	5 for no more than usual follow-up; 1 for more frequent, longer and more extensive data collection
8 Primary outcome	To what extent is the trial's primary outcome relevant to participants?	5 where the outcome is of obvious importance to participants; 1 where using a surrogate, physiological outcome or assessment expertise that is not available in usual care
9 Primary analysis	To what extent are all data included in the analysis of the primary outcome?	5 for using intention to treat; 1 for analysis that excludes ineligible post-randomisation participants, includes only completers or those following the intervention protocol.

ASSESSMENT OF RISK OF BIAS

The Cochrane Collaboration's standardized risk of bias tool was used to assess risk of bias (Appendix 3.5).⁴² Authors MF and JJ, not blind to author or journal information, independently reviewed and recorded information for all but one of the included studies across the seven specific risk of bias domains: sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective outcome reporting and 'other' issues. Assessment of risk of bias for the trial conducted by Authors MF, LW, JW and JJ⁴³ was undertaken by an independent assessor who had had no involvement in that study. Authors MF and JJ independently assigned a judgment of either 'low risk', 'high risk, or as 'unclear risk' of bias for each domain. The assessment process and tools were piloted prior to initiation of the review. Discrepancies between reviewers were resolved by consensus or if required via a third reviewer (LW). Summary figures were generated with the Review Manager software.⁴⁴

DATA SYNTHESIS AND ANALYSIS

The characteristics of included studies were described narratively. Meta-analysis was performed using a random effects model in Review Manager (Version 5.3.5)⁴⁴ and reported as a standardized mean difference (SMD) given differences in outcomes and measures reported in included studies.⁴² Where multiple measures of physical activity were reported in trials, counts or count rates were used in pooled analyses in preference to measures of MVPA. Measures of physical activity across the day were used in preference to physical activity occurring only in the childcare service. Measures of physical activity occurring at the furthest period from baseline were used in preference to measure of activity occurring during intervention implementation or immediately post intervention; and data from intention-to-treat trial analyses were used in preference to data included in less conservative analyses. For

cluster-randomized trials, the trials' effective sample size was calculated using the methods described in the Cochrane handbook⁴² before pooling with data from individual randomized controlled trials. We used the intra-cluster correlation co-efficient (ICC) derived from the trial (if available), otherwise we used an ICC of 0.05 as it represented the median ICC of included trials.

Intervention characteristics identified to be important to intervention effects from previous narrative reviews, or to be of particular relevance for policy makers and practitioners^{26, 37, 45, 46}, were investigated. These analyses were performed for interventions that included the following components (in isolation or in conjunction with others): structured lessons which included planned teacher led activities or programs (yes/no); enhancement of the childcare physical environment (such as provision of equipment, re-arrangement of built environment or addition of playground markings) (yes/no); parent engagement strategies including communication or education (workshop or educational materials) (yes/no). To assess the impact of intervention duration, interventions were grouped into two categories including those of less than six months duration and those greater than six months. To assess the impact of different intervention delivery personnel, subgroups analysis were performed in terms of interventions delivered by: existing teaching or service staff; or by external staff and or experts. For use of theory, trial results were pooled according to an explicit use of a theory or theoretical framework in the design of the intervention (yes/no).

To describe the effects of pragmatic and non-pragmatic interventions, trials were classified as pragmatic or non-pragmatic using the average score across the nine-domains of the PRECIS-2 tool as per the method applied by Koppenaal et al.⁴⁰ The PRECIS coding form and toolkit can be seen at Appendix 3.3. Where insufficient data existed to score for such domains, this was scored as missing. Where this occurred the average was calculated without the "missing value". As no cut-off scores are currently provided for the PRECIS-2 tool the scoring method

for categorising trials was based on previous studies.³¹ Trials were classified as pragmatic if average score was more than 3.3 or greater and non-pragmatic if less than 3.3.

Where information on adverse events and cost-effectiveness was available, findings of included studies were described narratively. Visual inspection of funnel plots was undertaken to identify the potential for publication bias. We performed sensitivity analysis removing outliers from pooled analyses based on the inspection of the funnel plots. Statistical heterogeneity was reported using the I^2 statistic and explored through sub-group analysis.

RESULTS

After duplicates were excluded, a total of 6,132 publications were retrieved from the database searches. After screening the titles and abstracts of the publications, 64 publications were considered potentially eligible. Based on full text review, 47 publications were excluded, leaving 17 publications describing 17 unique intervention trials that were included in the review. The primary reasons why studies were excluded from the review are included in Figure 3.1.³⁴

CHARACTERISTICS OF STUDIES INCLUDED IN REVIEW

Table 3.2 shows a summary of the characteristics of the included trials. The trials were published between 2006 and 2014 with seven conducted in the US⁴⁷⁻⁵³, two conducted in Australia^{43, 54}, Switzerland^{55, 56}, and Belgium^{57, 58}, and one each in Germany⁵⁹, Israel⁶⁰, England⁶¹ and Scotland.⁶²

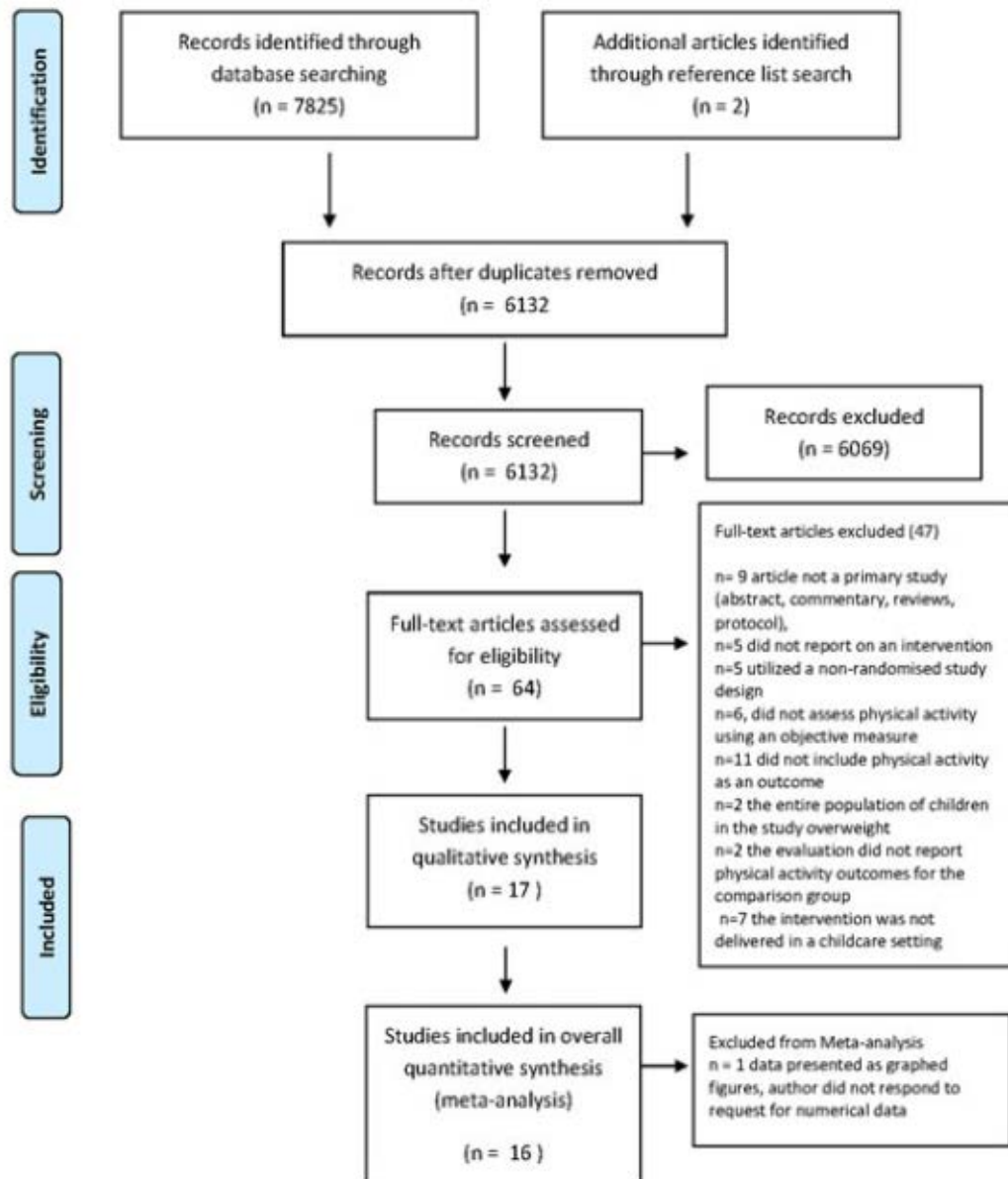


Figure 3.1 Flow diagram outlining search strategy

Of the 17 trials, six were conducted in areas of low income or social disadvantage^{48-52, 61}, with four of these conducted with minority populations (African American, Latino and Migrants).^{50-52, 56} The number of services participating in each trial ranged from one to 40, with the number of child participants ranging from 33 to 826. Across the interventions, the mean age range of child participants was between 3.3 and 5.5 years. Intervention duration across the included trials ranged from two days in one trial⁵¹ to 12 months in another⁵⁶. In five trials intervention duration was between four to eight weeks^{47, 52, 53, 61, 63} and between three to five months in six.^{43, 48, 49, 54, 58, 60} In a further four, intervention duration was between six to nine months.^{50, 55, 59, 62}

Structured active lessons were included as an intervention strategy in 13 of the 17 trials.^{41, 47-50, 52-54, 58, 59, 61, 62} Other intervention strategies that were either included as a single component or as an additional component to a structured activity intervention included re-arrangement of play spaces (n=4)^{43, 55, 56, 58}, addition of physical activity promoting play equipment/markings (n=2)^{54, 57} and teacher engagement/ role modeling with children during free play (n=2).^{43, 54} One trial involved scheduling additional outdoor play time.⁵¹ Six of the trials also included a parent component along with service based strategies^{47,48,56,59,62} all of which were information/education focused (newsletters, information sheets or workshops) with one also including a parent homework strategy. Of the interventions, nine included atleast two intervention components.^{41, 49, 52, 54-56, 58, 59, 62}

Specific intervention theories were specified in seven trials, the socio-ecological model for three^{43, 55, 61}, social cognitive theory in two^{48, 52} and general systems theory⁵⁹, and the PRECEDE-PROCEDE model⁵⁸ in a single trial each. Childcare staff delivered the intervention in most of the trials (n=11). In two trials the intervention was delivered by research staff or experts^{53, 59}

and in two, intervention delivery occurred through a combination of research/experts and childcare staff.^{60, 61}

Physical activity was measured using accelerometers in 14 trials, with the remaining three using pedometers.^{43, 49, 60} Outcome data were collected: while intervention support from the research team was still active in four trials^{47, 50, 51, 53}; immediately post intervention support in 11 trials^{43, 48, 49, 52, 54, 56, 57, 59-62}; and between 1-6 months post intervention support in two trials.^{55, 58} In three trials follow-up assessments were carried out at two time points.^{54, 59, 61}

Based on classification using the PRECIS-2 tool, eight interventions were classified as pragmatic^{43,51,52,55,58,59,62} and nine as non-pragmatic.^{48-50,53,54,56,60,61,63}

Table 3.2 Characteristics of included trials

Author / Country / Year	Target Population	Sample	Intervention duration	Intervention strategies	Intervention delivery personnel	Theory base	Physical activity assessment	Outcome measure	Assessment periods	Follow-up	Effect size SMD
Alhassan United States 2007	3-5 years Latino children attending preschool program serving low-income families	34 1 centre	2 days	Scheduling two 30 minute additional time blocks of unstructured outdoor free play	N/A	Not described	Accelerometer (Actigraph)	Counts per minute, % time in sedentary, light and MVPA	2 days during waking hours ^d	During active intervention	0.10
Alhassan United States 2012	2.9-5 years Latino / Hispanic and African American children attending low SES status preschool centres	71 2 centres	6 months	Daily 30 minute structured lessons focusing on locomotor and movement skills	Childcare staff	Not described	Accelerometer (Actigraph GTIM)	Counts per minute, % time in sedentary, light and MVPA	7 consecutive days (including 2 weekend days), during waking hours	6 months after baseline during the intervention	-0.28
Alhassan United States 2013	2.9-5 years	67 2 centres (four classes)	4 weeks	30 minute outdoor structured curriculum based lessons, 3 times/week	Research staff (with aid of classroom teachers)	Not described	Accelerometer (Actigraph GTIM)	% time in sedentary, light and MVPA	7 consecutive days, during waking hours	During week four of intervention	1.21

				during playtime							
Author / Country / Year	Target Population	Sample	Intervention duration	Intervention strategies	Intervention Delivery Personnel	Theory base	Physical activity assessment	Outcome Measure	Assessment Periods	Follow-up	Effect size SMD
Annesi United States 2012	3-5 years Primarily African American children from lower to middle class socio – economic strata attending preschool classrooms of the YMCA	338 7 centres (19 classrooms)	8 weeks	Daily 30 minute structured gross motor skill lessons. Long and short term goal setting for children	Childcare staff	Social cognitive and self- efficacy	Accelerometer (Actigraph GT3X)	% time in sedentary, light and MVPA, vigorous	4.75 hours, during care (9.15am to 2.00pm)	8 weeks after baseline	0.41
Bellows United States 2013	3-5 years Attending head start centres ^b across rural and urban settings	201 8 centres	18 weeks	20 minute structured lessons focusing on gross motor skill/s conducted 4 days/week	Childcare staff	Not described	Pedometer (Walk4L Classic)	Total number of daily steps taken	6 consecutive days (4 weekdays and 2 weekend days), during waking hours	19 weeks after baseline (immediately after the intervention)	-0.12

Author / Country / Year	Target Population	Sample	Intervention duration	Intervention strategies	Intervention Delivery Personnel	Theory base	Physical activity assessment	Outcome Measure	Assessment Periods	Follow-up	Effect size SMD
Bonvin Switzerland 2013	2-4 years Attending childcare centres from rural and urban areas	273 30 centres	8 months	Rearrangement of indoor and outdoor play spaces Daily physical activity period Parent education	Childcare staff	Social cognitive conceptual model	Accelerometer (Actigraph GT1M)	Counts per minute number of epochs/hr in MVPA and vigorous physical activity	One day during attendance at childcare	9 months after baseline	0.19
Cardon Belgium 2009	4-5 years Attending public preschools	583 40 preschools	6 weeks	Provision of portable play equipment Playground markings	N/A	Not described	Accelerometer (Actigraph GT1M)	Counts per minute % time in sedentary, light and MVPA	One day during afternoon recess time	4-6 weeks after baseline (directly after implementation)	0.13
De bock Germany 2013	4-6 years	826 37 centres (participating in existing, state sponsored physical activity program)	9 months	Parent engagement / education 1 hour structured physical activity lessons 2 times/week	External gym trainers	General systems theory	Accelerometer (Actihart monitors)	Mean counts per minute Minutes spent in MVPA	6 consecutive days (including 2 weekend days), during waking hours	6 months after baseline At end of intervention and at 12 months	0.03

Author / Country / Year	Target Population	Sample	Intervention duration	Intervention strategies	Intervention Delivery Personnel	Theory base	Physical activity assessment	Outcome Measure	Assessment Periods	Follow-up	Effect size SMD
De Craemer Belgium 2014	4-6 years	472 27 centres	24 weeks	Rearrangement of indoor classroom play space 1 structured lessons once/week Class room activities (stories, excursions) Parent education	Childcare staff	PRECEDE-PROCEDE model	Accelerometer (Actigraph GT1M, GTX3 and GTX3+)	Minutes of light, moderate, vigorous, MVPA and total physical activity	6 consecutive days (including 2 weekend days), during waking hours	One year after baseline	0.17
Eliakim Israel 2007	5-6 years	101 4 preschool classes	4 months	Daily 45 minute structured sessions based on circuit training (games)	Childcare staff for 4 days/week; professional youth coach 2 days / week)	Not described	Pedometers (Stepometer)	Mean steps/day	During school hours (8am-1pm) and after school hours for three consecutive weekdays	At end of 4 month program	4.32

Author / Country / Year	Target Population	Sample	Intervention duration	Intervention strategies	Intervention Delivery Personnel	Theory base	Physical activity assessment	Outcome Measure	Assessment Periods	Follow-up	Effect size SMD
Finch Australia 2014	3-5 years	245 20 centres	4 months	Daily 20 minute structured fundamental movement skills sessions Staff role modelling, limiting SSR Rearrangement of indoor and outdoor environment	Childcare staff	Social ecological model	Pedometer (Yamax SW 200 and SW7000)	Step counts per minute Mean steps/day	1 day during childcare hours (9am-3pm)	At end of 4 month intervention	0.34
Fitzgibbon United States 2011	3-5 years enrolled in Head start programs ^b	190 18 centres	14 weeks	20 minute structured lesson related to physical activity and exercise, twice/week Weekly parent newsletter with homework assignment	Childcare staff	Social cognitive theory and self – determination theory	Accelerometer (Actigraph GT1M)	% time spent in moderate, vigorous and MVPA	7 consecutive days, during waking hours	At end of 14 week intervention	2.83

Author / Country / Year	Target Population	Sample	Intervention duration	Intervention strategies	Intervention Delivery Personnel	Theory base	Physical activity assessment	Outcome Measure	Assessment Periods	Follow-up	Effect size SMD
Jones Australia 2011	3-5 years Attending centres in child metropolitan area	97 2 centres	20 weeks	20 minute structured lessons focusing on fundamental movement skills, 3 times/week Teacher engagement with children during unstructured free play	Primarily childcare staff (16 sessions staff, 4 session research staff)	Not described	Accelerometer (ActigraphMT17164))	Counts per minute % time in MVPA during childcare	2 consecutive days (during attendance at childcare)	During final two weeks of intervention and one week after 20 week intervention	-0.31
Odwyer United Kingdom 2013	3-4.9 years attached to surestart ^c centres located in neighbourhoods in highest 10% for national deprivation	218 12 centres	6 weeks	Portable equipment 1 hour structured active play sessions, once/week	2 sessions experts, 2 sessions co-instruction, 2 session staff only	Social ecological model	Accelerometer (Actigraph GT1M)	Mean minutes and % time spent in light, moderate, vigorous, MVPA	7 consecutive days, during waking hours	At end of week intervention and at 6 months after baseline	0.12

Author / Country / Year	Target Population	Sample	Intervention duration	Intervention strategies	Intervention Delivery Personnel	Theory base	Physical activity assessment	Outcome Measure	Assessment Periods	Follow-up	Effect size SMD
Puder Switzerland 2011	4-6 years Attending preschools in urban surrounds, in areas of high migrant population	421 30 preschools (40 classes)	1 school year	45 minute structured lessons aimed at increasing fitness and coordination, 4 times/week Parent education Rearrangement of recess play environment	Childcare staff 3 lessons and health promotor 1 lesson per week, reduced to twice a month after four months	Not described	Accelerometer (ActigraphMTI/CSA7164)	Counts per minute	5 days (consistently worn)	At the end of the 1 year intervention	0.01
Reilly Scotland 2006	Children in their preschool year	285 36 centres	24 weeks	30 minute structured lessons, 3 times/week Parent education	Childcare staff	Not described	Accelerometer (ActigraphMTI/CSA7164)	Counts per minute % time in moderate or vigorous physical activity	6 days, during waking hours	6 months after baseline	-0.45

Author / Country / Year	Target Population	Sample	Intervention duration	Intervention strategies	Intervention Delivery Personnel	Theory base	Physical activity assessment	Outcome Measure	Assessment Periods	Follow-up	Effect size SMD
Trost United States 2008	3-5 years Attending half day preschool program	42 1 preschool (4 classes two morning, two afternoon)	8 weeks	10 minute structured active lessons, several times/week	Childcare staff	Not described	Accelerometer (Actigraph WAM 7164)	Minutes of class room MVPA during class room and normally scheduled outdoor playtime	During preschool program (2.5 hours)	Over the course of the 8 week intervention and during last two intervention weeks	N/A

^aFinal sample used in analysis

^bHead start programs (The Head Start Program is a program of the United States Department of Health and Human Services that provides comprehensive early childhood education, health, nutrition, and parent involvement services to low-income children and their families)

^cSurestart centres provide support for parents of <5 yr old children who reside in the most disadvantaged areas of England

^dWake hours defined as attached when child got out of bed and taken off when child went to bed in the evening

RISK OF BIAS

Figure 3.2 shows the results of the risk of bias assessments. It was unclear whether random sequence generation was adequately performed in eight trials due to lack of information in the publication.^{47-52, 60, 63} Risk of bias for concealment of allocation sequence was unclear in five trials.^{48, 49, 52, 58, 60} Six trials reporting intervention delivery involving research personnel that were not blinded were assessed as high risk of performance bias^{43, 48, 50, 51, 53, 60} and in six trials risk was unclear due to lack of information.^{47, 49, 54, 56, 58, 61} In regard to detection bias, while only two trials reported blinding of outcome assessors^{54, 62}, given the objective nature of the measures used, outcomes were judged not likely to be influenced and assessed as low risk. In five trials insufficient information was available regarding numbers and reasons for drop out at follow-up to determine risk of attrition bias.^{47, 52, 53, 57, 60} Only three trials provided information to permit judgment of risk for selective reporting.^{43, 48, 59} Other potential risks of bias were identified for three trials. Of these, three trials did not adjust their analyses to take account of the effects of clustering in their analysis.^{49, 52, 60}

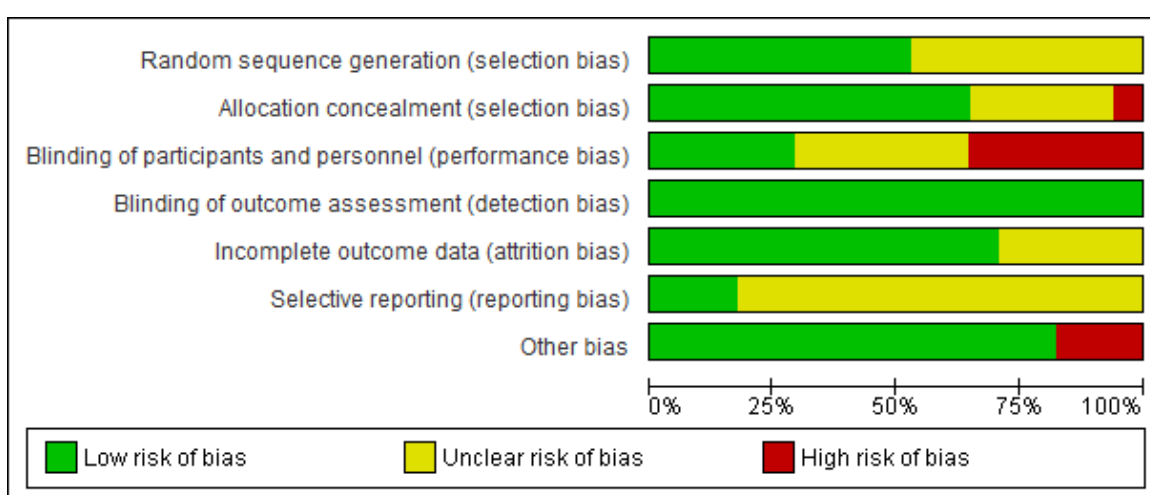


Figure 3.2 Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies

INTERVENTION EFFECTS

Overall, 16 of the 17 included trials provided data to enable inclusion in a meta-analysis. In the remaining study, no numerical data were provided, with the results being presented in visual graphed format only.⁴⁷ This study reported significant intervention impact on classroom levels of MVPA relative to the control group at the completion of an eight week intervention involving ten minute structured active lessons, several times/week.

Figure 3.3 presents the findings of the meta-analysis for all 16 included studies. Results show a significant effect of interventions (SMD 0.44; 95% CI: 0.12-0.76; $p=0.007$). In the sensitivity analysis excluding an outlier⁵⁶, pooled effect estimates were no longer significant (SMD 0.28; CI: -0.01-0.56; $p=0.06$).

Figures 3.4 and 3.5 present the pooled analysis results for trials classified as pragmatic and non-pragmatic respectively. Pragmatic interventions did not significantly improve child activity (SMD 0.10; 95% CI: -0.13-0.33; $p=0.40$), while non-pragmatic interventions showed a significant effect (SMD 0.80; 95% CI: 0.12-1.48; $p=0.02$).

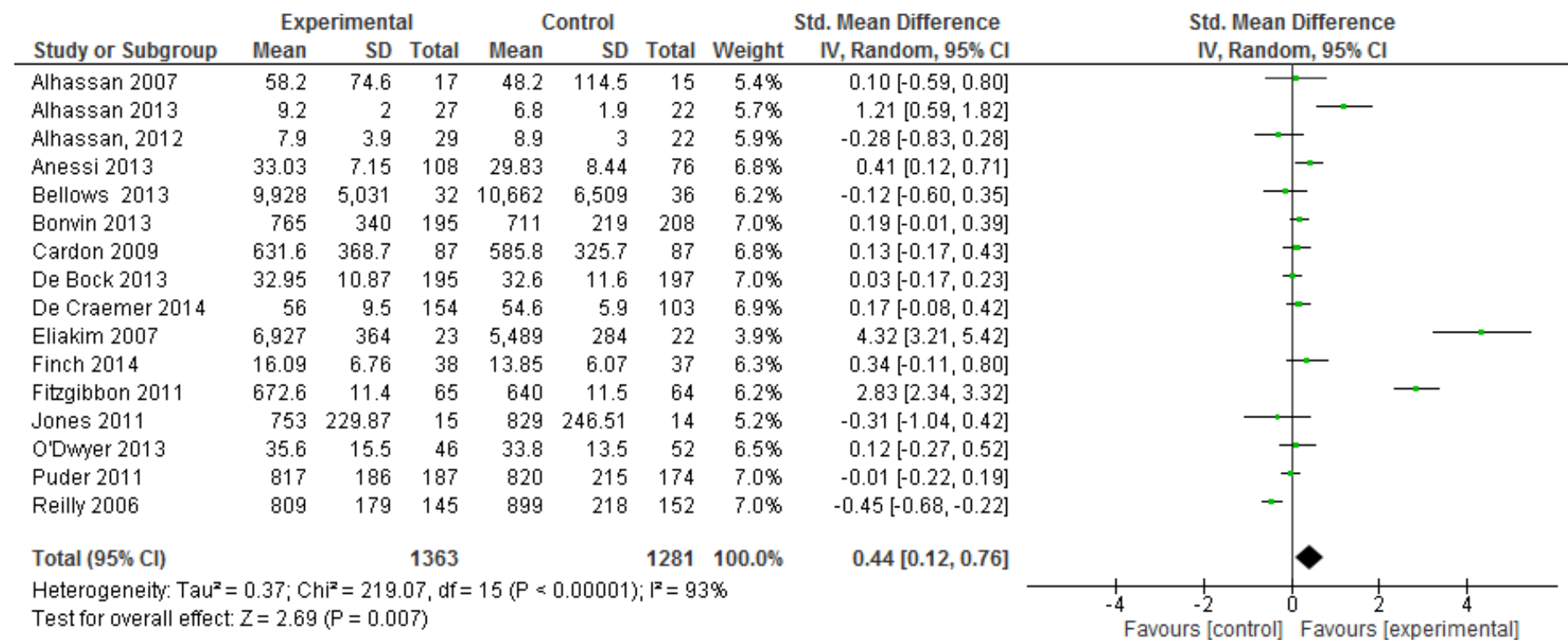


Figure 3.3 Standardised mean difference in objectively measured physical activity across all interventions

Table 3.3 presents the findings of the subgroup analysis for intervention characteristics. Interventions that included structured activity lessons showed a significant intervention effect (SMD 0.53; 95% CI: 0.12-0.94; $p=0.01$,) as did those not including this strategy (SMD 0.17; 95% CI: -0.01-0.33; $p=0.04$). A significant effect was observed for interventions with (SMD 0.41; 95% CI: 0.02-0.80; $p=0.04$) and without an environmental enhancement strategy (SMD 0.73; 95% CI: 0.14-1.32; $p=0.02$). Interventions that did not include a parent strategy showed a significant effect (SMD 0.54; 95% CI: 0.09-1.00; $p=0.02$) as did those six months or less in duration (SMD 0.58; 95% CI: 0.10-1.05; $p=0.02$), where interventions involved delivery by experts (SMD 1.26; 95% CI: 0.20-2.32; $p=0.02$) and were based on a theory or framework (SMD 0.76; 95% CI: 0.08-1.44; $p=0.03$).

Table 3.3: Results of meta-analysis for intervention characteristics

CHARACTERISTIC	n	I ² (%)	STANDARDISED MEAN DIFFERENCE ^a	EFFECT SIZE (95% CONFIDENCE INTERVAL)	p VALUE
Intervention strategies^b					
Structured active lessons ^c					
Yes	13	95*	0.53	0.12, 0.94	0.01*
No	3	0	0.17	-0.01, 0.33	0.04*
Parent strategy ^d					
Yes	6	96*	0.41	-0.10, 0.93	0.11
No	9	88*	0.54	0.09, 1.00	0.02*
Physical environment ^e					
Yes	6	90	0.41	0.02, 0.80	0.04*
No	10	96*	0.73	0.14, 1.32	0.02*
Intervention period					
6 months or less	13	94	0.58	0.10, 1.05	0.02*
Greater than 6 months	3	10	0.07	-0.05, 0.19	0.25
Intervention delivery personnel					
Teachers / staff only	10	94*	0.27	-0.13, 0.68	0.19
Involved experts	4	96*	1.26	0.20, 2.32	0.02*
Theoretical basis for the intervention reported					
Yes	5	96*	0.76	0.08, 1.44	0.03*
No	11	89*	0.25	-0.09, 0.59	0.14

^aStandardised physical activity

^bCategories include all trials describing use of intervention strategy, ie not mutually exclusive

^cPlanned teacher led activities or exercise programs where children were encouraged to explore and practice gross motor or fundamental movement skills

^dCommunication or education

^eProvision of equipment, rearrangement of built environment or addition of playground markings

* $p < 0.05$, significant variable

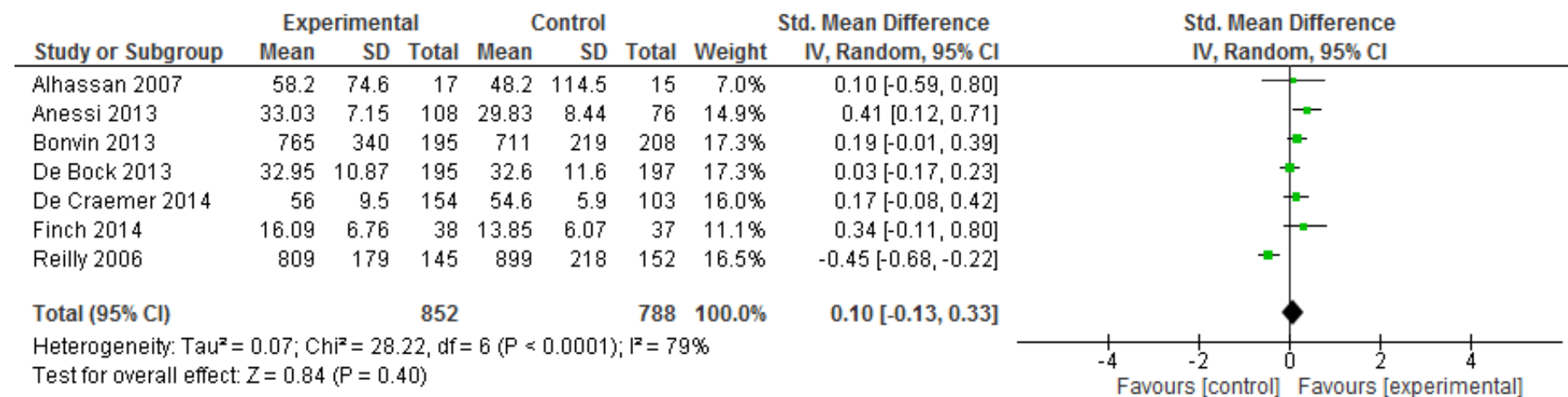


Figure 3.4 standardised mean difference in objectively measured physical activity for pragmatic interventions

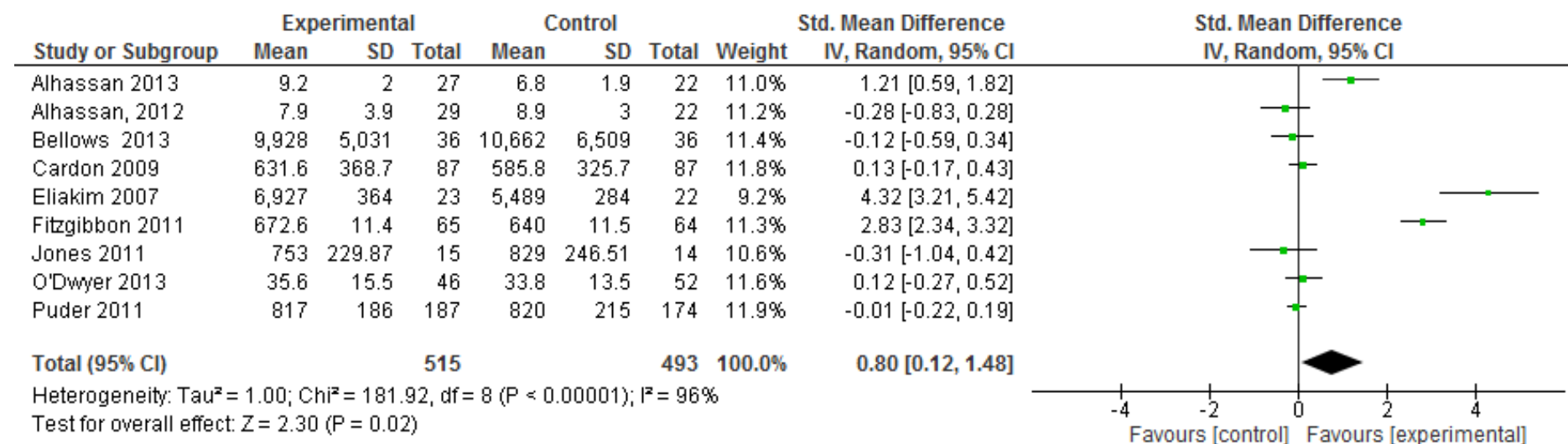


Figure 3.5 Standardised mean difference in objectively measured physical activity for non-pragmatic interventions

COST AND ADVERSE EVENTS

Of the 17 trials only one reported adverse events and reported no significant difference in the rate of change in injuries per month between intervention and control groups.⁴¹ No trials reported cost data.

DISCUSSION

A comprehensive systematic review of the effectiveness of physical activity interventions in centre-based childcare services was conducted to provide practice relevant information to health policy makers and practitioners. The findings of the review suggest that evidence supporting the effectiveness of physical activity interventions in this setting is equivocal. A number of intervention characteristics were associated with greater effects including structured activity, use of theory in intervention design and delivery of intervention by experts or external staff. The review did not find evidence to support the effectiveness of pragmatic interventions; however, meta-analysis of non-pragmatic interventions suggests they are effective in improving child physical activity. Despite the importance to policy makers and practitioners of information regarding any associated adverse events of intervention, only one trial reported this information, while no trials reported data on intervention costs or cost effectiveness.

Meta-analysis of 16 of the 17 included trials showed a significant effect favoring interventions (SMD 0.44; 95% CI: 0.12-0.76). Such findings are consistent with those of the only other comparable meta-analysis reporting a significant pooled effect on preschoolers physical activity in a sub-group analysis of physical activity interventions conducted in early childhood education settings.⁶⁴ However, funnel plots suggesting the presence of publication bias, and sensitivity analysis that involved removing one outlying trial, produced pooled effects that

were no longer significant. Other systematic reviews, which have synthesized trial evidence narratively, have suggested that the effectiveness of physical activity interventions in childcare settings are equivocal.^{37, 45, 65} For example, in the review of physical activity interventions delivered in centre-based childcare conducted by Ward, half of the eight studies identified with a physical activity outcome reported non-significant findings.⁴⁵

Analyses for intervention characteristics suggest that interventions including structured activity lessons were effective, a finding supported by correlational studies^{66, 67} and previous reviews.^{45, 62} Consistent with a previous systematic review, interventions including enhancements to the physical environment were found to be effective as were interventions delivered by external experts.⁴⁶ Interventions including a parent component were, however, not effective. Intervention strategies targeting parents included in the review primarily involved the distribution of newsletters, information leaflets and education sessions. This finding may therefore suggest that more intensive parent strategies may be required to improve child physical activity behaviours.^{62, 68} While data within the childcare setting are limited, parent communication and engagement strategies are an important component of recommended approaches to implementing setting based interventions to promote child health⁶⁹ and have been associated with greater intervention effects in school based physical activity interventions.⁷⁰ Further research using more direct and engaging strategies may be required to establish the potential value of parents in maximising the effectiveness of physical activity interventions in this setting.

Compared to interventions not utilizing theory in their design, those using theory demonstrated an effect that was significant (SMD: 0.76; 95% CI: 0.08-1.44). While it has long been suggested that the effectiveness of interventions are maximised where an appropriate

theoretical framework is utilised to guide intervention development⁷², this is the first investigation of its effect for physical activity interventions delivered in the childcare setting. It should be noted however that the 11 studies that did not report on a "theory" may have integrated a theory or conceptual knowledge within their design but not included this information in their paper. As such this finding should be interpreted with caution.

While there was evidence to support the effectiveness of non-pragmatic interventions, pragmatic interventions in this setting did not significantly improve child physical activity. Similar findings have been reported in reviews of other child health interventions.^{25, 31, 32} For example a meta-analysis of 49 child obesity prevention interventions found that the overall effect of pragmatic trials on body mass index was non-significant while a significant effect was found in trials that were explanatory in design.³¹ Such findings may be a result of difficulties experienced by childcare staff in implementing interventions with high fidelity. For example, the pragmatic intervention conducted by Finch⁴³ reported that service staff failed to deliver a number of key intervention components.⁴³ Similarly, the pragmatic trial conducted by Bonvin and colleagues reported inadequate dose of structured physical activity and heterogeneous intervention implementation in their evaluation of a large scale government led physical activity program.⁵⁵ Findings also suggest that there is a gap in available information required to effectively inform intervention implementation strategies. For example, in half of the ten studies reliant on real-world staff to conduct the intervention, limited information was reported on the type and nature of training employed to support implementation. Without such data practitioners are left bereft of key information required to effectively implement such programs. These findings underscore the need for implementation and dissemination research to be prioritised to inform strategies that may be most effective in improving implementation of programs in this setting.

None of the included trials reported cost analyses and only one examined any unintended adverse effects. The trial by Finch and colleagues⁴³ found no difference in the injury rate of staff or children over the intervention period. The findings of this review suggest that information regarding adverse events is currently not available in trials to inform policy decisions and highlights the need for future childcare-based physical activity interventions to include these outcomes.²⁸

Strengths of this review include the use of a comprehensive and rigorous methodology including a broad search strategy, screening of trials, extraction of data, and appraisal of risk of bias using two independent reviewers. In regard to quality of the trials where reporting was sufficient, the overall quality of studies in this review was high. While information to assess reporting bias was insufficient for most studies, overall most were assessed as having a low risk of bias across a number of domains. Despite this, it should be noted that five of the included trials were small pilot studies involving two or less childcare centres. There was also considerable variation within the characteristics of included trials. For all but one analysis, I^2 statistics indicate considerable heterogeneity (72-97%) and heterogeneity remained high following subgroup analysis. Future systematic reviews, with a greater number of included studies will have greater capacity to examine findings for trials with large sample sizes and explore such heterogeneity. It should also be acknowledged that while we examined the effects of individual components many of the interventions included in our analysis were multi-component, as such we were unable to separate out the contribution of different intervention factors. Future research would benefit from employing factorial designs to isolate effects of specific intervention strategies allowing reviews to examine characteristics of interventions most likely to contribute to positive intervention effects.

CONCLUSIONS

Despite aiming to generate practice relevant information, our findings indicate the current evidence base for childcare delivered physical activity interventions provides limited direction for policy makers and practitioners. The results demonstrated that pragmatic interventions are not likely to be effective and that information on cost and adverse effects is almost universally lacking. However positive effect sizes were identified for a number of intervention characteristics, such that structured activity, environmental enhancements and use of theory should continue to be recommended for childcare based interventions broadly.

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AUTHOR INFORMATION

First author MF led the development of this manuscript. Authors LW, JW and MF, conceived the review. Author LW completed the meta-analysis. All authors contributed to, read and approved the final version of this manuscript.

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CHAPTER 4A

A CLUSTER RANDOMISED TRIAL TO EVALUATE A PRAGMATIC, STAFF DELIVERED INTERVENTION TO INCREASE PHYSICAL ACTIVITY AMONG CHILDREN ATTENDING CHILDCARE: STUDY PROTOCOL

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ABSTRACT

Background. Young children are not participating in recommended levels of physical activity and exhibit high levels of sedentary behaviour. Childcare services provide access to large numbers of young children for prolonged periods, yet there is limited experimental evidence regarding the effectiveness of physical activity interventions implemented in this setting. The aim of this study is to assess the effectiveness and acceptability of a multi-component physical activity intervention, delivered by childcare service staff, in increasing the physical activity levels of children attending long day care services.

Methods. The study will employ a cluster randomised controlled trial design. Three hundred children aged between three to five years from twenty randomly selected childcare services in the Hunter Region of New South Wales, Australia will be invited to participate in the trial. Ten of the 20 services will be randomly allocated to deliver the intervention with the remaining ten services allocated to a wait list control group. The physical activity intervention will consist of a number of strategies including: delivering structured fundamental movement skill activities, increasing physical activity opportunities, increasing staff role modelling, providing children with a physical activity promoting indoor and outdoor environment and limiting children's small screen recreation and sedentary behaviours. Intervention effectiveness will be measured via child physical activity levels during attendance at childcare. The study also seeks to determine the acceptability and extent of implementation of the intervention by services and their staff participating in the study.

Discussion. The trial will address current gaps in the research evidence base and contribute to the design and delivery of future interventions promoting physical activity for young children in long day care settings.

INTRODUCTION

Regular physical activity among young children can contribute to social, psychological and fundamental motor skill development, maintain bone health and prevent obesity.¹⁻⁶ Despite these benefits, research suggests that preschool aged children are not adequately physically active.^{3, 7, 8} For example, a recent study found that 44% and 21% of Australian preschool aged children are not sufficiently active on weekdays and weekends respectively.⁸

For a variety of reasons, childcare services (centre-based care including long day care services and preschools) have been identified as a promising setting for the delivery of interventions to increase physical activity among children in early childhood.^{2, 9-11} First, childcare services provide access to a large and growing number of children for prolonged periods each day.^{5, 13, 14} Second, childcare services have existing infrastructure which can be used to facilitate child physical activity.¹³ Third, childcare service staff appear amenable to interventions which aim to enhance children's activity.^{15, 16} Lastly, descriptive research suggests that service policies and practices and the physical environment of childcare services are important influences on children's physical activity behaviours.^{9-11, 17}

Despite the potential of childcare services as a setting to increase young children's physical activity experimental research examining the effectiveness of interventions targeting physical activity promoting characteristics in childcare services is limited.^{12, 18} This was demonstrated in the findings of Chapter 3 which reported that evidence regarding effectiveness of childcare physical activity interventions was equivocal.¹² Further, as indicated in Chapter 1 and Chapter 3, in order to maximise the population health impact of childcare physical activity

interventions there is a particular need for interventions that are pragmatic in nature and able to be delivered by service staff in the context of usual routines and responsibilities.

While Chapter 2 identified potential effective intervention strategies, the effectiveness of a pragmatic staff delivered intervention, consistent with best practice physical activity guidelines in this setting in Australia,²¹ had not been tested. Therefore the aim of this study was to assess the effectiveness and acceptability of a pragmatic physical activity intervention, delivered by childcare service staff, in increasing the physical activity levels of children attending childcare services. This chapter will describe the study protocol by which this trial was conducted.

METHODS

STUDY DESIGN

The study will employ a cluster randomised controlled trial design (see Figure 4A.1). A sample of eligible childcare services in the study region will be randomly selected and approached to participate in the trial. Ten such services will be randomly allocated to a service-level physical activity intervention, delivered over a 15 week period, and ten services to a wait list control group. The primary trial outcome measure, mean step counts per minute of children, will be collected at baseline and approximately 6 months following baseline data collection. Services allocated to the wait list control group will receive the intervention after the collection of all follow-up data.

The research methods will be reported in accordance with the CONSORT statement.²¹ The trial is funded by Hunter New England Population Health, and by a Hunter Medical Research

Institute Grant (G0900142) (See appendix 4A.1). Ethical approval to conduct the study has been obtained from the Hunter New England Area Human Research Ethics Committee (approval No.09/09/16/5.12) and University of Newcastle Human Research Ethics Committee (approval HREC/09/HNE/286) (Appendix 2.1).

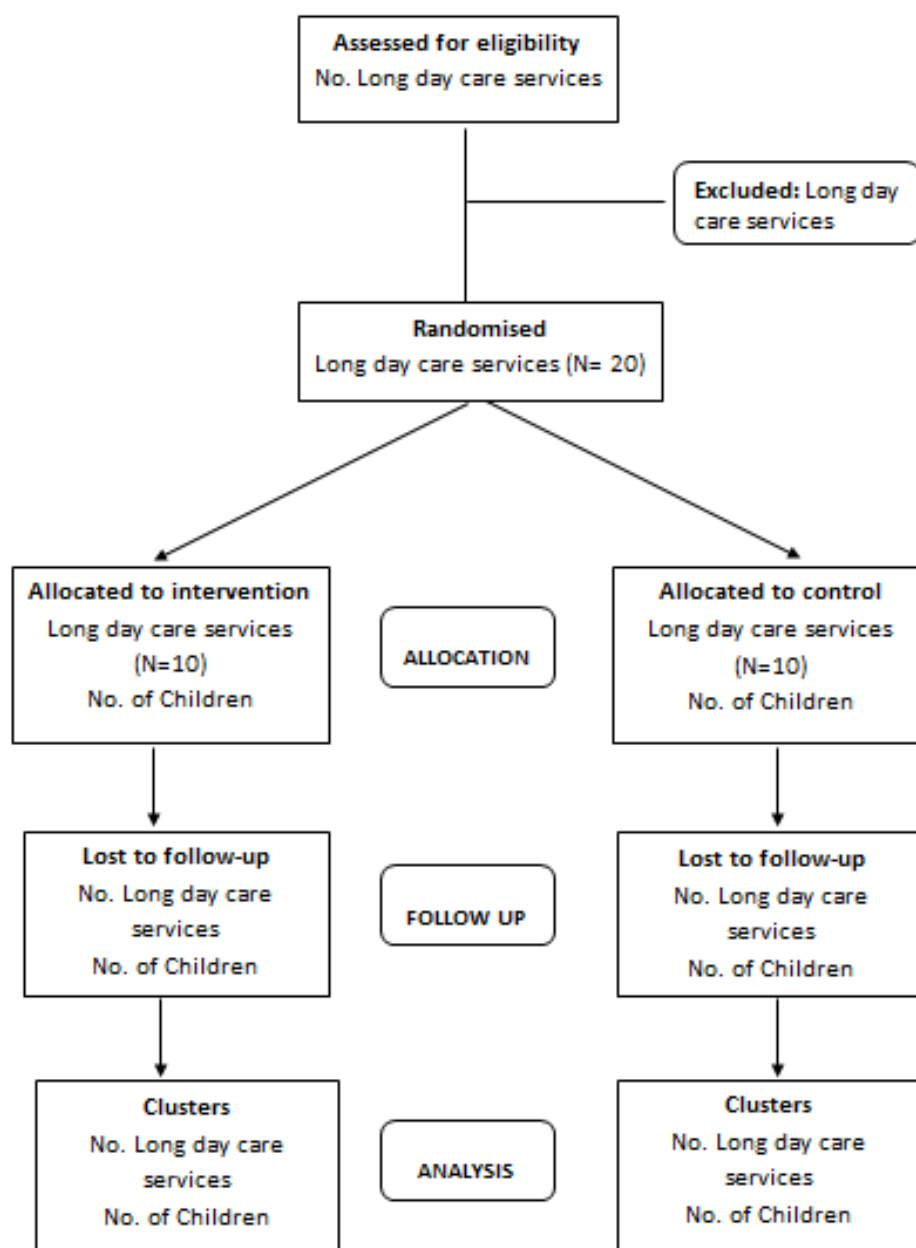


FIGURE 4A.1 CONSORT Flowchart describing progress of participants through the trial

SETTING

The study will take place in the Newcastle, Lake Macquarie and Port Stephens local government areas of the Hunter Region of New South Wales (NSW), Australia. These areas encompass non-metropolitan ‘major cities’ and ‘inner regional’ areas as described by the Australian Standard Geographic Classification system.²² There are 385,376 people residing in the area of which 14,061 are children aged three to five years.²³ Five percent of residents speak languages other than English and two percent of residents are of Aboriginal or Torres Strait Islander origin.²³ The Hunter Region has lower indices of socio-economic status than the NSW state average.²²

SAMPLE

CHILDCARE SERVICES

The sample included childcare services in New South Wales (NSW) that provide care for eight or more hours per day for five days per week and usually enroll children from six weeks old to under six years.¹⁴ These services are centre-based and provide specific preschool programs for children aged three to five years that aim to provide early educational activities to help children prepare for school.¹⁴

There are a total of 85 services in the study region. Twenty of these services (24%) will be recruited into the trial. A list of all childcare services in the region provided by the New South Wales Department of Community Services (the Government Licensing Authority) will serve as the sampling frame. Services catering solely for special needs populations, such as children with vision or hearing impairment, will be excluded from participating in the trial given the specialist care required for such children and the likelihood of a differential effect of the intervention in this population group. To be eligible to participate in the trial childcare services

will be required to have at least 25 children enrolled aged three to five years. Eligibility will be confirmed with the Authorised Supervisors (managers) of the services during phone contact as part of the recruitment process.

CHILDREN

Parents of all eligible children aged three to five years at each of the 20 services will be asked to provide consent for child participation in the study. A minimum of 175 children in each of the intervention and control groups at baseline are expected to participate in the study (average of 18 per service) on the basis of consent rates from similar studies in this setting.¹¹ Children at the service with a significant physical or intellectual disability will be excluded where this disability prohibits or has the potential to preclude participation in the intervention or impair accuracy of physical activity measures. To be eligible children must be enrolled to attend the service on the day of the week nominated by the Authorised Supervisor for baseline data collection.

RECRUITMENT PROCEDURES

CHILDCARE SERVICES

Prior to formal requests to participate, the research trial will be promoted to Authorised Supervisors through existing childcare networks via a postal newsletter, and an email to all services approximately six weeks and two weeks prior to commencing recruitment respectively.

The order in which eligible services in the study region will be approached to participate in the study will be randomised using a random number feature in Microsoft Excel. Authorised Supervisors will be mailed recruitment letters informing them of the study and requesting their consent to participate (Appendix 2.2). Consent will be obtained through the supervisor

faxing or posting a signed consent form back to the research team. If consent is not received within two weeks a research assistant will telephone Authorised Supervisors to answer any questions they may have and remind them to return their form. Recruitment of services will continue until 20 consent to participate in the study.

CHILDREN

To maximise child participation in data collection at recruited long daycare services, the study will employ strategies recommended for obtaining active parental consent for health research within a school setting.²⁴ The recruitment of participants will include the following components:

1. Recruitment oversight:

One member of the research team will act as a designated recruitment coordinator and will be the primary liaison with Authorised Supervisors throughout the study. The coordinator will manage the distribution of consent and information materials to services and parents and monitor return rates of service and parent consent forms. During the recruitment period, parents and Authorised Supervisors will be able to contact the coordinator directly with any queries about the study. The coordinator will not be involved in the delivery of the intervention or collection of baseline or follow-up measures.

2. Promotion of research prior to requests for participation:

The research will be promoted to parents from all participating long day care services via a brochure disseminated a week prior to distribution of information and consent materials.

3. *Dissemination of materials to maximise parent engagement:*

The recruitment coordinator will arrange for recruitment packs (one per parent of each child aged three to five years) to be delivered to each participating service. Distribution of these packs to parents will occur via methods considered appropriate and most effective by the Authorised Supervisor. The research team will aim to hand recruitment packs directly to parents when they drop-off or pick-up their children from childcare. This will also enable parents to ask research staff questions about the research. Other distribution methods may include the service emailing parents or placing recruitment packs in children's pigeon holes, lockers or bags. The recruitment packs will be brightly coloured and include an information sheet, consent form and return envelope.

4. *Parent reminders:*

Two weeks after delivery of the recruitment packs, reminder letters will be disseminated via the same channels as described above. The letters will remind parents about the study and the opportunity to participate.

Parents will be asked to sign and return the consent form in the envelope provided to the service their child attends (Appendix 2.3). Parents will have up to three weeks to return their consent form. The consent form includes items that ask for some demographic information about the parent and child, the usual number of days their child attends the service each week, and the outside of care physical activity and small screen recreation habits of their child on a usual week day. In order to identify any bias due to selective non-participation, all parents will be asked to complete the items on the consent form and return it regardless of whether they consent to study participation.

RANDOM ALLOCATION OF CHILDCARE SERVICES

Childcare services will be allocated to either the intervention or control condition using block randomization performed in a 1:1 ratio in randomly sequenced blocks of two, four or six by a computerized random number function in Microsoft Excel. Allocation of services will be undertaken by a statistician who will have no other involvement in the study, and will occur after all services have been recruited into the trial. As evidence suggests physical activity practices in childcare services differ according to the socio-economic status of the area in which the service is located²⁵ the random allocation of childcare services will be stratified by the socioeconomic characteristics (high/low) of the service locality. Childcare services in a postcode area with a socio-economic status ranked in the top 50% of NSW, based on the Socio-Economic Indexes for Areas²⁶ will be defined as a 'high socio-economic area service' and those within a postcode area with a socio-economic status ranked in the lower 50% will be defined as a 'low socio-economic area service'. Due to the difficulty in blinding services to their group allocation, this trial will be an 'open' trial. After services have consented to participate in the study a member of the research team not involved in recruitment or data collection will inform services of the group to which they were allocated.

INTERVENTION

THEORETICAL PERSPECTIVE

Chapter 3 found that the effectiveness of interventions are maximised when an appropriate theoretical framework is utilised to guide intervention development.^{12,27} The multi-level intervention, described below, was designed using social ecological models of health behaviour change. Social ecological approaches acknowledge the multiple interrelated influences on health behaviours across social, cultural, and environmental domains.^{28, 29} The social ecological framework has been identified as a suitable conceptual model for the design

of physical activity interventions³⁰ and has been applied when describing correlates of children's physical activity behaviours.^{6, 31} Furthermore, school-based interventions grounded in such social ecological theory have been found to be effective in increasing physical activity levels of children by altering instructional practices and the environment.³² Drawing on the social ecological framework the intervention aims to influence children's physical activity behaviour through the manipulation of mediators across the social, physical and organisational environment of childcare services.³³ Specifically the intervention will target staff instructional practices and interactions with children (social), service physical activity policy and programming (organisational) and the characteristics and equipment available within play space (physical environment).

PHYSICAL ACTIVITY INTERVENTION

The intervention components are consistent with the recommendations of the Australian National Physical Activity guidelines for children⁶ and the Australian National Healthy Eating and Physical Activity Guidelines for Early Childhood Services.²⁰ The intervention has been designed and will be overseen by an advisory group with representation from the Department of Community Services, the New South Wales Health Department, Authorised Supervisors from local services, health promotion practitioners, paediatric researchers and physical activity experts. The intervention will be delivered by staff of participating intervention group long day care services. Based on evidence from descriptive and available experimental research to increase child physical activity levels and reduce time spent being sedentary in childcare^{12, 19}, the intervention will comprise of the following components:

1. *Delivering structured fundamental movement skill development sessions:*^{9, 12, 34- 36}

Service staff will deliver daily structured fundamental movement skills (FMS) sessions.

Fundamental movement skills are the building blocks to more advanced movement skills

and specific sport skills.³⁷ Structured activity is defined as those that are teacher initiated.

Each session will include a warm up activity, age and developmentally appropriate teacher led games focusing on one or more FMS, and a cool down activity.

2. *Increasing the number of children's opportunities each day to participate in physical activity:*⁹

Service staff will increase the opportunities provided throughout the day for children to participate in physically active play. This will occur through service staff programming and opportunistically initiating movement based group activities such as dance and group games. This will also include modifying planned activities to incorporate active movement such as transitions between daily activities (such as moving inside to eat lunch or washing hands) and including movement within typically sedentary activities (such as table play e.g puzzles or play dough).

3. *Staff role modeling of active play and delivery of instructional practices:*^{1, 19,20, 34}

Staff will be supported to become active participants during all child initiated free play (role modelling) and provide verbal guidance (prompts to extend active play) and encouragement (positive statements about children's activity) to children to increase physical activity levels.

4. *Providing children with a physical activity promoting indoor and outdoor physical environment:*^{11,29, 34, 38,39}

Services will increase the variety of activity promoting resources and toys available to children in indoor and outdoor areas. This will include varying arrangements of specific portable equipment to maximise child utilisation and interest. Services will also promote physically active play through displays, photos, books and posters within the service.

5. *Limiting children's small screen recreation and sedentary behaviours:*^{6, 19}

Whilst at the service, the amount of time children spend watching or using electronic media will be limited according to current aged based recommendations.⁶ The time children spend in sedentary activities will be limited to periods of less than 30 minutes at a time (except when eating meals or sleeping).

INTERVENTION IMPLEMENTATION STRATEGIES:

The research team will implement a number of strategies to engage services and facilitate their implementation of the physical activity intervention. The strategies to support intervention delivery are based on an organisational and practice change theoretical framework⁴⁰ and are supported empirically.⁴¹⁻⁴⁵ The intervention implementation support strategies will include:

1. *Provision of staff training:*^{46, 47}

All staff from intervention services will be invited to participate in a six-hour workshop to facilitate the implementation of the intervention. The workshop will introduce key physical activity intervention messages and concepts, include demonstrations of intervention activities and familiarisation with intervention resources. The training will support integration of physical activity across other learning areas linking to the service's existing curriculum, programs and activities. The content of the workshop has been piloted with long day care services in the New England Region of New South Wales, Australia.

2. *Provision of resources and instructional materials:*³⁵

All services will receive a package of resources and instructional materials to sufficiently equip staff to implement the intervention. Specifically the resources will include: an intervention manual providing a program rationale and background, current recommendations and best practice guidelines for physical activity in childcare

services; policy template; instructional handbooks and DVD with age and developmentally appropriate physical activity games and play based activities to encourage the development of FMS; laminated activity cards to be used in the classroom with visual and written instructions for setting up and facilitating play based FMS activities; lanyards to be worn by staff during outdoor play with pictures of each FMS including prompts to support teacher demonstration and cues for appropriate teaching. Services will also receive a planning resource in which to develop and record strategies for an individualised service action plan.

3. *Follow-up support:*^{45, 48}

Authorised Supervisors will receive two 15 minute telephone support calls and a two hour service visit from intervention support staff to support the ongoing implementation of intervention components. The telephone support will be provided to Authorised Supervisors at approximately four and 15 weeks post provision of staff training. The service visit will occur approximately seven weeks post training. During the follow-up contacts, intervention support staff will assist Authorised Supervisor to set goals and develop an action plan regarding intervention delivery, review goals and service progress, reinforce service level changes and assist with problem solving. Authorised Supervisors will be asked to document goals, action plans and progress in a booklet provided. Additionally, during the service visits, intervention support staff will discuss any issues that service staff may be experiencing regarding the provision of intervention support.

4. *Performance monitoring, and feedback:*^{45, 48}

Information collected during support contacts with the service will be used to monitor adoption of intervention components. Aggregated and non-identifiable summaries

regarding implementation performance will be distributed to all services following the service visit and second phone contact via a project newsletter. The newsletter will reinforce the intervention components services are implementing well, highlight areas where some services may require improvement, and provide supportive information or case studies to facilitate intervention improvement. Performance feedback regarding individual service implementation will also be provided by program intervention staff during the follow-up service contacts.

5. *Use of relevant and credible opinion leaders:*^{41, 46, 47}

Support to services to deliver the intervention will be provided by two qualified early childhood teachers. The first represents a well-known early childhood training organisation with extensive experience in the provision of training and support for services, particularly with regard to issues of child health. The second is a local practicing Authorised Supervisor, early childhood teacher and lecturer from the School of Education at the University of Newcastle. Both intervention support staff members were selected on the advice of the Program Advisory Group as they are well known, influential and respected experts in the field of physical activity and early childhood, and would be perceived as both a credible and reliable source of information by Authorised Supervisors and service staff.

6. *Securing executive support and endorsement:*⁴¹

The importance and benefits of implementing the physical activity intervention will be communicated to Authorised Supervisors and staff during telephone support calls, service visits and through the dissemination of regular project newsletters describing the implementation success of other services. Authorised Supervisors will be

encouraged to demonstrate executive level support for the implementation and integration of the physical activity intervention into usual service practice through the endorsement and dissemination of service level physical activity policy to staff and parents, and discussing service physical activity practices at staff meetings.

CONTROL GROUP

Participating services randomised to the wait list control group will not receive any intervention support or materials during the study period. All control services will be offered staff training, resources and follow-up support after completion of all follow-up data collection.

DATA COLLECTION PROCEDURES

Research staff involved in data collection will be blind to group allocation and participating services will be asked not to disclose their group allocation to data collection staff during data collection. To assess the effectiveness of blinding, field data collection staff will be asked to guess the group to which they suspect the service was allocated following collection of trial outcome data.

SERVICE OPERATIONAL CHARACTERISTICS

To describe the operational characteristics of participating childcare services information will be collected from the Authorised Supervisor via telephone interview during the recruitment process.

PARENT AND CHILD DEMOGRAPHICS AND PHYSICAL ACTIVITY

Parents will be asked to self-report basic demographic information about their child, as well as complete items assessing their child's usual outside of care physical activity on the participant

consent form at baseline (Appendix 2.3). At follow-up, parents will again be asked to complete the question on child physical activity levels outside of care via a form which they will return to their childcare service. Self-reported physical activity data will be used to assess any physical activity displacement as a result of the intervention.

INTERVENTION IMPLEMENTATION

Information on the implementation of the intervention by staff at each service will be collected via a staff survey, completion of the Environment and Policy Assessment Observation (EPAO) instrument (see data collection tool at Appendix 2.5) on one three to five year class at each service and an audit of service documents. The pen and paper staff survey (Appendix 2.6) will be distributed to all teaching staff at each participating service by the research team two weeks prior to baseline and follow-up collection of physical activity data. The survey will contain items developed by the research team and take approximately ten minutes to complete. Surveys will be coded to ensure answers remain confidential. Completed surveys will be posted back to the research coordinator or collected by field staff when they visit the service for data collection. The survey will measure the extent to which staff within each service implemented the intervention components as intended.

The physical activity component of the EPAO⁴⁹ will be used to assess intervention delivery during a one day field observation of staff practices, and environmental characteristics (Appendix 2.4, study training manual). The EPAO will be conducted in intervention and control services at baseline and follow-up on the day of field data collection assessing child physical activity. Two trained research staff will visit each service. The first staff member will act as the observer and record observations using the observation tool on one three to five year old class at each service. Where a service has multiple classes, one class will be randomly selected to be

the subject of observations. Observations will take place between nine am to three pm, the core hours of service operation. The second staff member will assist with pedometer placement, playground measurement and general administration. The EPAO has been used in both descriptive and intervention studies^{2, 49} and has reported high inter-observer agreement (87.3%).⁴⁹ As part of the EPAO, one research staff member will conduct a brief ten minute interview with Authorised Supervisors during which key physical activity documents including service policies and physical activity curriculum will be viewed and audited. Data collection will be rescheduled in instances where weather conditions disrupt usual service routines and prevent children from using outdoor space (e.g during wet weather or temperatures above 30 degrees celsius).

PHYSICAL ACTIVITY

Data will be collected from children attending each intervention and control service on a day of the week negotiated between the Authorised Supervisor and the research team. All children participating in the study will be asked to wear a pedometer (model Yamax SW200 and SW7000) on one week day over a six hour measurement period between nine am and three pm. Data in each individual service will be collected for the same day of the week in the baseline and follow-up data collection periods.

Pedometers are unobtrusive battery-operated instruments that are lightweight and about the size of a match-box. Pedometers measure vertical oscillations of body movement⁵⁰, and provide a total count of accumulated movements over the data collection time period.⁵¹ Pedometers have been identified as a suitable tool for large-scale studies given their low cost and feasibility.^{51, 52} Additionally, pedometers have been demonstrated to be an accurate and reliable method of measuring physical activity levels in children^{56, 58} and preschool aged children.^{6, 51, 54} Participant burden associated with wearing a pedometer is minimal⁵⁴,

furthermore, it has been found that preschool age children are comfortable with the contact required to collect the data (by pedometer).⁵¹

The procedures for fitting participants with pedometers will follow protocols utilised in previous studies with young children (Appendix 2.4).^{38,51,53} Pedometers will be attached by trained research staff to the clothing of children above the right hip and in line with the right knee. If children wear dresses, loose pants or shorts, the pedometer will be attached to a small adjustable elastic belt worn by children at the waist. Pedometers will be set to zero at the beginning of the measurement period. Total step counts will be collected by research staff at the end of the measurement period. Pedometer data collection will also be rescheduled in instances where weather conditions disrupt usual service routines.

INTERVENTION ACCEPTABILITY

Information on the acceptability of the intervention and intervention resources will be collected through inclusion of items in the staff survey at follow-up for intervention services only.

ADVERSE EVENTS

Information on adverse events will be assessed via interview with Authorised Supervisors in both intervention and control groups at baseline and follow-up.

MEASURES

CHILDCARE OPERATIONAL CHARACTERISTICS

Operational information sought from the service will include number of years in operation, number of enrolled and attending children aged three, four and five years, and number of primary contact teaching staff (educators).

PARENT AND CHILD DEMOGRAPHICS AND PHYSICAL ACTIVITY

Parents will be asked to report child age, Aboriginal and/or Torres Strait Islander status, gender, postcode of residence and parental education level on the participant consent form. Parents will also be asked about the usual number of days their child spends at long day care each week and the usual amount of time their child spends being physically active and participating in small screen recreation during weekdays outside of care hours. Items assessing demographic and time spent in physical activity and small screen recreation outside of care were based on those used in other population based surveys of preschool age Australian children.⁵⁵

INTERVENTION IMPLEMENTATION

Triangulation will be used to assess the extent to which services implemented the intervention as intended. First, data from the staff survey will assess how often staff report delivering structured fundamental movement skill activities for three to five year olds; the inclusion of warm ups, cool downs and skill specific feedback in FMS activities and the usual amount of time that structured FMS activities run for. The survey will also assess the frequency with which service staff report delivering verbal prompts and participating in children's active play; the number of occasions per day that the majority of three to five year old children are sedentary for over 30 minutes at a time (excluding meal and nap times); and how often three

to five year old children participate in small screen recreation activities including usual length of time for each occasion.

Second, the EPAO field study will provide observational information on key physical activity intervention components occurring at the service on the day of data collection. This will include the number of occasions and total minutes of outdoor play, teacher led physical activities and structured fundamental movement skills activities during the six hour observation period. The number of times during the observation period that staff deliver prompts to increase activity and make positive statements to encourage activity, the number of times staff join in children's active play, total minutes of children's sedentary activity and small screen recreation. The observation will involve identifying the presence of portable and fixed play equipment in indoor and outdoor areas, a description of the space available for indoor and outdoor play (limited room for active play, obstructed by furniture or equipment), and a checklist of features of the outdoor play space such as playground surfaces and markings, vegetation and the presence of physical activity displays, books and posters.

Third, data collected as part of the EPAO Authorised Supervisor interview and service audit will be used to assess the presence of a physical activity policy, support within the policy for limiting small screen recreation time, integrating physical activity into the curricula and the provision of daily fundamental movement skills activities.

PHYSICAL ACTIVITY

The primary trial outcome is child physical activity level, operationally defined as step counts per minute^{34, 38, 51} as measured by pedometers over the six hour operational period of services, from nine am to three pm.

INTERVENTION ACCEPTABILITY

At follow-up the intervention service staff survey will include items assessing the use, acceptability and satisfaction with the intervention training and support provided to staff and services as part of the intervention. The items will require staff to respond to a series of statements on a four point Likert scale ranging from strongly agree to strongly disagree. Acceptability items were developed by the research team based on previous assessments of staff acceptability in delivering health promotion programs.⁵⁶

ADVERSE EVENTS

Adverse events were assessed by asking Authorised Supervisors “What was the number of injuries recorded at your service” in the month of data collection at baseline and follow-up.

SAMPLE SIZE AND POWER CALCULATIONS

Assuming a step count per minute of 17 among children attending control services and an intra-class correlation of 0.1⁵⁷ a sample size of approximately 280 children (140 per group) attending 20 services at the six month follow-up will be sufficient to detect a difference between intervention and control groups of four steps per minute with 80% power at the 0.05 significance level. Assuming that long day care services care for 30 children aged three to five years per day on average, a study participation rate of 65% will be required to obtain the desired sample given a 20% attrition rate at the follow-up assessments.

ANALYSIS

All statistical analyses will be performed with SAS (version 9.2 or later) statistical software. All statistical tests will be two tailed with an alpha value of 0.05. Descriptive statistics will be performed to describe the demographic and service characteristics of intervention and control

groups at baseline. Similarly measures of intervention implementation will be described using descriptive statistics.

The effectiveness of the intervention on child physical activity will be assessed utilising an intention to treat approach. An intention to treat analysis includes all participants in the analysis, based on the groups to which they were allocated, without excluding data based on missing outcomes or non-adherence.²¹ Specifically, linear mixed models will be used to examine between group differences on the primary trial outcome. Such analyses account for the correlation between pre and post measures and adjust for clustering. Any differences in the characteristics of participants at baseline will be adjusted for in the final linear model. To ensure the results are robust, a sensitivity analysis will be performed whereby participants' observations at baseline will be used as a substitute for any subsequent missing data. A per-protocol analysis will also be conducted with participants from services which have sufficiently implemented the intervention.

Acceptability of the intervention among staff of services will be assessed by collapsing Likert scale categories and reporting the percentage of staff who responded 'strongly agree' or 'agree' to each acceptability item.

DISCUSSION

There is a clear need for intervention studies to extend research regarding the effectiveness of interventions to increase physical activity behaviours of young children attending childcare.²⁰ This trial aims to advance the currently limited experimental evidence in this field and will contribute important information regarding the effectiveness, feasibility and acceptability of comprehensive service based strategies to address physical activity at

childcare. Strengths of this study include the trials randomised design, the use of theory, and multi-disciplinary input into the intervention design, the implementation of the intervention by usual service staff, and, the use of an objective measure of physical activity.

CONCLUSION

This manuscript provides a description of the implementation of a cluster randomised controlled trial of a multi-component intervention aimed at increasing physical activity levels of preschool aged children attending long day care services. The study is one of a handful of randomised trials of such interventions internationally and will contribute greatly to the evidence regarding the effectiveness of strategies in this setting.

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

First author MFinch led the development of this manuscript. Authors LW, PM, MFinch and JW conceived the intervention concept. Authors LW, PM, JW and MFreund secured grant funding from Hunter Medical Research Institute. Author RW contributed to the development of the recruitment protocol. All authors contributed to the research design and trial methodology and contributed to, read and approved the final version of this manuscript.

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CHAPTER 4B

A CLUSTER RANDOMISED TRIAL TO EVALUATE A PRAGMATIC, STAFF DELIVERED INTERVENTION TO INCREASE PHYSICAL ACTIVITY AMONG CHILDREN ATTENDING CHILDCARE

A version of this chapter was published as a paper in Preventive Medicine

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ABSTRACT

Objective. To evaluate the impact of a multi-level intervention on the physical activity levels of three to five year old children attending childcare services.

Method. The trial was conducted in New South Wales (NSW) Australia in 2010 in 20 childcare services with 459 children. The intervention, included: fundamental movement skill sessions; structured activities; staff role modelling; limiting small screen recreation and sedentary time; and an activity promoting physical environment. Control services continued with usual routines. Physical activity during care was assessed using pedometers at baseline and at six months after baseline. Intervention implementation was assessed via observation of staff physical activity practices and audits of service environment and policy.

Results. Mean step counts at baseline and follow-up were 17.20 (CI 15.94-18.46) and 16.12 (CI 14.86-17.30) in the intervention group and 13.78 (CI 12.76-14.80) and 13.87 (CI 12.57-15.17) in the control group ($p=0.12$). Intervention services showed significantly greater increases in the total minutes that teachers led structured activities, relative to control group services ($p=0.02$).

Conclusion. The intervention showed no significant effect on child step counts per minute despite increasing time that staff delivered structured activity which is likely to be attributable to difficulties experienced by service staff in delivering a number of intervention components.

INTRODUCTION

Adequate physical activity for preschool age children (age three to five years), promotes bone health, is protective against obesity and contributes to social, psychological and fundamental motor skill development.¹⁻⁸ The United States National Association for Sport and Physical Education have recommended that three to five year old children should engage in at least 60 minutes of structured physical activity per day.⁹ Australian physical activity recommendations advise that children aged three to five years participate in a minimum of three hours of physical activity per day.¹⁰ Compared with these recommendations, research suggests that young children are not adequately physically active.^{11, 12} For example a systematic review of 39 studies from seven countries (United States, Scotland, Finland, Australia, Chile, Estonia, Belgium) found that overall, only 54% of two to six year old children participated in moderate to vigorous physical activity for at least 60 minutes per day.¹³

Childcare services represent a unique opportunity to deliver interventions to increase young children's physical activity levels. They provide access to a significant proportion of the population under five years, often for prolonged periods.¹⁴ Research also suggests that young children are not sufficiently active during attendance at care.¹⁵⁻¹⁸ A number of service characteristics have been associated with increased child activity, providing a potential target for physical activity interventions. Specifically, delivery of structured physical activities^{15, 19}; fundamental movement skill programs^{20, 21}; limiting small screen recreation opportunities^{16, 22}; staff involvement in, and verbal prompting of children's active play^{23, 24}; having a physical activity policy^{15, 25}; and adequate availability of portable play equipment.¹⁵ Interventions targeting such characteristics that are

effective and able to be implemented by existing childcare service staff, as opposed to external experts, have particular public health appeal as they are not reliant on external staff or experts or constrained by additional costs associated with their employment. However, findings from Chapter 3 indicated that while there was evidence to support the effectiveness of non-pragmatic interventions, pragmatic interventions in this setting did not significantly improve child physical activity.²⁶

In this context, we sought to assess the effectiveness and acceptability of a pragmatic physical activity intervention, delivered by childcare service staff, in increasing the physical activity levels of children attending childcare services. We hypothesized that children in services assigned to the intervention group would exhibit higher step counts per minute than children in services where usual care was provided. We also sought to measure intervention implementation, acceptability and any unintended adverse effects of the intervention on child injury. This chapter will describe the conduct and results of this trial.

METHODS

DESIGN AND SETTING

A detailed protocol for the trial has been published elsewhere.²⁷ The cluster wait-list randomized controlled trial (see Figure 4B.1) was conducted in a sample of eligible childcare services (centre-based care including long day care services providing care for a minimum of eight hours a day). The sample was located across three local government areas of NSW, Australia and the study took place between March and October 2010. All trial outcomes reported in this article were registered

with the Australian New Zealand Clinical Trials Registry (ACTRN12610000087055). The study was approved by the Hunter New England Area Human Research Ethics Committee (approval No.09/09/16/5.12) and University of Newcastle Human Research Ethics Committee (approval HREC/09/HNE/286) (Appendix 2.1).

PARTICIPANTS AND RECRUITMENT

Recruitment was conducted from January to February 2010.

CHILDCARE SERVICES

To be eligible to participate in the trial, services were required to have at least 25 enrolled children aged between three and five years. A total of 70 childcare services in the study region served as the sampling frame.

CHILDREN

Children aged three to five years attending participating services were eligible for the study if they attended on the day of the week nominated by the Authorised Supervisor for baseline data collection.

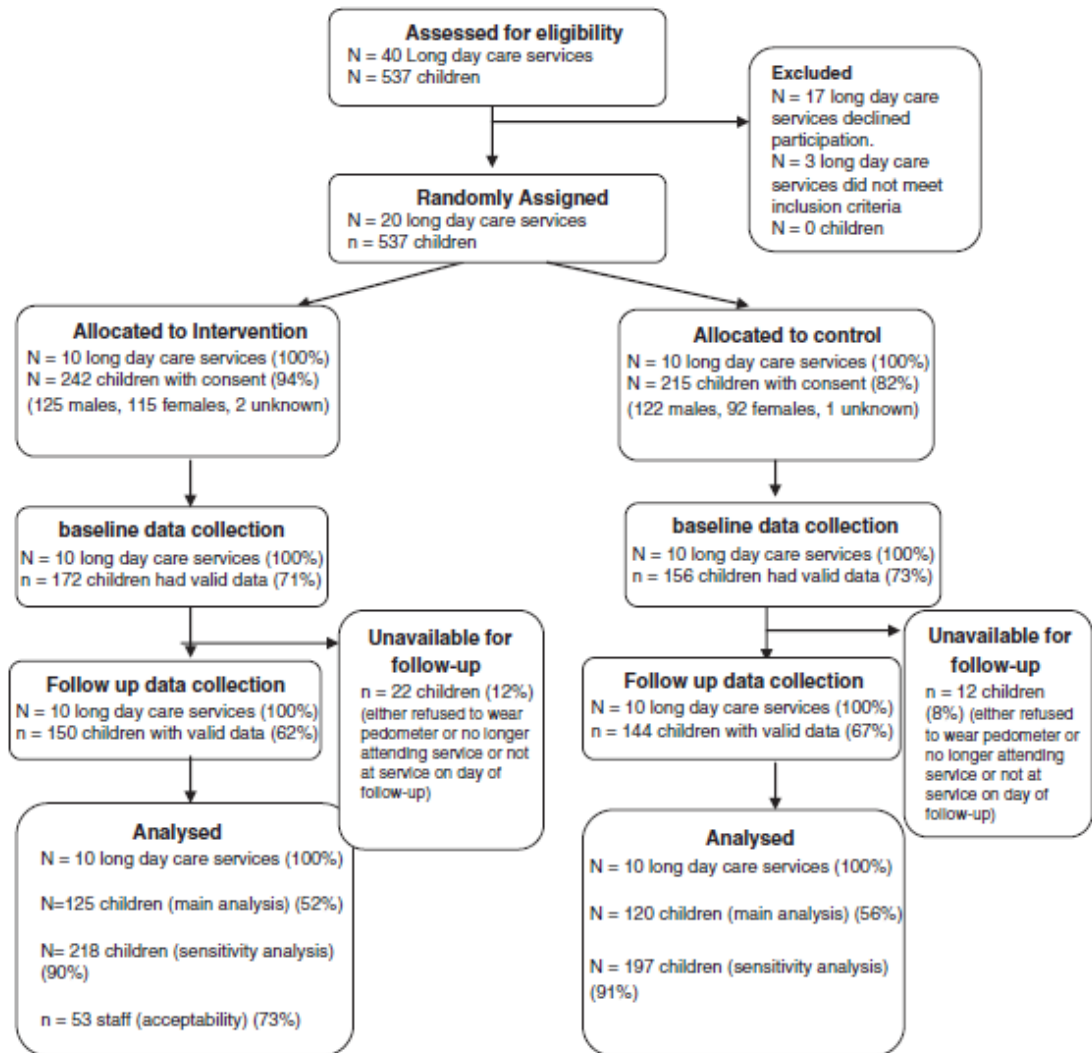


FIGURE 4B.1 CONSORT flow diagram

RANDOMISATION AND ALLOCATION

After the completion of service recruitment, a statistician not associated with the project allocated services to either the intervention or control condition using block randomization performed in a 1:1 ratio in randomly sequenced blocks of two, four or six by a computerized random number function in Microsoft Excel. Randomization of long daycare services was stratified by socioeconomic status based on evidence of an association with service adoption of physical activity promoting practices²⁸, with such status being determined by the postcode in which the service was located.²⁹ Services were informed of group allocation via a letter after baseline data collection.

INTERVENTION

The multi-level intervention, designed using social ecological models of health behavior change³⁰, aimed to influence children's physical activity behaviour through the manipulation of mediators across the social, physical and organisational environment of the childcare services.^{25, 31} Specifically the intervention targeted staff instructional practices and interactions with children (social), service physical activity policy and programming (organisational) and the characteristics and equipment available within play space (physical environment). The social ecological framework has been identified as a suitable conceptual model for the design of physical activity interventions³² and has been applied when describing correlates of children's physical activity behaviours.^{22,33} Furthermore, school-based interventions grounded in such social ecological theory have been found to be effective in increasing physical activity levels of children by altering

instructional practices and the environment.³⁴ The intervention was delivered over a four month period and comprised of the following components:

1. *Daily structured fundamental movement skill development sessions:*

The 20 minute session included a warm up activity, an age and developmentally appropriate teacher led game focusing on one or more fundamental movement skill, and a cool down activity.

2. *Increased opportunities each day for children to participate in physical activity:*

Service staff were asked to, over the course of the usual day, program and opportunistically initiate physically active, structured, teacher led activities such as movement based group or circle time (where children participate in dance and group active games) and modifying planned activities to incorporate active movement such as during transitions between routine activities (e.g. children performing a locomotor skill on their way to lunch).

3. *Staff role modeling of active play and delivery of instructional practices:*

All staff were asked to participate with children during active child initiated free play (role modeling) and provide verbal guidance (prompts to extend active play) and encouragement (positive statements about children's activity) during each free-play period.

4. *Providing children with a physical activity promoting indoor and outdoor physical environment:*

Services were asked to make more readily available their existing activity promoting resources and portable equipment to children in indoor and outdoor areas (for example ball and batting play equipment, skipping ropes, hula hoops, tumbling mats, twirling play

equipment and climbing frames). Services were also encouraged to include, photos, books and posters promoting physical activity within the service.

5. *Limiting children's small screen recreation and sedentary time:*

Staff were asked to limit the amount of time children spent watching or using electronic media whilst at the service and limit time children spent sitting still to periods of less than 30 minutes at a time (except when eating meals or sleeping).

STRATEGIES TO SUPPORT INTERVENTION IMPLEMENTATION

Strategies employed to support intervention implementation by service staff are described in detail elsewhere.²⁷ In brief, they included: a 6 hour training workshop for service staff (a choice of four sessions were made available on different dates and days of the week in order to maximise the opportunity for attendance by staff in intervention services), provision of resources and instructional materials; delivery of follow-up support (two telephone support calls and a two hour service visit over the four month intervention period); performance feedback on service implementation of intervention components via a project newsletter on two occasions; incentives (entered into a draw to win Au\$500 vouchers for educational toys and resources) for the development of a physical activity policy; and having reliable and credible opinion leaders (qualified early childhood teachers, who are respected experts in the field of physical activity and early childhood) deliver the training and follow-up support and; securing executive support and endorsement through engagement of the service manager.

CONTROL GROUP

Services allocated to the wait list control group did not receive the intervention or any intervention support or materials during the study period and were offered the intervention after collection of all follow-up data.

DATA COLLECTION PROCEDURES AND MEASURES

Baseline data collection occurred between March-April 2010 and post intervention follow-up data were collected six months later (September-October 2010).

SERVICE, PARENT AND CHILD CHARACTERISTICS

Service operational information was collected from the Authorised Supervisor via a telephone interview during service recruitment and environmental and additional staffing and child number data were assessed by field data collection staff on the day of baseline data collection. Measures include: socioeconomic status of the area based on service postcode location³⁵, number of years in operation, total number of three to five year old children enrolled, number of children enrolled to attend on the day of data collection, number of university trained teaching staff, number of room staff working on the day, number of staff per child on day, outdoor play area (m²) and fixed play equipment in the outdoor environment. Fixed play equipment includes balancing surfaces (balance beams, boards etc.), basketball/netball hoop, climbing structures, sandpit, see-saw, slides, swinging equipment (swings, rope etc.), tricycle or bike track, tunnels, trampoline or vegetable garden. The observation also identified the presence of portable and fixed play equipment in indoor and outdoor areas.

Parent and child demographic information were assessed via a brief parental self-report survey included with the child consent form. Measures obtained included: parental education level; socioeconomic status of residence based on postcode; child age, sex; Aboriginal and/or Torres Strait Islander status; number of days spent at long daycare each week; and time children spend being physically active and participating in small screen recreation during weekdays outside of care hours.

CHILD PHYSICAL ACTIVITY

Child physical activity was measured using pedometers (model Yamax SW200 and SW7000). Step counts during attendance at care were recorded between nine am and three pm on the same day of the week at both baseline and follow-up. Craig et al as part of a large nationally representative survey of pedometer-determined physical activity in youth including children, reported that one day of pedometer monitoring yielded a valid representation of steps per day relative to the whole week in terms of both reliability (ICC = 0.79) and validity (relative absolute percent error [APE] = <10%).³⁶ Pedometers measure vertical oscillations of body movement³⁷, and provide a total count of accumulated movements over the data collection time period³⁸ and are suitable for assessing accumulated time spent being physically active.^{7, 8} Pedometry has been shown to be a reliable and valid measure of physical activity in preschool age children (age three to five years)^{7, 8, 37-39} and has been used in intervention studies assessing child physical activity levels attending childcare.^{17, 40} Participant burden associated with wearing a pedometer is minimal⁴¹, reactivity is minimal³⁶ and preschool age children are comfortable with the contact required to collect the data (by pedometer).³⁹ Pedometers were attached by trained research staff to the clothing of children above the right hip and in line with the right knee.^{17, 38, 39} Each participant's count was reviewed to

identify possible malfunctioning, or resetting. All research staff involved in data collection were blinded to group allocation. Step counts per minute were calculated, with data being considered valid if the pedometer had not malfunctioned, been reset and was worn for at least three hours.

IMPLEMENTATION OF INTERVENTION

Implementation of intervention policies and practices were measured in intervention services through an observational audit based on the physical activity component of the Environment and Policy Assessment Observation (EPAO) (Appendix 2.4).⁴² The EPAO has been used in both descriptive and intervention studies^{3, 42} and has reported high inter-observer agreement (87.3%).⁴² The EPAO was conducted by two trained research staff at baseline and follow-up over a six hour observation period in the indoor and outdoor play area of each service between the core service hours of nine am to three pm on the day that children's physical activity was measured. This included a ten minute interview with Authorised Supervisors. Such assessments were also conducted in controls services to describe secular changes. For both groups, the EPAO assessed the number of occasions and total minutes that children participated in: fundamental movement skills sessions; physically active structured (teacher led) activities; and small screen recreation. The number of minutes of seated time and number of times such activities exceeded a 30 minute period were assessed as were the number of times staff: delivered prompts to increase child activity; made positive statements to encourage activity; and joined in children's active play. The observation also identified the presence of physical activity displays, books and posters, a written physical activity policy and portable play equipment in indoor and outdoor areas. Portable play equipment included ball play equipment, climbing structures (ladders, frames), floor play equipment (tumbling mats, carpet squares), jumping play equipment (skipping ropes, hula hoops),

parachute, push/pull toys that require the children to stand when playing (wagon, scooters, prams), riding toys (tricycles, cars), rocking and twisting toys (rocking horse), sand/water play toys (buckets, scoops, shovels), slides, twirling play equipment (ribbons, scarves, batons), batting equipment (foam bats, light weight cricket bats), foot prints (stones, bricks, tiles, wood blocks), aiming equipment (portable goals, poles with baskets, targets), mini trampolines, balancing equipment, trucks and cars.

INTERVENTION ACCEPTABILITY

Data regarding intervention group staff acceptability of the intervention resources was collected via a written survey completed at follow-up for intervention group services. Data regarding uptake of training by services was sourced from program records which were collected by research staff during implementation. Acceptability of the resources, training and overall program was assessed by asking staff to respond to a Likert scale including ‘strongly agree, agree, disagree, strongly disagree’ for the following items; The information in the Guide is easy to understand; The information in the Guide is appropriate to the long daycare setting ; The information in the Activity Handbook can be applied in the long daycare setting;The information in the Activity Handbook is easy to use; Children found the activities from the Handbook enjoyable; The activities in the Handbook were age and developmentally appropriate;The Activity Cards are easy to use; Children found the activities in the cards enjoyable; The activities in the handbook were age and developmentally appropriate. In regards to training and overall satisfaction, the following items were similarly assessed: I would recommended the training to other childcare staff; The information covered in the training was useful; I learned new information at the training that I could apply in my day to day practice; The children attending our service benefited from

participation in the program; I benefited from participation in this program; I would recommended the program to other children's services staff. Reach was assessed using the total number of staff at each service eligible to attend training.

ADVERSE EVENTS

Information on adverse events was assessed via interview with Authorised Supervisors in both intervention and control groups at baseline and follow-up. Adverse events were assessed by asking Authorised Supervisors "What was the number of injuries recorded at your service" in the month of data collection at baseline (March 2010) and follow-up (August 2010).

TEMPERATURE

Baseline data was collected during autumn and follow up collected during winter/spring. Information on minimum and maximum daily ambient temperature (degrees celcius) were obtained from local meteorological data each data collection day during baseline and follow-up data. The average of the minimum and maximum temperatures was then calculated for each data collection period.

SAMPLE SIZE AND POWER CALCULATIONS

Assuming a step count per minute of 17 among children attending control services and an intra-class correlation of 0.1⁴³ it was calculated that recruiting 350 children from 20 childcare services would provide a sample of 280 participants (140 per group) at the final follow-up data collection. This was based on the assumption that services cared for 30 children aged three to five years per day on average (Unpublished data), an estimated child participation rate of 65% and 20% attrition

at follow-up. Such a sample size was sufficient to detect a difference between the intervention and control groups of four step counts per minute with 80% power at the 0.05 significance.

ANALYSIS

All statistical analyses were performed with SAS (version 9.2) statistical software. All statistical tests were two tailed with an alpha value of 0.05. Mean, standard deviation, and percentages were calculated to describe the parent and child demographic and service characteristics of intervention and control groups at baseline. Step counts were converted to a rate per minute based on wear time.^{17, 38} The analysis of the step count data was completed using a generalised linear mixed model, which is a hierarchical model with random intercept terms for childcare service and for children nested within each service. Such analyses account for the correlation between pre and post measures and adjust for clustering within childcare services. The outcome in the model was the child's step count with predictors of time, group and an interaction term for time by group. The coefficient of the interaction term is an estimate of the differential change between groups. The analysis used all available participants with data for both time points. A sensitivity analysis imputed step-counts forwards or backwards as a substitute for missing data where participants had consented but were unavailable on the day of data collection at either baseline or follow-up. Intervention effect on staff practices, organisational policy, environment and adverse events were estimated using logistic regression. The logistic regression models included terms for time, group (intervention or control group) and the interaction of time and group. Results are described as mean and standard deviation (SD) or as a count. Acceptability data was calculated using the percentage of staff that reported either 'strongly agree' or 'agree' to each item.

RESULTS

Figure 4B.1 describes the participation of services and participants in the trial. Of the 537 eligible children, consent was obtained for 459 (84%) to participate in baseline and follow-up data collection. Of these 348 (65%) were available at baseline to wear the pedometers and 328 (61%) provided valid data. At follow-up 317 (59%) of the original 459 children were available to wear pedometers and of these 294 (55%) had valid data.

SERVICE, PARENT AND CHILD CHARACTERISTICS

Service and participant characteristics by intervention and control group are shown in Table 4B.1. A higher percentage of control group services were located within areas of higher socioeconomic classification (90 vs 60%) and reported being in operation for more years than services in the intervention group (20 vs 8 years). The control group also had a higher proportion of parents residing in areas of higher socioeconomic classification (82 vs 65%) and a higher proportion of children of Aboriginal or Torres Strait Islander background (4.6 vs 2.9%).

CHILD STEP COUNTS

The between group analysis comparing rate of change in mean child step counts per minute from baseline to follow-up were non-significant $p=0.12$. Specifically mean child step counts in the intervention group at baseline and follow-up were 17.20 (CI 15.94-18.46), and, 16.12 (CI 14.86-17.30) and in the control group were 13.78 (CI 12.76-14.80), and 13.87 (CI 12.57-15.17) (Table 4B.2). This non-significant result remained for the sensitivity analysis when children's step counts per minute at baseline and follow-up were imputed for missing data at both time points ($p=0.07$).

Table 4B.1: Service, parent and child characteristics by group

AT BASELINE	INTERVENTION		CONTROL	
Service characteristics	n=20		n=20	
SEIFA in top half of state %	60.0		90.0	
Years of operation- mean (std)	7.8	(4.44)	20.0	(10.1)
Children enrolled – overall mean (std)	64.3	(21.2)	58.5	(25.4)
Children enrolled on day of collection- mean (std)	30.6	(7.21)	27.1	(9.60)
Number of Tertiary qualified staff –mean (std)	1.7	(1.5)	1.6	(1.2)
Number of children in class observed–mean (std)	21	(5.5)	19	(7.0)
Number of staff working on survey day–mean (std)	3.1	(0.6)	3.1	(0.9)
Number of children per staff member–mean (std)	6.6	(1.3)	6.2	(2.1)
Outdoor play area size (m2) –mean (std)	435	(233)	342	(81)
median (min, max)	395	(78, 806)	334	(234, 534)
Number of types of fixed play equipment–mean(std)	3.3	(1.3)	3.3	(2.1)
median (min, max)	3.0	(1.0, 5.0)	2.5	(1.0, 7.0)
Parent characteristics				
Consenting parent has university qualification (%)	50.0		51.0	
Parent residential area socioeconomic classification in top half of state	65.0		82.0	

Table 4B.1: Service, parent and child characteristics by group (*continued*)

AT BASELINE	INTERVENTION	CONTROL
Child characteristics ^a	n=172	n=156
Age of child (%)		
3 years	37.0	35.0
4 years	57.0	61.0
5 years	5.3	3.9
Male (%)	54.0	60.0
Aboriginal or Torres Strait Islander (%)	2.9	4.6
Days a week the child usually attends (%)		
1 day	3.5	13.0
2 days	45.0	41.0
3 days	31.0	27.0
4 days	9.7	17.0
5 days	11.0	2.6
Time child spends being physically active outside childcare (%)		
Zero/none	0.8	0.9
1-30 minutes	14.4	9.8
31-120 minutes	54.0	66.0
121-180 minutes	12.0	12.0
Greater than 3 hours	18.0	12.0
Time child spends watching Television, video, DVD or computer games outside childcare (%)		
Zero/none	3.8	5.2
1-30 minutes	25.4	25.0
31-60 minutes	28.0	28.0
Greater than 60 minutes	28.0	27.1

^a All children who had valid pedometer data at baseline

Table 4B.2: Pedometer step counts by group

		STEP COUNT PER MINUTE (sd)				ICC ^c	Effect size	t-value	p value
		Intervention	95% CI	Control	95% CI				
^a	Main Baseline analysis	17.20	15.94-18.46	13.78	12.76-14.80	0.23			
		(7.33)		(5.61)					
		N=172		N=156					
	Follow-up	16.12	14.86-17.38	13.87	12.57-15.17	0.23	1.39	1.56	0.12
		(6.22)		(6.25)					
		N=125		N=120					
^b	Sensitivity Follow-up analysis	16.09	15.06-17.12	13.85	12.87-14.83		1.28	1.85	0.07
		(6.76)		(6.07)					
		N=218		N=197					

^a All children with valid data at both time points with no imputation^b All children with valid data at both time points and imputing both forwards and backwards to that those that only have data for one time point have their data imputed for the other (BOCF)^c Intra-class correlation coefficient based on ANOVA

IMPLEMENTATION OF INTERVENTION

Table 4B.3 shows the results for implementation of intervention components by group over time. Relative to the control group, intervention group services showed significantly greater increases in total minutes that staff were observed to deliver structured activities ($p=0.02$). There were no other significant between group differences in the prevalence of supportive practices, policy or environmental characteristics.

ACCEPTABILITY

Staff reported high satisfaction with the program overall (93-98%), and the resources (60-100%), with unanimous satisfaction reported for the training (100%). All intervention services had staff attend the training workshop with an average of 3.5 staff members attending from each service, representing 41% ($n=34$) of all intervention service staff. The range of staff participation in the workshop for intervention services was 18-100%.

ADVERSE EVENTS

At baseline the injury rate per month was 0.18 (CI 0.09-0.27) in the intervention group and 0.12 (CI 0.04-0.20) in the control group. At follow-up the injury rate per month for the intervention group was 0.17 (CI 0.08-0.27) and 0.11 (CI 0.03-0.19) in the control group. When comparing groups there was no significant difference observed in the injury rate per month ($p=0.85$).

TEMPERATURE

During the baseline data collection period the mean ambient minimum temperature was 18.7 and mean maximum temperature was 26 degrees celcius. During follow-up data collection period the mean minimum temperature was 11.9 and mean maximum temperature 20 degrees celcius.

Table 4B.3: Pedometer step counts by group

OBSERVED PRACTICE AND POLICY	MEASURE	INTERVENTION (n=10)		CONTROL (n=10)		Interaction <i>p</i> value
		Baseline	Follow-up	Baseline	Follow-up	
Fundamental movement skill development activity sessions	Total occasions	0.00	0.80	0.10	0.30	0.07
	Mean (std)	(0.00)	(0.92)	(0.32)	(0.48)	
	Total minutes	0.00	4.30	1.70	2.50	0.24
	Mean (std)	(0.00)	(6.09)	(5.38)	(4.84)	
Staff delivery of structured physical activity	Total minutes of structured physical activity	23.67	52.40	37.80	27.00	0.02
	Mean (std)	(6.03)	(45.29)	(13.33)	(1.41)	
Staff role modeling of active play and delivery verbal prompts	Number of times staff participated in active play	4.90	6.30	5.30	3.70	0.08
	Mean (std)	(3.84)	(4.16)	(5.62)	(4.60)	
	Number of times staff prompted to initiate or increase physical activity	6.40	5.40	12.90	9.80	0.75
	Mean (std)	(5.52)	(5.52)	(13.15)	(13.46)	
	Number of times staff provided positive statements about physical activity	9.20	10.90	17.80	7.40	0.07
	Mean (std)	(6.96)	(17.19)	(15.49)	(9.75)	
Limiting small screen recreation and sedentary time	Total minutes of television viewing	0.00	0.00	6.90	12.00	0.29
	Mean (std)	(0.00)	(0.00)	(21.82)	(37.95)	
	Number of services with any observed seated time exceeding 30 minutes	4	4	6	3	0.34
	Total minutes of seated time	39.17	45.71	52.11	45.80	0.56
	Mean (std)	(41.27)	(25.82)	(27.82)	(27.44)	

OBSERVED PRACTICE AND POLICY	MEASURE	INTERVENTION (N=10)		CONTROL (N=10)		Interaction <i>p</i> value
		Baseline	Follow-up	Baseline	Follow-up	
Physical activity promoting resources and materials	Number of posters, pictures or displayed books about physical activity	2.33	4.25	1.00	9.33	0.20
	Mean (std)	(2.31)	(2.06)	(.)	(10.21)	
Portable equipment	Number of portable play equipment items indoors	0.50	0.20	0.50	0.30	0.77
	Mean (std)	(0.53)	(0.63)	(0.71)	(0.48)	
	Number of portable play equipment items outdoors	0.50	0.20	0.50	0.30	0.77
	Mean (std)	(0.53)	(0.63)	(0.71)	(0.48)	
Policy	Number of services with a written physical activity policy	3	5	2	6	0.50

^a The interaction *p* value is to see if there is a different effect of the intervention over time on the outcome

DISCUSSION

This randomized controlled trial sought to assess the impact of a pragmatic intervention delivered by existing childcare service staff to increase objectively measured child physical activity in care. The findings indicate that while the intervention increased the amount of time staff spent delivering structured activities and was considered highly acceptable, no significant intervention effect on child step counts per minute during care were found.

A number of factors may have contributed to this result. First, at both time points mean child step counts per minute were higher (+3.42, +2.25) in the intervention group compared to the control group limiting scope for further increases. There is also the potential that differences between groups in the service level characteristics assessed or other environmental characteristics that were not assessed in this study such as playground topography (trees, shrubbery, and broken ground)¹⁷ may have acted as confounding factors. Future studies randomizing a greater number of services will reduce the risk of confounding. Intervention implementation data also provides potential explanation of the trial results. Although observational data indicated that intervention services provided significantly more time for structured physical activity compared with control group services, the duration of structured activity in both groups was relatively high and greater than the 20 minutes of daily structured activity which has characterized other effective interventions.^{40, 44, 45} Chapter 3 found that while structured activities delivered by external experts or research staff are effective in improving child physical activity^{40,46}, those which have been delivered by usual childcare service staff have tended to be ineffective.^{43,47,48} While the intervention delivered in this trial targeted a number of physical activity promoting characteristics

beyond structured activity, most of the intervention elements did not improve, reducing the capacity to influence child activity level.

Several factors may have also limited the effectiveness of the intervention implementation strategies and could be considered as opportunities for enhancing future interventions which rely on delivery by existing service staff. First, the trial included only one day of staff training, at which less than half of all intervention service staff attended with representation by one service as low as 18%. Providing training on site, or offering multiple opportunities for staff to attend professional development opportunities at times convenient for staff may maximise the number of service staff appropriately trained to deliver the intervention. Second, follow-up support involved just two follow-up telephone contacts and a two hour site visit. By comparison, other successful interventions delivered by staff have been characterized by up to three staff training sessions held on site, and, greater frequency of follow-up (weekly on-site visits).^{44, 34} Third, the intervention was delivered over a relatively short period (four months). Early childhood educational research suggests that prolonged periods of ongoing support (at least 12 months), is required for the embedding of new and complex teaching practice change in this setting.⁵⁰

The measure of child physical activity used in this study did not assess the context in which children were active, how many were engaged in activities, type or intensity of activity⁴¹, or fundamental movement skill ability. It is possible that the intervention may have had an impact on these factors without increasing accumulated step counts. In addition, the analysis was conducted using a minimum wear time of three hours which could be accumulated from any part of the six hour data collection period including scheduled seated times (e.g eating meals) and sleep times.

However analysis using available data for a wear time of five hours or greater show similar trends to the three hour data. In addition as part of the EPAO observation we collected information on eating and sleeping times for participating services. A review of this data suggests that service routines within the observation period allocated time for seated morning tea and lunch, and a sleep time. As such the analysis using the five hour wear time data would have accounted for such routines, and based on these results, suggests that they did not influence step count data. Future studies, however would benefit from being able to restrict analysis to specific time periods to account for this variation.

The findings of this trial highlight the challenges faced by policy makers and practitioners interested in promoting child physical activity in childcare, and, corroborates the experience of other researchers reporting challenges with childcare service staff delivered interventions.⁵¹⁻⁵³ Physical activity interventions in this setting are only of benefit if they are able to be implemented to a level sufficient to influence child physical activity. In contrast to the findings of this study, Trost and colleagues⁴⁴ and Fitzgibbon and colleagues⁴⁹ who provided multiple staff training sessions (including one on-site) and weekly on-site individual meetings with staff reported sound intervention implementation and significant intervention effects. This demonstrates that with sufficient support childcare service staff are able to deliver effective interventions.

Strengths of this study include its use of a randomized controlled design, broad inclusion criteria, use of an objective measure of physical activity and assessment of intervention implementation by direct observation, recommended as the gold standard for environmental assessments.⁵¹ However, several limitations are important to consider. Child step counts were assessed on one

day, which while shown to give a valid representation of steps per day relative to a whole week in population studies of children³⁶, represent the minimum standard for reliability. Craig et al as part of a large nationally representative survey of pedometer-determined physical activity in youth including children aged from five to 19 years, reported that one day of pedometer monitoring yielded a valid representation of steps per day relative to the whole week in terms of both reliability (ICC = 0.79) and validity (relative absolute percent error [APE] =<10%).³⁶ This information in combination with strong findings of non-reactivity⁴⁷, evidence that younger children demonstrate smaller variation in physical activity levels⁵⁷, and that variability is less during week days⁵⁵ suggest that one day of data collection was sufficient to reliably assess young children's physical activity during a weekday in childcare settings. None-the-less, the internal validity of the findings would have been improved with the addition of multiple days. Further, the use of pedometers, rather than accelerometers or direct observation methods precluded examination of the impact of the intervention on activity intensity, type and context. Finally the trial did not report on costs of program delivery, an outcome that if, the trial was effective, would have increased the utility of findings for policy makers and practitioners.

CONCLUSION

The findings of this trial provide an important contribution to the limited literature regarding physical activity interventions to increase young childrens' physical activity delivered in the childcare setting. The intervention failed to show an impact on child step count per minute despite increasing time that staff delivered structured activity which is likely to be attributable to difficulties experienced by service staff in delivering a number of intervention components. Such

findings highlight the need for future research to focus on identifying strategies which more effectively support staff implementation of physical activity interventions in this setting.

AUTHOR'S CONTRIBUTIONS

First author MFinch led the development of this manuscript. Authors LW and MFinch, conceived the intervention. Authors LW, MFinch, JW, PM, MF designed the research and advised on implementation of the intervention and secured funding. MFinch, LW and JJ conducted the research. All authors contributed to, read and approved the final version of this manuscript.

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CHAPTER 5

IMPACT OF A POPULATION BASED INTERVENTION TO INCREASE THE IMPLEMENTATION OF PHYSICAL ACTIVITY PROMOTING PRACTICES IN CHILDCARE SERVICES: A QUASI EXPERIMENTAL, EFFECTIVENESS STUDY

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ABSTRACT

Background. There is considerable scope to improve the implementation of policies and practices that increase the physical activity levels of children in childcare services. Few studies have reported the effectiveness of interventions to address this, particularly at a population level. The primary aim of this study was to describe the impact of an intervention to increase the implementation of multiple policies and practices to promote physical activity in childcare services.

Methods. A quasi experimental study was conducted in childcare services (n =228) in New South Wales (NSW), Australia and involved a three month intervention to increase the implementation of eight practices within childcare services that have been suggested to promote child physical activity. Intervention strategies to support the implementation of practices included staff training, resources, incentives, follow-up support and performance monitoring and feedback. Randomly selected childcare services in the remainder of NSW acted as a comparison group (n=164) and did not receive the intervention but may have been exposed to a concurrent NSW government healthy eating and physical activity initiatives. Self-reported information on physical activity policies, fundamental movement skills sessions, structured physical activity opportunities, staff involvement in active play and provision of verbal prompts to encourage physical activity, small screen recreation opportunities, sedentary time, and, staff trained in physical activity were collected by telephone survey with childcare service managers at baseline and 18 months later.

Results. Compared with the comparison area, the study found significantly greater increases in the prevalence of intervention services with a written physical activity policy, with policy

referring to placing limits on small screen recreation, and with staff trained in physical activity. In addition, non-significant trends towards a greater increase in the proportion of intervention services conducting daily fundamental movement skill sessions, and such services having a physical activity policy supporting physical activity training for staff were also evident.

Conclusions. The intervention increased the reach of a number of evidence based childcare service policies and practices associated with promoting child physical activity by increasing their population-wide implementation. Increasing reach through implementation of a broader range of practices may require more intensive and prolonged intervention support.

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INTRODUCTION

Adequate physical activity among young children promotes bone health, is protective against obesity and is beneficial for child social, psychological and fundamental motor skill development.¹⁻⁴ Despite these benefits, international research suggests that many children aged less than five years do not meet current recommendations for participation in physical activity, exhibit high levels of sedentary behaviour, and participate in excessive television viewing.⁵⁻⁸

Centre based childcare services, such as preschools and long daycare services⁹ represent a promising setting for the delivery of interventions to increase the physical activity levels of children^{10,11} as they provide access to a large number of preschool age children (three to five years old), often for prolonged periods.^{9,12} In Australia, for example, centre based childcare is provided by both long daycare and preschool services with 95% of children attending either a full-day preschool or long daycare services in the year before commencing formal schooling.^{9,13} Furthermore, such childcare services have existing organisational infrastructure and equipment that can be used to promote physical activity^{11,14} and are supported by accreditation and licensing guidelines that require services to promote the health and physical development of children.^{15,16}

Findings from descriptive research identified in Chapter 1 identified a range of characteristics associated with increased child physical activity. Specifically, children attending services with higher quality facilities and equipment¹⁷⁻¹⁹, lower playground density (less children per square metre)²⁰, with more vegetation, unbroken open areas¹⁸ and with staff trained in physical activity^{17, 19, 21, 22} have been found to be more active. Similarly, children are more likely to be

active if they attend centre based childcare services with a physical activity policy;^{19, 22} that deliver structured physical activities;^{10, 17, 19, 23} that support fundamental movement skill development;^{2, 24} where small screen recreation opportunities are limited;^{14, 25} where staff are involved in, and verbally prompt children's active play;^{26, 27} and where there is adequate availability of portable play equipment.¹⁹ While experimental research is limited, findings from Chapter 3 indicate that non-pragmatic childcare physical activity interventions that seek to address a number of these practices are effective in increasing child physical activity whilst in care.²³ As such, the implementation of physical activity promoting policies and practices are recommended by best practice guidelines for the sector.²⁸

Increasing the reach of evidence-based physical activity policies and programs by supporting their population-wide implementation is required if the benefits of such initiatives are to be maximised. However, previous studies indicate that childcare services do not comply with the recommended physical activity promoting practices.²⁹⁻³¹ A recent Australian study, for example, found that only half of childcare services had a physical activity policy (41-48%); 28-30% of services allowed children to view non active small screen recreation daily; and 49-51% did not have any staff who had recently participated in physical activity training.²⁹ Similarly, in the US, it has been reported that just 25% of staff in centre-based childcare services had completed training in physical activity, 86% of services provided less than two hours of active play time each day and 61% of childcare service staff did not participate in active play with children.³⁰

A recent Cochrane review examining the effects of strategies to improve the implementation of policies, practices or programmes that promote children's healthy eating, physical activity and/or obesity prevention in centre based childcare³² identified just ten studies reporting on

implementation outcomes. Two of these studies are included in this Thesis (Chapters 4 and 5).^{33,34} Four studies evaluated interventions targeting the implementation of nutrition practices only³⁵⁻³⁸ while the remaining studies targeted both healthy eating and physical activity.³⁹⁻⁴²

Three of these studies evaluated the US Nutrition and Physical Activity Self-Assessment for Child Care (NAPSACC) program, consisting of service environmental self-assessment tool, education workshops and the provision of technical support for service staff provided by childcare nurse consultants.^{39,40,41} The first pilot study conducted with a convenience sample of services (randomised into four control and 13 intervention) assessed the feasibility, acceptability and impact of the program and reported no significant change in the NAPSACC self-assessment survey score completed by service managers in the intervention group relative to the control group between baseline and post-intervention.⁴⁰ The second larger randomised controlled trial (conducted with 84 services) reported no significant differences on physical activity environment score (assessed using the Environment and Policy Assessment and Observation tool) between baseline and post-intervention.⁴¹ The third NAPSACC study, a randomised controlled trial conducted with 17 childcare services serving predominantly low-income Families (US), reported no significant change in mean physical activity scores between intervention and control services evaluated using a modified version of the EPAO tool during a one-day observation.³⁹ The final study conducted by Hardy and colleagues randomly allocated 15 preschools (Australia) to receive an intervention comprising of a staff professional development workshop, service resources and access to a health promotion officer to support healthy eating and physical activity practice implementation.⁴² Following the intervention, the service manager self-reported frequency of fundamental movement skill sessions significantly

increased relative to control services, yet there were no between group differences on five other measures of the physical activity environment.⁴²

Given the limited number of published population-based interventions in this setting⁴³, we conducted a study to describe the impact of an intervention to increase the implementation of multiple physical activity promoting policies and practices in childcare services. What distinguished this study from previous research was the scale of the intervention and its assessment of population-wide implementation of these practices. We also sought to determine the impact of the intervention on childcare service manager's knowledge of physical activity recommendations and the acceptability of the intervention strategies to managers.

METHODS

STUDY DESIGN AND SETTING

A quasi experimental study was conducted in centre based childcare services in the state of New South Wales (NSW), Australia. All centre based childcare services in one region (Hunter New England) were offered the intervention. Randomly selected childcare services in the remainder of the state acted as a comparison and were exposed to a separate government physical activity intervention. The intervention region involved a large non-metropolitan area (more than 130 000 km²) encompassing urban and rural communities (based on the Australian Standard Geographic Classification system)⁴⁴ with a population of 60,970 children aged zero to five years (12% of NSW zero to five 0-5 year old population and 23% of the state's Indigenous children aged zero to four).⁴⁵

The comparison region of NSW has an area of 801 305 km² and includes major cities, inner regional centres, outer regional centres, remote and very remote areas. NSW has a population of 506 095 children aged zero to five years (33% of the Australian children's population and 31% of the country's Indigenous children).⁴⁶ The study was approved by the Hunter New England Human Research Ethics Committee (HNEHREC 06/07/26/4.04) (Appendix 5.1).

SAMPLE AND RECRUITMENT

The sampling frame consisted of all centre based childcare services in the state as recorded by the licensing agency for such services. In this study centre based childcare services were defined as long day care services and preschools. In Australia, long daycare services provide centre based care for eight or more hours per day for five days per week and usually enrol children aged from six weeks old up to six years. Preschools provide centre based care for six to eight hours per day and enrol children aged between three to six years. Both long daycare services and preschools provide educational activities for children aged three to five years to assist in their preparation for school. Across Australia the role and function of preschools and long daycare services are similar⁹ and licensing and accreditation requirements regarding physical activity policies and practices identical.⁴² Furthermore research suggests that the current prevalence of implementation of physical activity promoting policies and practices for both services are alike.²⁹ Those services catering solely for children with special needs such as intellectual or physical disabilities were excluded from the study (n=28).

All eligible centre based childcare services (n=338) located within the intervention region were invited to participate in the intervention. A ten percent simple random sample of eligible centre based childcare services in the remainder of the state were invited to participate in the study to serve as a comparison group (n=268). Managers of all eligible services were sent a

letter inviting them to participate in the study (Appendix 5.2). Approximately two weeks after receipt of the letter, a trained research assistant telephoned each service to assess their interest in participation and confirm their eligibility.

INTERVENTION

The intervention was designed by the authors (MF, LW, DE, NP and MF) in conjunction with a regional community advisory group with representation from local service managers, health promotion practitioners, early childhood researchers and physical activity experts. The timing of intervention delivery was also determined by the research team and was conducted as a component of a large scale regional child obesity prevention initiative (<http://www.goodforkids.nsw.gov.au>) offered to all centre based childcare services within a defined geographic government health district. The same intervention was delivered over a three month period to services across the intervention region in two waves. Approximately 40% of services received the intervention between September and December 2009 (wave one). The remaining services received the intervention between April and July 2010 (wave two). The timeline for delivery of the intervention can be seen in Figure 5.1.

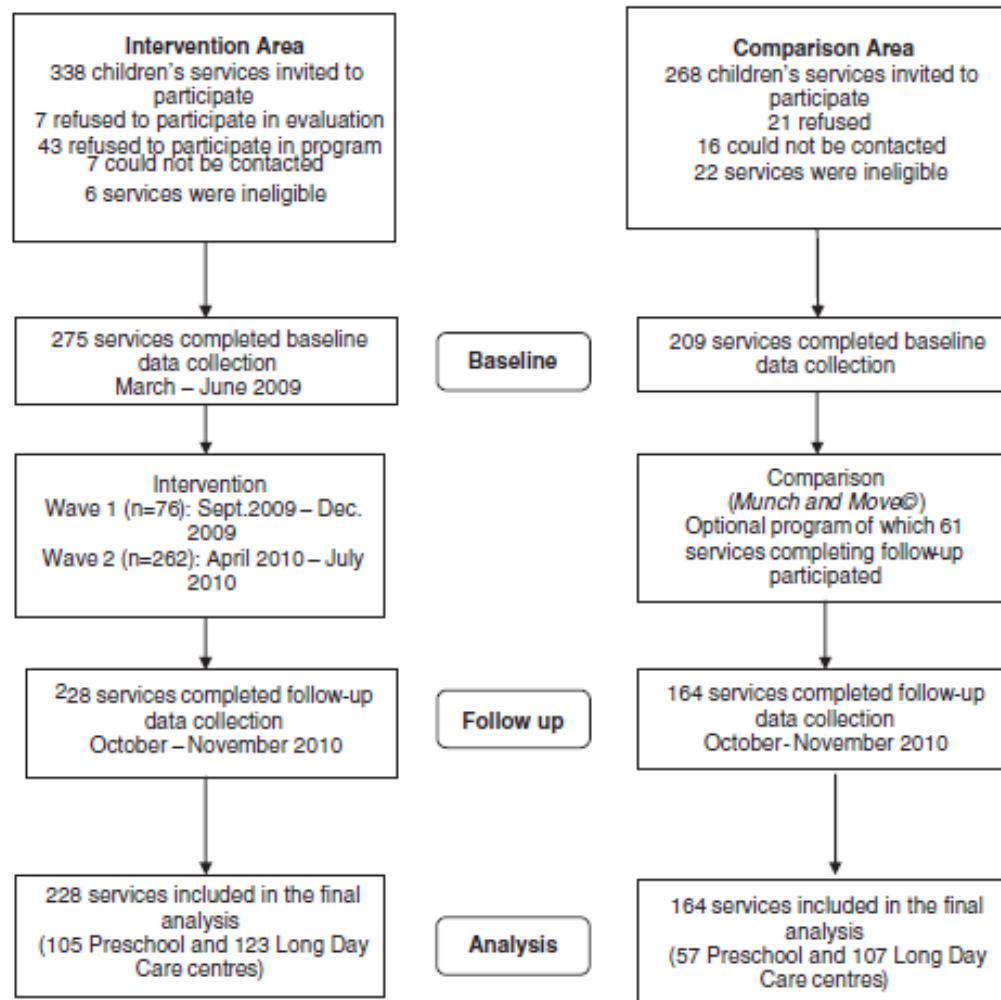


Figure 5.1: Participant recruitment and retention by group

Eight practices that have been reported to promote child physical activity⁴⁷ and that were consistent with the Australian National Physical Activity Best Practice Guidelines for Early Childhood Services²⁸ were targeted by the intervention for implementation by the services for children three to five years. Multiple implementation strategies, selected based on theory and evidence of efficacy, were offered to childcare services to facilitate their implementation of the physical activity promoting policies and practices described below. Specifically, the five strategies employed were:

1. Offer of staff training:^{22, 48}

Services were invited to send two staff to a six hour physical activity training workshop. The choice of staff to attend was at the discretion of each service and could include the service manager or teachers or a combination of the two. Staff training was conducted by a respected early childhood training organisation, and a local service manager and academic with considerable expertise in child physical activity. The training provided basic information, skill development and guidance regarding service physical activity policies and practices and how they could be modified to better support child activity in care. All services were provided access to an online web- based training module covering similar content to that provided in the workshop. Service managers were encouraged to ensure all service staff who had not attended the workshop completed the online module. The online module required approximately 40 minutes of staff time.

2. Offer of information, program resources and instructional materials:^{5, 49}

Program resources and instructional materials were delivered in the form of a resource package. This included, a guide manual with background and instructional information covering topics related to key physical activity promoting practices, three age- appropriate structured activities handbooks, two DVDs demonstrating fundamental movement skills, laminated game cards and staff lanyards with pictorial and descriptive explanations of

fundamental movement skills, a planning poster which identified timeframes for services to implement practice changes and, a fundamental movement skills template to assist with programming fundamental movement skills sessions. All printed resources are available to download from the Good for Kids. Good for Life. program website <http://www.goodforkids.nsw.gov.au>.

3. Offer of follow-up support:^{50, 51}

Service managers were offered two 15 minute telephone support calls to reinforce key program messages, identify barriers to practice change and provide additional advice and support. Calls were delivered after staff had attended training or the service received an intervention resource kit via post. Services also received two support emails or faxes and six newsletters to reinforce key messages, case study successful services and provide further information to services based on barriers identified through telephone contacts. Twenty percent of services elected to provide a fax number, rather than email as their contact. All services were provided with a free contact number direct to a member of the project team for any further queries or support.

4. Provision of performance monitoring and feedback regarding practice implementation:^{50,}

⁵²

Information collected during the telephone support contacts with the service was used to monitor implementation of intervention components and provide performance feedback regarding individual service implementation during telephone contacts.

5. Offer of incentives:^{53, 54}

Services implementing a physical activity policy went in a draw to win vouchers for educational toys and resources and services with staff completing on-line training also went in a draw to win vouchers for educational toys and resources. Staff completing online training went in a draw to win holiday accommodation.

COMPARISON GROUP

Centre based childcare services in the comparison area had the opportunity to participate in an alternative, government delivered intervention (Munch and Move © www.healthykids.nsw.gov.au/campaigns.../about-munch-move.aspx) that aimed to promote physical activity and healthy eating in childcare services. The intervention was offered to all comparison area centre-based childcare services in two waves, with preschools being offered the program from June 2008 and long daycare services from August 2010.^{55, 56} The strategies employed to support implementation of physical activity nutrition practice changes involved service staff being invited to attend a full-day workshop provided by a non-government organisation, provision of a printed resource folder and provision of a small financial grant to support staff attendance at training or the purchase of equipment. The opportunity existed for additional support strategies to be provided by local health promotion services at their discretion.

DATA COLLECTION PROCEDURES

A 30 minute computer-assisted telephone interview (CATI) was developed by the research team to determine the study outcomes and assess intervention acceptability (Appendix 5.3). The instrument was developed with advice from an advisory group consisting of centre based childcare service managers, NSW Department of Community Services, NSW Ministry of Health, health promotion practitioners, paediatric researchers and physical activity experts. Service managers in intervention and comparison area centre based childcare services participated in the CATI. Baseline assessments were conducted from March to June 2009 and follow-up assessments occurred from September to October 2010. Follow-up was conducted approximately 12 months after the initiation of the intervention with wave one services and approximately six months after the initiation of the intervention for wave two services

(Appendix 5.4). In Australia service managers are responsible for policy development, ensuring compliance with licensing and accreditation requirements. Furthermore most service managers also have teaching roles, and as such would have knowledge of practices.

MEASURES

CHILDCARE SERVICE CHARACTERISTICS

Service size (average number of children enrolled), operational characteristics (average opening hours per day, number of days per week open), number of university trained teachers, number of primary contact staff (teaching staff or educators, not including cooks, administration staff) and, number of Aboriginal and Torres Strait Islander child enrolments for services in the intervention and comparison areas were reported by the service managers. Service postcode was used to describe the socioeconomic and geographic remoteness of the service location.^{57, 58} A remoteness index was used to describe the geographic locality of services. The index classifies post codes based on physical access to a range of goods and services and opportunities for social interaction. Major cities are classified as highly accessible, inner regional areas have some restrictions to accessibility; outer regional areas have significantly restricted accessibility and remote areas have very restricted accessibility.⁵⁹

IMPLEMENTATION OF PHYSICAL ACTIVITY PRACTICES

Survey items assessing physical activity practice implementation can be seen in Table 5.1. The items were developed following a review of existing validated US tools^{60, 61} and were designed to match the specific practices targeted by the intervention. All survey items were reviewed for suitability and pre-tested by centre based childcare service managers. The survey items

have been previously used to report on service implementation of physical activity policies and practices in Australia.²⁹

SERVICE MANAGER KNOWLEDGE OF PHYSICAL ACTIVITY RECOMMENDATIONS

Service managers were asked to report the recommended minutes/hours for: minimum time for participation in physical activity per day for children aged two to five years; the maximum time for participation in small screen recreation for children aged two to five years; and, the maximum time for children aged two to five being sedentary per day (based on the Australian National Physical Activity Recommendations for Children aged zero to five years).⁶²

ACCEPTABILITY OF THE INTERVENTION STRATEGIES AND RESOURCES

The managers in the intervention area were asked to respond to a series of statements assessing the acceptability of the program on a five-point Likert scale (strongly agree, agree, disagree, strongly disagree and neutral). These statements included whether staff perceived that children at their service benefited from their involvement in the physical activity intervention; whether they would recommend the intervention to other services, and whether the training workshop was beneficial for staff to attend.

Acceptability of the support calls was assessed by asking managers to respond on a four-point Likert scale (very useful, somewhat useful, neutral, not at all useful) to the statement: 'Overall, how useful did you find the support calls were in helping your service to implement best practice physical activity strategies at your service?'. The acceptability of each of the intervention resources (game cards, lanyards, activity handbooks, DVDs, guide manual and policy template) was similarly assessed (very useful, somewhat useful, neutral, not at all useful).

Table 5.1: Physical activity policy and practice survey items and measures

TELEPHONE SURVEY ITEM	RESPONSE OPTION	FORMATION OF MEASURE	MEASURE DESCRIPTOR
Does your service have a written policy on physical activity	Yes; No; Don't know	% of services that responded yes	1 Services with a physical activity policy
Does your policy specifically refer to development of fundamental movement skills?	Yes; No; Don't know	% of services that responded yes	a Physical activity policy referring to child fundamental movement skills development
Does your policy specifically refer to limits on small screen recreation and TV?	Yes; No; Don't know	% of services that responded yes	b Physical activity policy referring to limits on small screen recreation and TV
Does your policy specifically refer staff training in physical activity?	Yes; No; Don't know	% of services that responded yes	c Physical activity policy referring to physical activity training for staff
Does your service carry out planned, adult guided sessions to facilitate preschool age children's exploration and development of fundamental movement skills? <i>This would include structured teacher led activity during which children explore and practice one or more fundamental Movement Skills</i>	Yes; No	% of services that: <ul style="list-style-type: none"> Responded yes to carrying out sessions; and Responded that sessions were conducted once per day and Responded that sessions always included; warm up, cool down, skill specific feedback, extension and challenge experiences, modelling and demonstration 	2 Services conducting daily fundamental movement sessions with recommended components
How often do the fundamental movement skills sessions occur?	Once per day; 4 times per week; 3 times per week; 2 times per week; once per week; less than once per week; Don't know		
How often do fundamental movement skills sessions include each of the following components? Warm up and cool down activities? Skill specific feedback eg error detection and correction? Extension and challenge experiences? Staff modelling and demonstration?	Always; Very often; Sometimes; Rarely; Never		

TELEPHONE SURVEY ITEM	RESPONSE OPTION	FORMATION OF MEASURE	MEASURE DESCRIPTOR AND SUPPORTING REFERENCES
How much of your daily operating time is spent in a form of specific adult guided activity such as group music, dancing or planned fundamental movement skills sessions with preschool age children?	Hours and minutes recorded	Mean hours	3 Time spent on structured physical activities
On a usual day do primary contact staff join in and participate with preschool age children during child initiated free active play? <i>This is when staff join in with active play that the children initiated and are leading and would include activities such as a staff member pushing a child on a swing while talking to another staff member.</i> <i>Please note general supervision while standing still is not considered role modelling.</i>	Yes; No; Don't know	% of services that: <ul style="list-style-type: none"> Responded yes to primary contact staff joining in and participating with children during child initiated free active play; and Responded that all staff implement this practice 	4 Services where all staff usually participate in free active play (role modelling)
How many primary contact staff implement this practice?	All staff; Most staff; Some staff		
On a usual day do primary contact staff provide verbal prompts to encourage or extend preschool age children's activity during child initiated free active play by saying things like 'run hard', 'good throw', or 'can you do it again'?	Yes; No; Don't know	% of services that: <ul style="list-style-type: none"> Responded yes to primary contact staff providing verbal prompts to encourage or extend children's activity during child initiated and Responded that all staff implement this practice 	5 Services where all staff usually provide verbal prompts for physical activity
How many primary contact staff implement this practice?	All staff; Most staff; Some staff		
On average, how often are preschool age children allowed to watch small screen (eg television, videos or DVDs or have time to play computer games) where they are sitting still?	Once per day; 4 times per week; 3 times per week; 2 times per week; once per week; less than once per week; Don't know	% of services that answer yes to less than once per week	6 Services where children are allowed to watch small screen recreation less than once per week

TELEPHONE SURVEY ITEM	RESPONSE OPTION	FORMATION OF MEASURE	MEASURE DESCRIPTOR
<p><i>This question is about occasions during the day where the MAJORITY of children are sitting still for more than 30 minutes at a time, for example times where staff put toys on a table and children are only allowed to sit at the table and play, or group activities where children are seated on the floor.</i></p> <p>On average, excluding meal and nap times, how many occasions during the day would this occur?</p>	<p>Never, once per day; 2 times per day; 3 times per day; 4 times per day; 5 times per day; Don't know</p>	% of services that responded never	7 Services where children participate in seated activities for no longer than 30 minutes at a time
<p><i>Next I would like to ask you some questions about any professional development relating to physical activity attended by your staff</i></p> <p>In the last 12 months, have any staff at your service participated in professional development or specific training relating to physical activity provided by an agency external to your service?</p>	<p>Yes; No; Don't know</p>	% of services that responded yes	8 Services with staff trained in physical activity

ANALYSES

All analyses were conducted with the statistical package SAS Version 9.2. Centre based childcare services providing both baseline and follow-up data were included in the analysis of trial outcomes. The median score of the service postcode for the state based on the Socio-Economic Indexes for Areas⁶³ was used to classify services as being from either high (at or above median) or low (below median) socioeconomic areas. The service postcode was also used to classify the services as either being in a major city, inner regional, outer regional or remote area using the Accessibility/Remoteness Index of Australia.⁵⁷

Based on their responses to the survey items, centre based childcare services were classified as implementing fundamental movement skills sessions to a recommended standard if they reported that such programs were implemented daily and always included all of the following components: warm up, cool down, skill specific feedback, extension and challenge experiences, and, modelling and demonstration (based on the NSW Ministry of Health Munch and Move© Resource Manual).⁶⁴ The formation of other trial outcomes, based on participant responses to survey items is described in Table 5.1.

Bivariate analyses (Chi Square tests) for categorical variables and paired t-tests for continuous variables were undertaken to determine within group changes in the prevalence of childcare service implementation of practices between baseline and follow-up in the intervention and comparison areas. Multivariate logistic and linear regression models were developed, within a generalised estimating equation framework, to determine between group differences in the change in prevalence for each of the outcome measures from baseline to follow-up. The logistic regression models included terms for time, group (intervention or comparison area)

and the interaction of time and region. A p-value of 0.05 for the interaction term was used to determine if there was a statistically significant difference in change in prevalence between the intervention and comparison areas. The characteristics of services were not adjusted for in the logistic regression models as the primary trial objective was to assess change within services and the baseline score of the services effectively controlled for potential differences in baseline characteristics between the two areas.

The sample size for the study was calculated to enable the detection of an absolute difference in the prevalence of policies or practices of 15% between groups with 80% power and an alpha of 0.05. The sample size calculation was based on a conservative assumption of a 50% policy or practice prevalence in the comparison group at follow-up. While the trial sought to assess the policies and practices of all 338 services in the intervention region, a 75% participation and a 25% study attrition rate was estimated based on previous research experience of the authors in this setting, leaving 190 intervention services providing data at follow-up. Based on such study participation and attrition rates, a sample of 268 services from the control group were invited to participate, which was expected to yield the 150 services at follow-up required to detect an effect size of 15% difference in service physical activity policies and practices.

RESULTS

SAMPLE

Figure 5.1 describes study participation and attrition rates. In the intervention region, 275 services completed baseline data collection representing an 81% response rate from eligible services. Of these 228 services (83%) provided follow-up data. In the comparison area, 209 services of all those eligible completed baseline data collection, and of these, 164 (78%) provided follow-up data. Descriptive characteristics of the intervention and comparison

services that completed evaluation telephone interviews at both time points and were included in the final analysis are shown in Table 5.2.

Services in the intervention area were significantly less likely to be in high socioeconomic areas or located in major cities, had a significantly higher prevalence of services with children of Aboriginal background compared with services in the comparison area (all $p < 0.01$) and were open for fewer hours per day ($p = 0.03$). There was a difference, approaching significance, in the mean number of child enrolments ($p = 0.06$) between services providing baseline data only and those providing both baseline and follow-up data. There were no other differences in the service characteristics of services providing follow-up data and those that did not ($p = 0.58$ - 0.95).

Table 5.2: Baseline characteristics of services included in physical activity outcome analyses by area

VARIABLE	INTERVENTION AREA		COMPARISON AREA		p^*
Services in high socioeconomic area (% , 95% CI)	41	(37,46)	68	(62,73)	<0.01
Service geographic locality (% , 95% CI)	37	(32,41)	67	(62,63)	<0.01
Major city	37	(32,41)	67	(62,63)	<0.01
Inner regional	31	(27,25)	21	(17,26)	<0.01
Outer regional	29	(25,33)	8	(5,11)	<0.01
Remote	3	(1,4)	2	(0,3)	<0.01
Services with children of Aboriginal (% , 95% CI)	71	(66,75)	43	(37,48)	<0.01
Number of children enrolled (mean, 95% CI)	83.6	(78.2,89.0)	79.9	(72.6,87.2)	0.42
Hours open (mean, 95% CI)	8.7	(8.5,9.0)	9.2	(8.9,9.5)	0.03
Days open (mean, 95% CI)	4.8	(4.7,4.9)	4.9	(4.8,5.0)	0.12
Tertiary educated staff (mean, 95% CI)	1.3	(1.1,1.4)	1.0	(1.1,1.5)	0.83
Contact staff per day (mean, 95% CI)	6.0	(5.7,6.3)	6.0	(5.6,6.4)	0.94

* Categorical variables are compared using chi squared tests and continuous variable are compared using t tests

IMPLEMENTATION OF PHYSICAL ACTIVITY PROMOTING PRACTICES

Table 5.3 shows the prevalence of implementation of practices that promote physical activity in both the intervention and comparison areas. The bivariate within group analyses identified significant pre to post increases for four of the eight outcomes of interest in the intervention area. There were no significant pre-post differences for any outcome in the comparison area.

Based on the multivariate analyses, adjusting for time and region, relative to the comparison area, intervention area services had significantly greater increases in the proportion with a written physical activity policy ($p<0.01$); with policy content referring to placing limits on small screen recreation ($p<0.01$); and with staff trained in physical activity ($p<0.01$) (Table 3). In addition, the change in proportions between groups trended towards being significantly greater in the intervention compared with the comparison area for two further outcomes: the proportion of services providing fundamental movement skills sessions with the recommended components daily ($p=0.08$) and having a policy that refers to physical activity training for staff ($p=0.07$). There were no other significant between group differences.

SERVICE MANAGER KNOWLEDGE OF PHYSICAL ACTIVITY RECOMMENDATIONS

For the intervention area bivariate, within group analyses identified a significant pre to post increase in service manager knowledge of the maximum recommended time children should be sedentary (5.4-11%, $p=0.02$) and service manager knowledge of recommendations for participation in physical activity trended towards a significant increase (1 -21%, $p=0.06$). For the comparison region, service manager knowledge of physical activity recommendations significantly decreased pre-post for service manager knowledge of maximum recommended time children should watch television (46-32%, $p=0.01$) and maximum recommended time children should be sedentary (11-2.5%, $p<0.01$). Multivariate analyses identified services in the

intervention area as having significantly greater increases in service manager knowledge of recommendations for child participation in physical activity relative to the comparison area ($p<0.01$). There were no other significant differences in assessment of service manager knowledge between groups.

Table 5.3: Changes in implementation of physical activity practices and service manager knowledge over time by area

OUTCOMES	INTERVENTION AREA			COMPARISON AREA			
	Baseline 2009	Follow-up 2010	p^1	Baseline 2009	Follow-up 2010	p^2	Interaction p^3
1 Services with a physical activity policy	21%	49%	<0.01*	34%	38%	0.31	<0.01
a Physical activity policy referring to child fundamental movement skills development	86%	87%	0.77	80%	85%	0.42	0.72
b Physical activity policy referring to limits on small screen recreation and TV	45%	82%	<0.01*	60%	65%	0.54	<0.01
c Physical activity policy referring to physical activity training for staff	63%	86%	<0.01*	60%	68%	0.38	0.07
2 Services conducting daily fundamental movement sessions with recommended components	13%	21%	<0.01*	13%	12%	0.87	0.08
3 Time spent on structured physical activities - mean hours (sd)	1.3 (1.0)	1.5 (1.0)	0.02*	1.5 (1.1)	1.6 (1.0)	0.25	0.65
4 Services where all staff usually participate in free active play (role modelling)	58%	65%	0.09	61%	69%	0.13	0.95
5 Services where all staff usually provide verbal prompts for physical activity	72%	74%	0.52	69%	72%	0.44	0.90
6 Services where children are allowed to watch small screen recreation less than once per week	23%	22%	0.73	19%	17%	0.62	0.89
7 Services where children participate in seated activities for no longer than 30 minutes at a time	62%	63%	0.84	59%	62%	0.64	0.82
8 Services with staff trained in physical activity	29%	76%	<0.01*	37%	43%	0.21	<0.01

¹ Pre-post changes in adoption of physical activity promoting practices for services in the intervention area

² Pre-post changes in adoption of physical activity promoting practices for services in the comparison area

³ Changes in adoption of physical activity promoting practices between intervention and comparison groups at follow-up (group x time interaction)

REACH AND ACCEPTABILITY OF THE INTERVENTION IMPLEMENTATION STRATEGIES

The majority of service managers in the intervention area (96%) indicated that they would recommend the program to other services (Table 5.4). Furthermore, 89% of services responded that children in their service were perceived to have benefited from participation in the program. With regard to the acceptability of intervention implementation strategies and resources, 94% of managers indicated that they would recommend the staff training to other services while 49% found the support calls very useful in helping their service to implement the program (Table 5.4). A total of 68% of managers found the resource kit very useful.

Table 5.4: Reach and acceptability of intervention implementation strategies

DESCRIPTION	MEASURE	%
Reach	Service received the resource kit	100
	Services received the newsletters and support emails/faxes	100
	Services with staff attending training session	82
	Services that participated in two support calls	78%
Acceptability	Service manager would recommend the program to other services	94
	Service manager would recommend training to other services	96
	Children attending service have benefited from the program	89
	Found the resource kit very useful	68
	Support calls were very useful in helping our service implement best practice physical activity strategies	91

% includes services completing baseline and follow-up assessments that were included in final analysis

DISCUSSION

This is one of only a handful of studies examining the impact of an intervention to increase centre based childcare service's implementation of policies and practices known to be associated with increased child physical activity. The study found significant within group pre-

post increases in the prevalence of implementation of four of eight practices in the intervention area and no increases in the comparison area. Significantly greater increases were found in the proportion of services implementing two practices relative to the comparison region: a physical activity policy (including the policy referring to placing limits on small screen recreation) and staff trained in physical activity. In addition, non-significant trends ($p = 0.07, 0.08$) towards greater increases in the prevalence of services having a physical activity policy that refers to promoting physical activity training for staff and implementing fundamental movement skills sessions daily in the intervention area were evident. Such findings indicate that increasing the reach of evidence-based programs through strategies to support population-wide implementation is possible.

Similar to the findings previously reported by Hardy and colleagues, the intervention examined in this study was successful in increasing the implementation of some physical activity policies and practices.⁴² While the current study employed a broader range of intervention implementation strategies, a number of similarities between intervention components of the two studies were evident such as the inclusion of staff training, program resources and instructional materials, two follow-up support contacts and incentives. However, the study by Hardy and colleagues was conducted as an efficacy trial, in a selected and small sample of government preschools only. The current study was conducted as a component of a program delivered to all childcare services (including long daycare and preschools), and sought to determine the effectiveness of the intervention as a program dissemination strategy. The finding of a significant increase in the implementation of a number of childcare service practices in such circumstances suggests that the intervention approach has the potential to be utilised more broadly as a means of translating research evidence into practice.⁶⁵

As the intervention was not effective in producing increases in the implementation prevalence of all targeted practices, additional strategies that are intensive or more prolonged, or some combination of these may be needed to achieve more comprehensive changes to the physical activity promoting practices of services. In addition, several factors may have limited the effectiveness of the practice change intervention and could be considered as opportunities for enhancing the implementation of such an intervention in the future. First, the intervention did not involve all staff within each service receiving training. Workshop attendance was limited to two staff from each childcare service, and few additional staff were found to have utilised the on-line training module despite project records indicating that 80% had access to the internet at the service. In addition, 22% of services did not participate in both follow-up calls, predominately as service managers could not be contacted by intervention staff within ten call attempts or service managers chose not receive the telephone support. Furthermore, the percentage of service managers with correct knowledge of sedentary and physical activity recommendations was relatively low, both at baseline and follow-up (5.4-21%).

These findings suggest that such intervention components may not have overcome frequently cited barriers such as staff time constraints which are known impediments to service staff engagement in health promoting practices.⁶⁶ Supportive attitudes, knowledge and skills of all staff are important determinants of organisational improvement and likely to be fundamental to the success of practice change initiatives.⁶⁷ Providing training to all staff in a service by incorporating training as part of a mandatory component of staff induction, the inclusion of refresher training in annual staff development opportunities and increased emphasis on knowledge and attitudes as well as skills may represent an opportunity for improving the long term impact of such implementation initiatives without placing additional time demands on staff.⁶⁷

Second, the intervention involved two follow-up telephone support contacts over a three month period after the initial training. Research from other settings including schools suggests that practice change requires support over a period of three to four years.^{68, 69} In addition, early childhood educational research suggests that prolonged periods of ongoing support (at least 12 months), is required for the embedding of new and complex teaching practice change in this setting.⁷⁰ Providing ongoing support through on-site visits⁷¹ and/or the establishment of supportive networks to provide peer support for practice changes, may represent a sustainable, low cost option of providing prolonged practice change support.^{43, 71, 72} Third, the effectiveness of the intervention could have been enhanced through the inclusion of additional intervention components found to be effective in practice change initiatives implemented in other settings. For example, embedding service delivery practices or practice change elements in organisational procedures and systems that prompt and monitor their delivery^{70, 72} or including them in regulatory standards of care has been shown to be effective, particularly in health service quality improvement initiatives.⁷³ As such, integrating physical activity within routine daily staff activity programming⁷⁴, and including the promotion of child physical activity in licensing and accreditation processes for services may also facilitate greater implementation of physical activity promoting characteristics in this setting.

Finally, opportunities for enhancing the quality and perceived relevance of intervention support and resources provided to services may result through greater tailoring of such support.⁷⁰ This may include greater targeting of strategies for rural or remote services, services in disadvantaged areas or with high aboriginal child enrolments; targeting strategies based on service readiness to change and identifying and providing support to address other individual staff and organisational impediments to policy or practice implementation.⁷⁶ The need for such

a focus is suggested by findings in this study that half of the services perceived the follow up support call to be only somewhat or not at all useful.

A strength of this study was its high external validity due to the broad inclusion criteria, and high participation and retention rates. A number of limitations of the study, however, warrant consideration. The primary limitation of the trial was its reliance on the self-report of service managers for the measurement of the prevalence of service policies and practices. Direct observation, recommended as the gold standard for environmental assessments,⁴¹ was considered prohibitively expensive and impractical given the scale of the intervention. While the validity of service manager reports in this study are unknown, previous research indicates that childcare managers and school principals can accurately report the health promotion practices of their organisations.^{40, 76} A further limitation of the study was the concurrent roll-out of a government sponsored program in the comparison area (Munch and Move©) during the study period. Twenty three percent of service managers in the comparison area reported that they had any staff attend Munch and Move© training at follow-up. The estimated intervention effect size reported in this study may have been larger had comparison services not received such support. Also the study examined only physical activity promoting policies and practices targeting children three to five years. Future research may consider evaluating the impact of an intervention on the implementation of practices supporting activity of infants and younger children. Finally, the study did not employ a randomized evaluation design. For this study, which was conducted in the context of whole of population child obesity prevention program, random assignment was not feasible. Nonetheless, the use of randomized experimental designs may improve the internal validity of future trials.

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AUTHOR INFORMATION

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CHAPTER 6

A SUMMARY OF FINDINGS AND DIRECTIONS FOR FUTURE RESEARCH

SUMMARY OF FINDINGS

CHAPTER 1: THESIS INTRODUCTION

In Chapter 1, low levels of physical activity in adults were shown to be associated with the most prevalent causes of preventable mortality and morbidity both internationally and within Australia.^{1, 2} In summarising the evidence of the health benefits of participation in physical activity during the preschool age period, such activity was shown to: be protective against obesity; promote bone and cardiovascular health; contribute to motor and fundamental movement skill development, and show promise for contributing to cognitive development. The chapter then identified considerable variation across countries in adherence to physical activity guidelines by preschool age children. In regard to Australia, studies reported between 30-70% of children may be insufficiently active.³⁻⁵ Childcare services were identified as a key setting through which physical inactivity activity among young children could be addressed.

The likelihood of interventions in childcare services being able to address the population prevalence of physical inactivity among young children was identified as a function of the effectiveness of such interventions in modifying the physical activity behaviours, and their 'reach', or number of childcare services that implemented effective interventions.⁶ To identify whether effective interventions were available, a summary of systematic reviews of physical activity interventions delivered in childcare services was conducted.⁷⁻¹⁰ Based on the equivocal findings of these systematic reviews, an analysis of individual studies included in two recent systematic reviews^{10,11} was undertaken to identify childcare policies and practices reported to be positively associated with children's physical activity in order to ascertain promising intervention opportunities.

The chapter concluded that although there is considerable potential to improve child physical activity levels through interventions delivered in childcare services, a need existed for additional research to further examine the policies and practices in the childcare setting that are associated with child physical activity. The chapter further concluded that there was a need for interventions that were not only efficacious but also effective in increasing child physical activity when delivered in the context of usual routines and responsibilities of childcare services. Addressing these needs for additional research was identified as the first broad aim of this thesis, with three specific studies described to address it:

1. A study to identify associations between childcare policies and practices and children's physical activity behaviours in the Australian context. This research question was addressed through a cross-sectional study encompassing measures of physical activity for children aged three to five years, childcare staff practices, and service environmental and organisational characteristics.
2. The conduct of a systematic review and meta-analysis describing the effectiveness of physical activity interventions. The review examined the impact of childcare physical activity interventions according to intervention and trial design characteristics including whether the trials were pragmatic (those most likely to approximate effects in real world settings) or non-pragmatic (those conducted under more tightly controlled research conditions).
3. A study to determine the impact on children's physical activity levels of a pragmatic, staff delivered, physical activity intervention delivered in childcare. This research question was addressed through the conduct of a cluster randomised controlled trial.

The final section of Chapter 1 identified the need for evidence regarding strategies that are effective in supporting childcare physical activity interventions to be implemented with sufficient reach and fidelity to achieve health improvements at the population level. The limitations of the current evidence regarding the effectiveness of strategies to improve the implementation of interventions, both in non-clinical settings generally and in childcare services specifically, was identified. It was demonstrated that insufficient evidence was available to inform successful population-wide implementation of physical activity-promoting policies and practices by childcare services. The chapter concluded that a need existed for additional research to identify effective implementation strategies to close this evidence gap. Addressing this need for additional research was identified as the second aim of this thesis:

4. To conduct a study to test the effectiveness of a population based intervention in increasing the implementation of physical activity promoting policies and practices by centre based childcare.

CHAPTER 2: CHILD PHYSICAL ACTIVITY LEVELS AND ASSOCIATIONS WITH MODIFIABLE CHARACTERISTICS IN CHILDCARE

Research evidence indicates that children's physical activity levels during attendance at childcare are low.^{12,13} Despite this, research identifying childcare characteristics that may be contributing factors is at a formative stage¹⁴ and only based on studies conducted in the United States and Europe.¹⁴ Objective measures of physical activity (such as step counts) have not previously been used to describe and determine environmental associations with physical activity levels of children in childcare in an Australian context.¹⁵

To address this evidence gap, a cross-sectional study was conducted with 328 children aged three to five years attending childcare services in the Hunter Region of New South Wales

(NSW), Australia. The physical activity of children was assessed using pedometers (model Yamax SW200 and SW7000).¹⁶⁻¹⁸ Centre characteristics and staff attitudes and physical activity practices were assessed using surveys, interviews and an observational audit. The association between children's activity (step counts) in childcare and the following factors were assessed: staff confidence, prompting and participation in free play; centres having a written physical activity policy, centres providing physical activity training for staff and outdoor play time for children; the size of outdoor play areas; the availability of fixed and portable outdoor equipment; and staff leadership of structured physical activity. Independent associations were tested by linear regression model within a Generalized Estimating Equation (GEE) framework.

The findings showed significant associations between children's activity and: staff participating in active play more than three times per day ($p=0.058$); centres having a written physical activity policy ($p=0.034$); and staff-leading structured physical activity ($p<0.0001$). The findings suggested that if such practices were routinely implemented by Australian childcare services, an increase in children's physical activity levels may be possible.

CHAPTER 3: EFFECTIVENESS OF CHILDCARE INTERVENTIONS IN INCREASING CHILD PHYSICAL ACTIVITY: A SYSTEMATIC REVIEW AND META-ANALYSIS FOR POLICY MAKERS AND PRACTITIONERS

A systematic review investigating the effectiveness of physical activity interventions in centre-based childcare services was conducted. The review assessed childcare based randomised controlled trials of physical activity interventions conducted with children aged less than six years. The review examined the impact of such interventions according to intervention and trial design characteristics, including whether the trials were pragmatic (those most likely to approximate effects in real world settings) or non-pragmatic (those conducted under more tightly controlled research conditions)¹⁸, to identify intervention characteristics shown to

influence intervention effects consistent with findings from descriptive research identified in Chapter 1 and association findings from Chapter 2. The following electronic data-bases were searched: the Cochrane Central Register of Controlled trials (CENTRAL) in the Cochrane Library, MEDLINE, EMBASE, PsycINFO, ERIC, CINAHL SCOPUS and SPORTDISCUS. Two independent reviewers screened the titles and abstracts of identified papers, and two independent reviewers extracted data and assessed the risk of bias of the included studies. Outcome data were converted into standardized mean differences and analysed using a random effects model.

A total of 17 publications describing 17 unique intervention trials were included in the review and 16 were included in the meta-analysis. The findings showed that overall, interventions significantly improved child physical activity (SMD 0.44; 95% CI: 0.12-0.76). Significant effects were found for interventions that: included structured activity (SMD 0.53; 95% CI: 0.12-0.94); used environmental enhancement strategies (SMD 0.41; 95% CI: 0.02-0.80); involved delivery by experts (SMD 1.26; 95% CI: 0.20-2.32); and used theory (SMD 0.76; 95% CI: 0.08- 1.44). The review did not find evidence to support the effectiveness of pragmatic interventions (SMD 0.10; 95% CI: -0.13-0.33). In contrast, non-pragmatic interventions showed a significant effect (SMD 0.80; 95% CI: 0.12-1.48). Despite findings indicating that physical activity interventions in childcare were effective, and a number of intervention characteristics were associated with positive outcomes, there remained a lack of effect for pragmatic studies. This finding suggests that there are barriers to supporting the implementation of physical activity promoting policies and practices in the childcare setting, and a need for additional strategies to improve the effectiveness of childcare based physical activity implementation interventions.

CHAPTER 4A) AND 4B): A CLUSTER RANDOMISED TRIAL TO EVALUATE A PRAGMATIC, STAFF DELIVERED INTERVENTION TO INCREASE PHYSICAL ACTIVITY AMONG CHILDREN ATTENDING CHILDCARE

Given the lack of previous trial based research examining the effectiveness of pragmatic interventions in increasing the physical activity of children in childcare, a randomised controlled trial of a physical activity intervention was conducted. The trial sought to assess the impact of a four-month intervention delivered by service staff on children's physical activity. Chapter 4A firstly described the published protocol for the trial, and Chapter 4B, described the conduct and results of the trial. Participants in the trial were 459 children aged three to five years recruited through 20 childcare services in the Hunter region of NSW, Australia. Services allocated to the intervention group were supported to implement physical activity promoting practices shown to be associated with children's physical activity identified in Chapter 2 and from additional research. They included: fundamental movement skill sessions; structured teacher-led activities; staff participation in, and role modelling of, active play; limiting small screen recreation and sedentary time; and creating an activity promoting physical environment. Services allocated to the control group received no additional treatment. The strategies included to support intervention delivery were based on organisational and practice change theoretical frameworks developed for clinical settings.²⁰ In brief, they included training for service staff, provision of resources and instructional materials, follow-up support, performance feedback on service implementation of intervention components, support for the development of a physical activity policy, and involvement of opinion leaders. Child physical activity was objectively measured using pedometers at baseline and six months after baseline. Intervention implementation was assessed via observation of staff physical activity practices and audits of the service environment and policies.

Analysis of all available data, accounting for the correlation between pre and post measures and adjusting for clustering within services, showed no difference between groups at follow-up in child step counts per minute ($p=0.12$). The results of the sensitivity analysis, which imputed children's step counts per minute at baseline and follow-up for missing data, was similarly non-significant ($p=0.07$). Observation of service practices indicated that the intervention increased the amount of time staff spent delivering structured activities and was considered highly acceptable, and resulted in no adverse events. Despite this, implementation of most of the targeted physical activity promoting practice components did not improve, reducing the capacity to influence child activity levels. The findings of the trial highlight the challenges faced by policy makers and practitioners interested in promoting child physical activity in childcare and confirm the findings of other researchers reporting challenges with implementation of staff delivered interventions.²¹⁻²³ Such findings highlight the need for further research to identify effective pragmatic physical activity interventions in childcare. The findings also highlight the need for evidence based strategies that can more effectively support staff to increase implementation of physical activity promoting practices such that the public health benefits of interventions delivered in this setting can be realised.

CHAPTER 5: IMPACT OF A POPULATION BASED INTERVENTION TO INCREASE THE IMPLEMENTATION OF PHYSICAL ACTIVITY PROMOTING PRACTICES IN CHILDCARE SERVICES: A QUASI EXPERIMENTAL, EFFECTIVENESS STUDY

Chapter 5 described a quasi experimental trial of the effectiveness of an intervention in increasing the implementation of such physical activity promoting policies and practices in a population of childcare services. A three-month intervention targeting service characteristics shown to influence child physical activity from descriptive research identified in Chapter 1 and Chapter 2 was offered to all childcare services ($n=338$) located within the Hunter New England

region of NSW, Australia. The intervention was designed to align with childcare setting guidelines and sought to increase the prevalence of implementation of policies and practices suggested to promote child physical activity in childcare. In seeking to address the limitations of previous studies, the intervention involved the development and provision of a range of evidence-based implementation strategies proven to be effective in clinical settings including: provision of staff training; resources; follow-up support; performance monitoring and feedback; and incentives. A random sample of childcare services in the remainder of the state of NSW served as the comparison group (n=164) and did not receive the intervention, but may have been exposed to a concurrent government healthy eating and physical activity initiative.

The primary outcomes of the trial were childcare service manager reported implementation of targeted physical activity promoting policies and practices including: written physical activity policy; fundamental movement skills sessions with recommended components; delivery of structured physical activity; staff involvement in children's active play and provision of verbal prompts; limiting small screen recreation and sedentary activity; and staff physical activity training. The outcomes were assessed by a telephone survey at baseline and follow-up occurring between six and 12 months after the initiation of the intervention.

The results of multivariate regression analysis, adjusting for time and region, showed that between baseline and follow-up significantly greater increases were found in the prevalence of intervention services implementing two of the eight targeted practices relative to the comparison region. These included a written physical activity policy ($p<0.01$) and staff trained in physical activity ($p<0.01$). The study concluded that whilst the intervention was found to be effective in promoting the implementation of a small number of the targeted policies and

practices, more comprehensive implementation required more intensive or extended implementation support, or the use of additional or different implementation strategies.

DIRECTIONS FOR FUTURE RESEARCH

The findings of this thesis have a number of implications for further research with regard to a need to i) address the limitations of previous pragmatic interventions aimed at increasing children's physical activity in the childcare setting, and ii) increase the evidence base regarding strategies to enhance the implementation of physical activity promoting policies and practices by childcare services.

I) ADDRESS THE LIMITATIONS OF PRAGMATIC INTERVENTIONS AIMED AT INCREASING CHILDREN'S PHYSICAL ACTIVITY IN THE CHILDCARE SETTING

Chapters 1 and 3 highlighted that in order to maximise the public health benefits of interventions to improve child physical activity through this setting, effective interventions that are able to be routinely implemented in the context of usual service routines and resources are required. Pragmatic interventions are those that tend to include broader flexibility in delivery and can be more easily implemented within the context of usual setting routines.²⁴ However, the systematic review reported in Chapter 3 indicated that while physical activity interventions in childcare overall were effective in increasing children's physical activity, there was no evidence of the effectiveness of pragmatic interventions in achieving this objective. Second, the pragmatic cluster randomized controlled trial (RCT) reported in Chapter 4 found that the intervention was not effective in increasing child physical activity levels. A common approach of pragmatic interventions conducted to date, including the one described in Chapter 4, has been to employ a staff-focused approach. Such interventions have sought to increase children's physical activity through building the knowledge, skills, and capacity of existing childcare staff to deliver physical activity promoting programs. Given the absence of

effective pragmatic interventions applying this approach, there is a need for additional research to identify alternative strategies that are effective in increasing children's physical activity in childcare that are able to be implemented in the context of usual service routines and resources .

Modifying the childcare environment represents one possible approach for achieving this outcome.²⁵ Several modifiable environmental characteristics have been associated with increased child physical activity in childcare, including periods of outdoor play,^{26,27} access to open outdoor play spaces and availability of portable play equipment, presence of structured looping cycle paths, smaller child group sizes, and lower playground density (less children per m²).²⁷⁻³⁵ Chapter 3 identified two RCTs^{36,37} that had sought to isolate the effects on physical activity levels of children in childcare of specific environmental intervention approaches. One trial compared the effect of adding portable play equipment and/or playground markings to the outdoor play environment.³⁶ The second trial tested the effectiveness of adding two additional 30 minute time blocks of unstructured outdoor free play on child physical activity levels during preschool recess time.³⁷ While neither trial reported significant effects between groups, overall levels of child physical activity were greater among children in the intervention compared control in both trials. Given such findings, and in light of the lack of evidence of the effectiveness of staff-focused pragmatic interventions, further evaluation of such environmental approaches appears warranted.

Modifying the frequency of outdoor free play may represent one promising environmental intervention for increasing physical activity levels of children attending childcare. In addition to evidence pointing to the potential for increasing child physical activity levels through provision of additional periods of outdoor free play,³⁷ evidence suggests that during such

periods, children are more physically active during the initial time period.^{28,33} A study by Cardon and colleagues has further suggested that multiple shorter periods of outdoor free play are a predictor of higher levels of physical activity, compared to fewer but longer periods of such play.³⁴ A likely explanation for this is that young children's activity in care is characterised by short, intense bouts occurring at the start of outdoor free-play.^{33, 38-40} In addition to the potential for increasing children's physical activity levels, such an intervention approach has the advantages of placing less demand on childcare staff knowledge, skills and capabilities, requiring little or no ongoing additional resources, and may be more likely to be consistently and sustainably implemented within and across childcare services. Such characteristics address previously described limitations of existing pragmatic intervention approaches to improving child physical activity in childcare. In the context of such evidence and hypothesized benefits, rigorous evaluation of interventions regarding the scheduling of multiple periods of outdoor free play opportunities in childcare services appears warranted.^{41,42}

ii) IMPROVING THE EVIDENCE BASE REGARDING EFFECTIVE STRATEGIES TO IMPROVE IMPLEMENTATION OF PHYSICAL ACTIVITY PROMOTING POLICIES AND PRACTICES IN CHILDCARE

To maximise the public health benefit of effective physical activity interventions delivered in childcare, strategies that are effective in ensuring their widespread implementation by childcare services are required. Evidence of the effectiveness of strategies in improving the implementation of physical activity promoting policy and practices by childcare services is however limited.^{43,44} For example, just ten studies were identified in a recently published Cochrane review examining the effectiveness childcare obesity prevention implementation strategies in interventions targeting healthy eating and/or physical activity policy and practice change (Appendix 6.1).⁴⁴ Seven of the studies described the effectiveness of interventions to improve the implementation of physical activity promoting policies and practices alone or in

combination with the implementation of nutrition components. None of the studies improved the implementation of all of the targeted policies and practices relative to a comparison group. Further, four of the included studies had small samples, or used self-reported measures of implementation.⁴⁴ Based on such findings, the review concluded that there was weak and inconsistent evidence of the effectiveness of interventions aiming to improve implementation of physical activity promoting policies and practices in this setting.⁴⁴ The findings of the review are consistent with those of the trials described in Chapters 4 and 5 of this thesis. In particular, the findings are consistent with those reported in the pragmatic cluster RCT reported in Chapter 4, where four out of the five targeted policies and practices were not implemented at follow-up despite multiple implementation support strategies being included in the intervention.

The use of comprehensive implementation theoretical frameworks has been recommended to strengthen the effectiveness of interventions to improve healthcare professionals' implementation behaviours.⁴⁵ Such frameworks are suggested to more comprehensively identify factors that impede or enable the implementation of desired professional practice, and aid the selection of evidence-based strategies to address such factors.⁴⁵⁻⁴⁷ In line with this, the findings of limited impact on physical activity promoting policies and practices of the trials described in Chapters 4 and 5 of this thesis may indicate that the selected implementation strategies may not have been sufficient, or applicable in addressing impediments to the implementation of the targeted policies and practices. Given the current limitations of the evidence base, decisions regarding implementation strategy selection will need to continue to rely on parallel evidence such as that generated in clinical settings. As the generalisability of evidence from clinical to community settings is to date unknown, trials of implementation strategies in community settings such as childcare represent a priority area for future research

investment. Although policies regarding child safety, non-cooperative colleagues, and diverse ages and needs of children have been reported as barriers to the promotion of children's physical activity by childcare staff,⁴⁸⁻⁵¹ such barriers were not specifically addressed by the intervention implementation support strategies. In this context, the effectiveness of the intervention's implementation strategies may have been enhanced had theoretically grounded and structured process been applied. Such an approach has the potential to produce a broader understanding of the context of physical activity policy and practice implementation in childcare services and identify setting differences that may better enable the extrapolation of strategies to community settings facilitating a selection of implementation support strategies better aligned to setting and implementation context.

Despite the potential benefits of a theory informed and systematic approach to the identification of barriers to practice change and the selection of evidence-based strategies, the use of implementation frameworks has been limited in childcare physical activity research. For example, in the previously described Cochrane review of childcare implementation interventions that targeted healthy eating and physical activity policies and practices, just four studies were identified that involved intervention strategies being selected using a theoretical framework.⁴⁴ In the context of this limited evidence, greater application of such frameworks in the design of future childcare physical activity implementation interventions aiming to support practice change, and evaluation of the benefits of this intervention design approach therefore appears warranted.⁴⁴

While many implementation frameworks or theories have been proposed,⁴⁶ the Theoretical Domains Framework (TDF) has a number of characteristics that lends itself to being applied to the selection of intervention strategies that seek to support implementation of physical

activity policies and practices in childcare. Firstly, the TDF was developed to be applied in settings requiring complex implementation interventions, such as those addressing childcare physical activity interventions. For example, the implementation of many of the identified physical activity promoting policies and practices in childcare requires changing practice behaviours of multiple staff members at varying levels of seniority while also relying on usual childcare service staff to simultaneously implement multiple new practice behaviours. Second, the framework has been successfully applied in the design of implementation interventions that have been effective in modifying care delivery practices in clinical settings.^{52,53} For example increases in General Practitioner intentions to practice consistent with evidence-based guidelines for acute low back pain were reported in a cluster RCT of a TDF informed intervention.⁵⁴ Third, more recently the framework has been successfully applied in the design of interventions in community settings such as schools⁵⁵ and a childcare-based intervention to improve implementation of menu guidelines by long daycare services.⁵⁶ However, the results of these intervention trials have yet to be reported. Finally, research has been reported to be underway which seeks to enhance the utility of the TDF in the design and evaluation of childcare implementation interventions specifically⁵⁷. Such research includes a review of barriers to childcare services implementation of child obesity prevention practices, based on the TDF barrier constructs, and the development of a validated survey tool to measure TDF implementation barriers related to the implementation of menu guidelines in childcare.⁵⁸

In addition to the potential benefit of applying a more structured, comprehensive and theoretically grounded approach to the development of implementation interventions to address the physical activity promoting practices of childcare services, the findings from this thesis also suggest that other intervention characteristics may have contributed to the limited implementation of targeted policies and practices in the interventions described in Chapter 4

and 5. For example, the interventions described in Chapter 4 and the quasi-experimental study in Chapter 5, involved less than three follow-up implementation support contacts of which two were conducted via phone and of 15 minutes duration with the childcare services over the intervention period. The findings of implementation research in other community settings such as schools suggests a longer duration of practice change support of up to three to four years is required.^{59,60} In addition, early childhood educational research suggests that prolonged periods of ongoing support (at least 12 months), is required for the embedding of new and complex teaching practice change in this setting.⁶¹

CONCLUSIONS

The findings of this thesis indicate that there is a need for future research to address evidence gaps in childcare based interventions aimed at increasing children's physical activity in regard to both their effectiveness and implementation. Firstly, given the limited effectiveness of current pragmatic interventions in improving child physical activity, future research is required to improve their potential. Secondly, given the limited effectiveness of strategies to implement evidence based physical activity interventions in this setting there is a need for further studies to improve the evidence available to inform the development of strategies aiming to improve physical activity promoting policy and practice implementation in childcare. This thesis highlighted a number of opportunities to address these needs.

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APPENDICES

APPENDIX ONE:

APPENDIX 1.1: UNIVERSITY OF NEWCASTLE THESIS BY PUBLICATIONS GUIDELINES

Office of Graduate Studies Information Sheet Thesis by Publication



A thesis may be submitted in the form of a series of published papers and the additional rules specific to this style of thesis are presented below. It is important to note that the general rules for a University of Newcastle thesis are also applicable. Please ensure you also refer to [The Rules Governing Research Higher Degrees](#) for the full scope of applicable rules.

Rule 39.1 A thesis by publication will include:

- i. a full explanatory overview that links the separate papers and places them in the context of an established body of knowledge;
- ii. a literature review;
- iii. if detailed data and descriptions of methods are not otherwise given within the separate papers, they must be included in the body of the thesis or as appendices to the thesis;

Rule 39.2 For a thesis by publication:

- i. the separate papers provided under sub-clause 39.1(i) must be published, in press or submitted to scholarly media only, i.e. refereed publications classified by current national standards and refereed conference papers, however at least 50% of these papers must have been published. Papers published up to three years prior to enrolment may be included provided they were published in scholarly media and do not represent more than 50% of the total papers;
- ii. publications submitted by the candidate for another degree may only be referred to in the thesis literature review;
- iii. the number of papers submitted should demonstrate that the body of work meets the requirements of the degree as outlined in the relevant schedule;
- iv. the candidate must be the lead author in at least 50% of the papers written in the time of their formal Research Higher Degree candidature. Any published paper of which the candidate is a joint author may only be included in the thesis provided the work done by the candidate is clearly identified. The candidate must include in the thesis a written statement from each co-author attesting to the candidate's contribution to a joint publication included as part of the thesis. These statements must be endorsed by the Assistant Dean (Research Training).
- v. the Assistant Dean (Research Training) may seek the approval of the Dean of Graduate Studies to include a paper that is outside the scope of these rules.

Considerations

- Each discipline area will have different issues to consider in the decision to submit a thesis in the form of a series of published papers.
- It is essential that you discuss your options carefully with your supervisor(s). The thesis by publication must reflect a sustained and cohesive theme, an integrated whole that sits logically in the context of the available literature. Overall the material presented for examination needs to equate to that which would otherwise be presented in the traditional thesis format.
- The review process for some journals is significant resulting in lengthy waiting periods for papers to be accepted and this can delay thesis submission/completion. Time management and selection of journals/publishers is critical. Focusing on publication rather than research may lead to candidates being tempted to publish sections of their work prematurely and missing opportunities to fully capitalize on the significance of the work.
- Consider the thesis from the examiners' view point - if the publications do not have a clear cohesion and the contribution to knowledge is not clearly demonstrated, then the thesis may attract criticism and be rejected by examiners. The content of the thesis remains a matter of professional judgment for the supervisor(s) and candidate.
- Any published paper of which the candidate is a joint author may only be included in the thesis provided the work done by the candidate is clearly identified. The candidate must include in the thesis a written statement from each co-author attesting to the candidate's contribution to a joint publication included as part of the thesis. The statement/s need to be signed by the Faculty Assistant Dean (Research Training). A sample statement is provided below.
- We strongly advise that you arrange for the signatures from co-authors to be collected as soon as the paper is prepared or submitted for publication rather than trying to collect them at the time of thesis submission.
- There is no minimum or maximum requirement on the number of papers. Of equal, or perhaps more importance than quantity, is the quality of the journals. Please refer to your school or faculty for more specific guidance on the number and length of papers that would normally be expected in your discipline.

Alternative option

As discussed above, you need to consider if your publications will form a sufficient body of cohesive work to meet the requirements of thesis by publication. You may like to consider the other option of including publications within a standard thesis format, either in the body or as an appendix as supported in the rule below.

Rule 38.5. A thesis may:

- i. Include publications arising as a consequence of the research undertaken for a thesis. When the candidate includes a co-authored published paper or co-authored scholarly work, or a substantive component of a co-authored published paper or co-authored scholarly work in the body of the thesis, the candidate must include in the thesis a written statement attesting to their contribution to the joint publication. This statement must be signed by the supervisor. A statement is not required when publications are included as an appendix to the thesis.

Components and Layout

PLEASE NOTE: the layout and ordering of the contents is flexible and should be based on the judgement and experience of candidates and supervisors as well as discipline norms. Please use your own discretion and seek expert advice. The following is a suggested layout only.

1. Title Page

2. Declarations

Originality

I hereby certify that to the best of my knowledge and belief this thesis is my own work and contains no material previously published or written by another person except where due references and acknowledgements are made. It contains no material which has been previously submitted by me for the award of any other degree or diploma in any university or other tertiary institution.

Thesis by Publication

*I hereby certify that this thesis is in the form of a series of 'papers'. I have included as part of the thesis a written statement from each co-author, endorsed in writing by the Faculty Assistant Dean (Research Training), attesting to my contribution to any jointly authored papers. (*Refer to clause 39.2 of the Rules Governing Research Higher Degrees for acceptable papers).*

3. Acknowledgements

4. List of publications included as part of the thesis

4.1 List all of the included published work with the full bibliographic citations in the order they appear in the thesis.

4.2 Provide a statement to indicate that where necessary permission regarding copyright has been obtained from copyright owners. For example, the statement may say "I warrant that I have obtained, where necessary, permission from the copyright owners to use any third party copyright material reproduced in the thesis (e.g. questionnaires, artwork, unpublished letters), or to use any of my own published work (e.g. journal articles) in which the copyright is held by another party (e.g. publisher, co-author)."

5. Table of Contents

6. Abstract

An abstract of approximately 300 words is required to describe the content of the thesis.

7. Overview

A full explanatory overview is required to link the published papers to the research thesis. This may include sections for Literature Review (if not included separately), Research Design and Review/Discussion. Not all of these sections may be necessary. Choose the format that underpins the academic argument so that the contents of the thesis are established as a substantial and significant body of work, but without unnecessary repetition.

8. Literature Review

9. Statement of Contribution of Others

In the thesis, at the front of each paper, include a written statement from each co-author attesting to the candidate's contribution to a joint publication included as part of the thesis. The purpose of this statement is to summarise and clearly identify the nature and extent of the intellectual input by the candidate and any co-authors.

9.1 Sample co-author statement

By signing below I confirm that [Candidate Name] contributed [insert outline of contribution]) to the paper/publication entitled [insert reference details].

List:

Full Name of Co-Author/s, Date, Signature of Co-Authors

Full Name of Faculty Assistant Dean Research Training, Date, Signature

10. Papers/Chapters

Each paper/chapter should have an introduction to explain how it contributes to the overall body of knowledge. It is not necessary to reformat published papers in the thesis. Where appropriate publications can be included in full or in parts thereof.

11. Appendices**12. Bibliography**

APPENDIX TWO

APPENDIX 2.1:

DETAILED SUMMARY OF STUDIES: PHYSICAL ACTIVITY AND HEALTH BENEFITS IN PRESCHOOL AGE CHILDREN

MEASURES OF ADIPOSITY

Randomised controlled trials

Five randomized controlled trials reporting on the effect on measures of adiposity after exposure to physical activity promoting programs were identified from two systematic reviews (Timmons, Leblanc et al. 2012, Venetsanou F, Kambas A et al. 2015). The first trial conducted with 545 children in their preschool year attending 36 nurseries in Scotland reported no significant effect on BMI at six and 12 months following receipt of an enhanced physical activity programme (three 30 minute sessions a week over 24 weeks) (Reilly JJ, Kelly L et al. 2006). The second trial was conducted with 97 children attending two childcare centers (Australia) and reported no significant change in BMI between groups following delivery of a 20-week structured activity program (Jones, Riethmuller et al. 2011). These trials also showed no effect of programs on physical activity levels (Reilly JJ, Kelly L et al. 2006, Jones, Riethmuller et al. 2011). The third trial conducted with 178 children aged 3–5 years enrolled in 11 childcare centres (United States) reported no significant differences in total body fat despite increases in moderate and vigorous activity among children participating in 30 minutes/day of gross motor activities compared to children participating in fine motor activities (Specker B and Binkley T 2003). Two additional trials both examining (Fitzgibbon, Stolley et al. 2005, Fitzgibbon, Stolley et al. 2006) the impact of a 14 week dietary and physical activity intervention involving a weekly 40-minute physical activity education and aerobic sessions per week. One among 289 predominantly African American children aged 3-5 (2005), and one among 331 predominantly Latino children (2006) attending 12 childcare centres (United States). A significantly smaller increase in BMI was observed in the African American sample and no differences between groups reported in the Latino sample after exposure to three. Both trials reported no effect on child physical activity (parental report of physical activity time and intensity) (Fitzgibbon, Stolley et al. 2005, Fitzgibbon, Stolley et al. 2006).

The literature search identified a further seven randomised trials, not included in either review, reporting on measures of adiposity after exposure to physical activity promoting programs. The first trial conducted with 83 children attending six childcare centres in Ottawa

(Canada) reported significant reductions in intervention children's body fat percentage and fat mass (bioelectrical impedance) and increases in minutes per preschool day spent in overall physical activity (accelerometers) after exposure to a six month program aimed at increasing active play (Goldfield GS, Harvey ALJ et al. 2016). The second trial including 209 three to five year old children attending 26 daycare centers (United States) reported significant increases in moderate to vigorous physical activity (MVPA) and total activity(accelerometer) yet no significant improvements in BMI, relative to the controls, after exposure to a six month nutrition and physical activity intervention (Bonis M, Loftin M et al. 2014). The third trial conducted with 273 children attending 58 childcare centers (Switzerland) reported no significant improvement in BMI (Zurich Neuromotor Assessment test) or physical activity (Accelerometer) after an eight month intervention including daily physical activity session (Bonvin A, Barral J et al. 2013). The fourth trial including 826 children (mean age at baseline 3.3 years) attending 39 childcare centres (Germany) reported no significant effect on BMI, percentage body fat or child physical activity levels (accelerometer) relative to the controls at follow-up after exposure to an additional program component motivating parents to develop and implement their own project ideas for promoting children's physical activity (De Bock, Genser et al. 2013). Children in the control group received just the state-sponsored program consisting of twice-weekly gym classes over six months (De Bock, Genser et al. 2013). The fifth trial conducted in 12 childcare services (United States) with 362 children (mean age at baseline 4 years) reported significantly smaller increases in BMI in the intervention group relative to the control group at one and two year follow-ups after participation in a 14-week (40 minutes, three times weekly) healthy eating and exercise program (Fitzgibbon ML, Stolley M et al. 2011). There were no significant changes in physical activity reported between groups (measured by parent report of frequency and intensity) (Fitzgibbon ML, Stolley M et al. 2011). The final trial conducted with 101 children aged 5-6 attending four preschool classes (Israel) evaluated the impact of a 14 week nutrition and physical activity intervention and reported that intervention children showed significant reductions in BMI and fat percent (skinfold) and significant increases in physical activity (pedometer) relative to controls (Eliakim A, Nemet D et al. 2007).

Non- randomised designs

The literature search identified one non-randomised study, not included in any review. The study conducted with 423 predominantly Mexican-American children (mean age = 4.1)

enrolled in four Head Start centres (low SES program) (United States) reported significantly lower gains in weight z-scores for age among children receiving a gross motor program with structured outdoor play, supplemental classroom activities, and, centre and parent education compared to the control children at follow-up. No differences were observed between groups in outdoor physical activity (pedometers)(Zenong Yin 2012).

Longitudinal studies

Four relevant longitudinal studies were identified from one systematic review (Timmons, Leblanc et al. 2012). The first study of 146 three to five year old children (United States) conducted over a three year period found increases in children's leisure activity were associated with decreases in subsequent weight gain as reported by parents thickness (Klesges, Klesges et al. 1995). The second study reporting in two papers (USA) assessed physical activity (Caltrac electronic motion sensors) and estimated body fatness using skinfolds in 103 children between the ages of four and 11(Moore LL, Nguyen UDT et al. 1995, Moore, Gao et al. 2003). Data across eight years of follow-up showed that higher activity at baseline was associated with smaller gains in BMI and evidence of a dose-response relationship between physical activity and BMI and skinfold thickness (Moore, Gao et al. 2003). The third study found no association between physical activity (accelerometer) and BMI and skin fold thickness among a cohort of 113 children from 54 schools(UK) measured on four annual occasions (five, six, seven and eight years) (Metcalf, Voss et al. 2008). The final study included in this review was conducted with 90 children (United States) and reported that activity (activity scores based on 1-day activity records) at three years of age was associated with less percent body fat, as measured using hydrostatic weighing, at 8 years of age in boys only (Ku, Shapiro et al. 1981).

One additional relevant longitudinal study, not included in the review (Timmons, Leblanc et al. 2012) was identified through the literature search. This prospective cohort study assessed BMI and MVPA(accelerometers among 470 children at ages five and seven (Netherlands) and reported that in normal weight children, MVPA was associated with decrease in BMI in boys but not girls (Remmers, Sleddens et al. 2014).

BONE AND SKELETAL HEALTH

Randomised controlled trials

Two randomized controlled trials reporting on the effect on measures of adiposity after exposure to physical activity promoting programs were identified from two systematic reviews (Timmons, Leblanc et al. 2012, Venetsanou F, Kambas A et al. 2015). These papers reported positive findings from a single trial investigating physical activity and skeletal health in preschool age children (Specker B and Binkley T 2003, Binkley T and Specker B 2004). The study including 178 three to five year old children reported that increased activity (accelerometers) following receipt of a gross motor activity intervention was associated with increases in tibia circumference (peripheral quantitative computed tomography) with the effect present up to 12 months post-intervention (Binkley T and Specker B 2004). No effects were observed for total body bone mineral content, arm bone mineral content, leg bone mineral content, total body bone area, arm bone area, or leg bone area (dual-energy x-ray absorptiometry). No additional randomised controlled trials were identified.

Non- randomised designs

No studies were identified for this health outcome

Longitudinal studies

While the reviews did not identify any additional longitudinal studies for this health outcome, a further two papers reporting observational findings from one longitudinal study investigating the relationship between accelerometer-measured physical activity and bone mineral content (dual-energy x-ray absorptiometry) were identified by the literature search. In their prospective cohort study among 370 children at age five and eight, Janz and colleagues concluded that maintaining high levels of everyday physical activity contributed to increases in BMC after adjusting for baseline BMC and body size (Janz, Gilmore et al. 2006). Specifically, children who maintained high levels of physical activity accrued, on average, 14% more trochanteric BMC and 5% more whole-body BMC relative to children maintaining low levels of physical activity (Janz, Gilmore et al. 2006). In a later follow-up of the children at age 11 findings from the available cohort of 333 showed that moderate to vigorous physical activity (MVPA) at age five predicted bone mineral content at eight and 11 years and that children in the highest quartile of MVPA at age five had 4%–14% more BMC at ages eight and 11 compared to those in the lowest quartile of MVPA (Janz KF, Letuchy EM et al. 2010).

MOTOR AND MOVEMENT SKILLS

Randomised controlled trials

Two RCTs reporting on the effect on measures of motor and movement skills after exposure to physical activity promoting programs were identified from the systematic reviews (Timmons, Leblanc et al. 2012, Venetsanou F, Kambas A et al. 2015). The first trial conducted with 97 children attending two childcare centres (Australia), reported, relative to control, significantly greater increases in physical activity (accelerometers) during the preschool day, but not at follow-up and improved scores on the Test of Gross Motor Development among children receiving a 20 week movement skill development physical activity intervention (Jones, Riethmuller et al. 2011). A second trial including 285 children from 36 childcare centres (Scotland) reported significant improvements in child fundamental movement skill performance (movement battery assessment) but not physical activity (accelerometers) following a 24 week physical activity program compared with those in the control group (Reilly JJ, Kelly L et al. 2006).

An additional five RCTs reporting both motor skill and physical activity outcomes after exposure to physical activity promoting programs were identified through the literature search. The first trial including 709 4-5 year old children from 41 preschools (Germany) reported borderline significant increases in MVPA during weekdays (accelerometer) and improvements in motor skills performance after participation in daily 30 minute physical activity program delivered over one year compared to children in the control group (Roth, Kriemler et al. 2015). A second RCT conducted with 273 children attending 58 childcare centers (Switzerland) showed no significant improvement in motor skills (Zurich Neuromotor Assessment test) after an eight month intervention including daily physical activity session. This intervention also failed to show an effect on physical activity levels (Bonvin A, Barral J et al. 2013). Similarly, results from a larger RCT conducted with 421 children from 30 preschools (Switzerland), reported improved motor agility but not physical activity (accelerometers), in the intervention group relative to controls after exposure to structured lessons aimed at increasing fitness and coordination (Puder, Marques-Vidal et al. 2011). Significant improvements in gross motor but not physical activity (assessed using pedometers) were also reported by Bellows and colleagues after exposure to structured lessons in an RCT involving 201 children attending four childcare centres (United States) (Bellows, Davies et al. 2013).

Significant improvements in leaping skills, but not physical activity (Accelerometers) were reported for children participating in a locomotor skills-based physical activity program in an RCT conducted with 75 children attending eight low-socioeconomic status preschool classrooms (United States) (Alhassan S, Nwaokelemeh O et al. 2012)

Non- randomised designs

One randomised study was identified from one systematic review (Venetsanou F, Kambas A et al. 2015). This study conducted with 423 predominantly Mexican-American children (mean age = 4.1) enrolled in four Head Start centres (low SES program) (United States) reported significantly higher gains in gross motor skills among children participating in intervention groups receiving a gross motor program with structured outdoor play, classroom activities, and the same program with the addition of parent education compared to children in the control group. No differences were observed between groups in outdoor physical activity (pedometers) (Zenong Yin 2012). No additional non-randomised studies were identified.

Longitudinal studies

One prospective cohort study was identified through the literature search. The study conducted with 217 preschool children (age 4–6 years) in Switzerland reported that higher baseline physical activity levels were associated with positive changes in motor skills agility (obstacle course), dynamic balance (balance beam), at a nine month follow-up (Burgi F, Meyer U et al. 2011).

CARDIOVASCULAR HEALTH

Randomised controlled trials

The systematic reviews and additional literature search did not identify any randomised controlled trials for this health outcome.

Non- randomised designs

The systematic reviews and additional literature search did not identify any non-randomised studies for this health outcome.

Longitudinal studies

Two unique longitudinal studies (reported in three published papers) examining the relationship between physical activity and indicators of cardiovascular health were identified from one systematic in the review (Timmons, Leblanc et al. 2012). The first prospective cohort study of 155 children (aged four to seven years) (Finland) reported that girls maintaining high levels of physical activity showed greater reductions in total cholesterol and HDL/total cholesterol ratio and boys who maintained high levels of physical activity (accelerometer) showed greater reductions in triglycerides over a three year follow-up period (Saakslähti, Numminen et al. 2004). The second longitudinal study reported in two published papers was conducted in the UK and reported on the relationship between physical activity (accelerometry) and cardiometabolic health measures among a cohort of 113 children from 54 schools followed up over four years (5, 6, 7 and 8 years) (Metcalf, Voss et al. 2008, Metcalf, Jeffery et al. 2009). Findings indicated that activity of at least moderate intensity was associated with a favourable and significant change in metabolic score (composite measure of insulin resistance, triglycerides, cholesterol/HDL ratio and mean arterial blood pressure) for boys, with a similar effect observed in girls however not reaching statistical significance in the girls ($p=0.06$) (Metcalf, Voss et al. 2008). The study also reported no correlation between physical activity levels and any of the included markers of metabolic health (adiponectin, leptin, and high-sensitivity C-reactive protein) (Metcalf, Jeffery et al. 2009).

COGNITIVE DEVELOPMENT

Randomised controlled trials

The review by Tandon identified one RCT investigating the relationship between physical activity and cognitive development in preschool age children. The trial was conducted with 111 children attending (Mean age 4.9 years) 15 child-care centers (Australia) and evaluated the impact of four conditions on word recall after participation in a four week Italian word teaching program. The study reported significantly higher free word recall among children enacting actions indicated by the words compared to children performing just physical exercises at the same intensity and compared to children enacting actions indicated by the

words by gesturing while remaining seated or repeating words while remaining seated (Mavilidi, Okely et al. 2015). Findings indicated that learning of a foreign language vocabulary was positively affected by the cognitive effects of enacting the words through physical exercises. No other randomised trials were identified through the literature search.

Non- randomised designs

Two systematic reviews (Timmons, Leblanc et al. 2012, Tandon, Tovar et al. 2016) identified three non-randomised studies. A cross-over study conducted with 16 children attending one childcare centre (United States), used accelerometers to examine the effect of a bout of exercise on cognitive function of preschool age children. The study reported that children exposed to the intervention showed significant improved ability to sustain attention, relative to assessments made after children had been kept sedentary. No significant findings were observed for measures of behavioral inhibition (Palmer KK, Miller MW et al. 2013). A second non-randomised trial conducted with 72 children (mean age of 3.8 years) participating in a Head Start program (low-socioeconomic) (United States) reported significant improvements in early literacy (Picture Naming, Alliteration) and greater levels of physical activity during free play compared to a non-exercising control group after participation in two 15 min periods of physical activity (Kirk, Vizcarra et al. 2014). The third non randomised trial conducted with 207 preschool age children participating in the Head Start program (United States) reported no significant differences between intervention and control groups for language skills and phonological awareness, despite increases in MVPA (accelerometer) after exposure to a music/movement programme twice a week over 26 weeks (Yazejian and Peisner-Feinberg 2009). The study did report the significantly greater gains in communication skills for children in the intervention group (Yazejian and Peisner-Feinberg 2009). No other non-randomised studies were identified through the literature search.

Longitudinal studies

One systematic review (Tandon, Tovar et al. 2016) identified one longitudinal study. The prospective cohort study conducted with 245 preschool age children in Switzerland reported that baseline aerobic fitness was independently related to significant improvements in children's attention at a nine month follow-up. The study also reported that baseline dynamic balance was associated with significant improvements in working memory (Niederer, Kriemler et al. 2011). No other longitudinal studies were identified through the literature search.

PSYCHOSOCIAL HEALTH AND DEVELOPMENT

Randomised controlled trials

The reviews did not identify any RCTs reporting on the effect on measures of psychosocial health after exposure to physical activity promoting programs. The literature search identified one additional relevant RCT. The trial conducted with 421 children from 30 preschools (Switzerland), reported no significant effects on cognitive motor agility or total activity (accelerometers) in the intervention group relative to controls after exposure to structured lessons aimed at increasing fitness and coordination (Puder, Marques-Vidal et al. 2011).

Non- randomised designs

One systematic review (Venetsanou F, Kambas A et al. 2015) identified one non-randomised trial reporting on the effect on measures of psychosocial health after exposure to physical activity promoting programs. The study conducted with 24 three to five year olds reported that children participating in an eight week exercise program consisting of 30 min of daily aerobic exercises showed significant decreases in heart rate and significant increases in agility and self-esteem at follow-up compared to children engaged in free play on the school playground (Alpert, Field et al. 1990). No other non-randomised studies were identified through the literature search.

Longitudinal studies

One review (Timmons, Leblanc et al. 2012) identified one prospective cohort study conducted with 129 children, in the United States which measured preschool actometer index and independently derived personality variables at ages three, four, and seven. The study and reported more active preschoolers were rated by their teachers as being more outgoing and less socially withdrawn over the follow-up period (Buss, Block et al. 1980). The additional literature search failed to identify any observational studies for this health outcome.

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APPENDIX THREE:

APPENDIX 3.1: ETHICS APPROVAL – HNE & UON 2009

17 November 2009

HUNTER NEW ENGLAND
NSW HEALTH

Dr Luke Wolfenden
Research Fellow
HNE Population Health
Wallsend Campus

Dear Dr Wolfenden,

Re: A randomised controlled trial to assess the feasibility and preliminary efficacy of a multi-component physical activity intervention in increasing the physical activity levels of children attending long day care (09/09/16/5.12)

HNEHREC reference number: 09/09/16/5.12
HREC reference number: HREC/09/HNE/286
SSA reference number: SSA/09/HNE/287

Thank you for submitting an application for authorisation of this project. I am pleased to inform you that authorisation has been granted for this study to take place at the following sites:

- Hunter New England Health

The following conditions apply to this research project. These are additional to those conditions imposed by the Human Research Ethics Committee that granted ethical approval:

1. Proposed amendments to the research protocol or conduct of the research which may affect the ethical acceptability of the project, and which are submitted to the lead HREC for review, are copied to the research governance officer;
2. Proposed amendments to the research protocol or conduct of the research which may affect the ongoing site acceptability of the project, are to be submitted to the research governance officer.

Yours faithfully

Dr Nicole Gerrard
Research Governance Officer
Hunter New England Health

Hunter New England Research Ethics & Governance Unit

(Locked Bag No 1)
(New Lambton NSW 2305)
Telephone (02) 49214 950 Facsimile (02) 49214 818
Email: hnehrec@hnehealth.nsw.gov.au
http://www.hnehealth.nsw.gov.au/Human_Research_Ethics

14 July 2010

HUNTER NEW ENGLAND
NSW HEALTH

Dr L Wolfenden
Research Fellow
HNE Population Health
Wallsend Campus

Dear Dr Wolfenden,

Re: A randomised controlled trial to assess the feasibility and preliminary efficacy of a multi-component physical activity intervention in increasing the physical activity levels of children attending long day care (09/09/16/5.12)

Thank you for submitting a request for an amendment to the above project. This amendment was reviewed by the Hunter New England Human Research Ethics Committee. This Human Research Ethics Committee is constituted and operates in accordance with the National Health and Medical Research Council's *National Statement on Ethical Conduct in Human Research (2007)* (National Statement) and the *CPMP/ICH Note for Guidance on Good Clinical Practice*. Further, this Committee has been accredited by the NSW Department of Health as a lead HREC under the model for single ethical and scientific review.

I am pleased to advise that the Hunter New England Human Research Ethics Committee has granted ethical approval for the following amendment requests:

- To invite the twenty Authorised Supervisors of Long Day Care Services participating in the trial to complete a brief 10-15 minute telephone survey regarding usual physical activity policies and practices at their service;
- To distribute a letter to parents of children who have given consent to participate in the study informing them of the date for follow-up data collection and requesting information about the usual physical activity habits of their child;
- For the Letter to Parent (Version 1 dated 30 June 2010); and
- For the Telephone survey of Authorised Supervisors

For the protocol **A randomised controlled trial to assess the feasibility and preliminary efficacy of a multi-component physical activity intervention in increasing the physical activity levels of children attending long day care**

Approval from the Hunter New England Human Research Ethics Committee for the above protocol is given for a maximum of **3** years from the date of the approval letter of your initial application, after which a renewal application will be required if the protocol has not been completed. The above protocol is approved until **November 2012**.

The *National Statement on Ethical Conduct in Human Research (2007)* which the Committee is obliged to adhere to, include the requirement that the committee monitors the research protocols it has approved. In order for the Committee to fulfil this function, it requires:

Hunter New England Human Research Ethics Committee

(Locked Bag No 1)
(New Lambton NSW 2305)
Telephone (02) 49214 950 Facsimile (02) 49214 818
Email: hnehrec@hnehealth.nsw.gov.au
Nicole.gerrand@hnehealth.nsw.gov.au
Michelle.lane@hnehealth.nsw.gov.au
http://www.hnehealth.nsw.gov.au/Human_Research_Ethics

- a report of the progress of the above protocol be submitted at 12 monthly intervals. Your review date is **November 2010**. A proforma for the annual report will be sent two weeks prior to the due date.
- A final report be submitted at the completion of the above protocol, that is after data analysis has been completed and a final report compiled. A proforma for the final report will be sent two weeks prior to the due date.
- All variations or amendments to this protocol, including amendments to the Information Sheet and Consent Form, must be forwarded to and approved by the Hunter New England Human Research Ethics Committee prior to their implementation.
- The Principal Investigator will immediately report anything which might warrant review of ethical approval of the project in the specified format, including:
 - any serious or unexpected adverse events
 - Adverse events, however minor, must be recorded as observed by the Investigator or as volunteered by a participant in this protocol. Full details will be documented, whether or not the Investigator or his deputies considers the event to be related to the trial substance or procedure.
 - Serious adverse events that occur during the study or within six months of completion of the trial at your site should be reported to the Professional Officer of the Hunter New England Human Research Ethics Committee as soon as possible and at the latest within 72 hours.
 - Copies of serious adverse event reports from other sites should be sent to the Hunter New England Human Research Ethics Committee for review as soon as possible after being received.
 - Serious adverse events are defined as:
 - Causing death, life threatening or serious disability.
 - Cause or prolong hospitalisation.
 - Overdoses, cancers, congenital abnormalities whether judged to be caused by the investigational agent or new procedure or not.
 - unforeseen events that might affect continued ethical acceptability of the project.
- If for some reason the above protocol does not commence (for example it does not receive funding); is suspended or discontinued, please inform Dr Nicole Gerrand, the Professional Officer of the Hunter New England Human Research Ethics Committee as soon as possible.

The Hunter New England Human Research Ethics Committee also has delegated authority to approve the commencement of this research on behalf of the Hunter New England Area Health Service. This research may therefore commence.

Should you have any queries about your project please contact Dr Nicole Gerrand as per her contact details at the bottom of the page. The Hunter New England Human Research Ethics Committee Terms of Reference, Standard Operating Procedures, membership and standard forms are available from the Hunter New England Area Health Service website.
Internet address: http://www.hnehealth.nsw.gov.au/Human_Research_Ethics

Hunter New England Human Research Ethics Committee

(Locked Bag No 1)
 (New Lambton NSW 2305)
 Telephone (02) 49214 950 Facsimile (02) 49214 818
 Email: hnehrec@hnehealth.nsw.gov.au
Nicole.gerrand@hnehealth.nsw.gov.au
Michelle.lane@hnehealth.nsw.gov.au
http://www.hnehealth.nsw.gov.au/Human_Research_Ethics

Please quote **09/09/16/5.12** in all correspondence.

The Hunter New England Human Research Ethics Committee wishes you every success in your research.

Yours faithfully

For:  Dr M Parsons
Chair
Hunter New England Human Research Ethics Committee

APPENDIX 3.3: CENTRE INFORMATION AND CONSENT MATERIALS

Hunter New England Population Health

Good for kids
good for life

LIVE LIFE WELL

NSW HEALTH
HUNTER NEW ENGLAND
ADEA HEALTH SERVICE

Dear Authorised Supervisor,

Thank you for agreeing to participate in the *Good for Kids. Good for Life.* Long Day Care Physical Activity Study. The results of this study will help guide Long Day Care Services best practice and support the healthy growth, learning and development of children. The following is a summary of key dates for your service:

Email the parent information and consent forms to all parents of children aged 3-6 that attend on Tuesdays	Email distribution of Parent information and consent materials. Please email out asap, so consents can be followed up on.
Tuesday the 23 rd of March 2010, between 8 am- 4 pm	The day we visit your service for baseline data collection
Tuesday the 17 th of August 2010, between 8 am- 4 pm	The day we visit your service for follow-up data collection

The Authorised Supervisor at your centre is required to be present for at least 20 minutes on both your allocated data collection days 23/03/10 and 17/08/10. Please mark these dates on your service calendar.

To assist our staff in supplying the appropriate number of staff surveys and parent information and consent packs to your service, it would be greatly appreciated if you could fax or email through:

- A list of the primary contact staff at your facility.
- The number of children aged between 3-6 enrolled to attend your service on a Tuesday.
- The number of children aged between 3 -6, who identify themselves as being of Aboriginal origin enrolled to attend your service on a Tuesday.

If you would like more information regarding this study please contact Ms Meghan Finch at Hunter New England Population Health on (02) 4924 6131 or email Meghan.Finch@hnehealth.nsw.gov.au.

Kind regards,
Meghan Finch

Important information for Staff

1. Distribution of Materials to Parents:

- Please email out the attached parent information document and consent form to all parents who have children aged 3-6 that attend your service on Tuesday. In the email please instruct parents to print off, complete and return the consent as soon as possible. Completed consent forms should be placed in a box that will be supplied to your service in the next few days.
- When research staff come to visit your service to distribute materials they will also supply you with a return box.
- It is a good idea to place the return box in location at your service that is accessible to parents and staff.
- Parents will be advised to read the information in the pack and to return their response in the sealed envelope to the box provided.
- We also ask for you to email out a **reminder letter to parent** the following week Good for Kids. Good for Life. staff will email these off at your service the first week of March.

3. Staff Survey

- Each primary contact staff member will have be allocated a staff survey.
- I would be great if you could hand these out to staff and ask them to complete the survey as soon as possible. When the surveys have been completed ask staff to seal it in the supplied envelope and place it in the return box provided.

4. Collection of returned materials:

- Encourage staff to return the completed staff surveys in the sealed envelope to the return box.
- Ask parents to return their forms to the return box. We are encouraging all parents to return the forms in cases where consent is given and where consent is not given.

Important information for Staff

What will be happening on the day of data collection?
--

- Good for Kids staff will arrive at your service at about **8:30am**
- We will collect completed staff surveys and any remaining consent forms
- Please assist us by telling the children that a visitor will be at the service to watch them play and participate in activities
- Trained Good for Kids staff will attach pedometers to the children's clothing at exactly **9.00am**
- From 9-3pm a staff member will observe and record physical activities and interactions of participating children over the course of the day
- Good for Kids staff will be required to minimise contact with the children and will not interject into interactions between children and/or staff
- We will measure your outdoor play area with a measuring tape
- We will organise a suitable time to spend up to 10 minutes with the Authorised Supervisor to conduct an interview about the service
- Trained Good for Kids staff will remove pedometers from children's clothing at exactly **3.00pm**
- We will be packed up and leave around **3:30pm**

Thanks again for your participation. It is greatly appreciated!

Hunter New England Population Health**Direct Contact Details**

Dr Luke Wolfenden
Locked Bag 10
Wallsend NSW 2298
Phone: (02) 49855168
Fax: (02) 4924 6490
Email: luke.wolfenden@hnehealth.nsw.gov.au

HUNTER NEW ENGLAND
NSW HEALTH

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STUDY**INFORMATION SHEET FOR STAFF**

Version 1, dated 3/11/2009

Research Team: Dr Luke Wolfenden, from the University of Newcastle;
Dr Philip Morgan from the University of Newcastle

Your service will be participating in the *Good for Kids. Good for Life.* Long Day Care Physical Activity Study which is being conducted by Dr Luke Wolfenden in collaboration with Hunter New England Population Health. This study is investigating ways long day care services can promote and encourage children to be physically active. Data from the study will be used by Ms Meghan Finch towards a Doctoral research thesis under the supervision of Dr Luke Wolfenden.

Why is the research being done?

Children's services play an important role in promoting the health and well being of young children. Participation in physical activity is important for children's healthy growth and development.

The *Good for Kids. Good for Life.* program will be implementing an innovative physical activity strategy in Long Day Care Services in the Hunter Region in 2010. The strategy is based on the most up to date recommendations for the early childhood setting and will provide training, resources and support to services to assist them to extend and enhance their capacity to promote physical activity. The aim of this study is to help us to evaluate this strategy.

Who is participating in the research?

Long Day Care Services randomly selected from a list of Children's services provided by the Department of Community Services in the Newcastle and Lake Macquarie areas will be participating in this research.

What choice do you have?

Your participation in this research study is voluntary and refusal to participate will not affect your relationship with your employers.

What will your service be asked to do?

Your service will participate in the Physical Activity program for Long Day Care and strategies to evaluate this program.

Physical Activity Program

The program will focus on promoting and extending opportunities for active play and skill development for children in Long Day Care. As part of the evaluation of the program your service will be randomly allocated to either an intervention or control group. The intervention group will participate in the program during March to June 2010, and the control group during August and September 2010. Participation in the program will require the Authorised Supervisor and some staff members to attend a 6 hour physical activity professional development workshop. Staff will have a choice of sessions on different days.

Services will also be provided with a resource kit with demonstration DVDs, and practical and fun age specific activity handbooks, the latest information to support development of fundamental movement skills, ie, templates for a physical activity policy, newsletter items, information sheets and ideas for how to engage and communicate with families in relation to physical activity. Your service will also be provided with two 15 minute support telephone calls from the *Good for Kids. Good for Life.* program and offered additional materials and resources to support your service to implement this strategy.

Evaluation Strategies

All participating services will be asked to participate in the evaluation. In January 2010 your service will be asked to distribute study information and consent form packages to parents of children aged 3-8 years attending your childcare service. The evaluation will also involve the collection of data, as part of a field visit to your service, and distribution of staff surveys occurring in January/February 2010 and July 2010. Staff surveys distributed in July 2010 for services in the intervention group will include additional questions about staff satisfaction with program materials. Information packages and staff surveys will be provided to your service by the research team. We will also ask that services distribute a reminder letter to parents 1 week following distribution of the information and consent packages. Should you require assistance research staff will be able to assist with the distribution and collection of information package and surveys.

Following distribution of information and consent packages to parents, research staff will organise a day to visit your service. During the visit research staff trained in data collection will:

- Attach a pedometer to the outer clothing of children who have written parental consent to participate in the study. A Pedometer is a small box shaped instrument that is used to measure physical activity by counting steps. They are unobtrusive, lightweight and slightly smaller than a matchbox and will be attached at 9am. The fitting of the pedometers to the children will occur in a public place in the presence of service staff.
- Observe and record physical activities and interactions of staff and participating children over the course of the day and collect information on features of the indoor and outdoor play areas.
- Spend up to 10 minutes with the Authorised Supervisor to collect information on physical activity training of staff, and some characteristics of the service such as how long the service has been in operation and if the service has a physical activity policy.
- Collect completed staff surveys.

What will you be asked to do?

Your participation in the Physical Activity program for Long Day Care and strategies to evaluate this program will include:

- Possible attendance at a 6 hour physical activity *Good for Kids. Good for Life.* professional development workshop.
- Distribution of study information and consent form packages to parents of children aged 3-8 years.
- On two occasions completion of a brief survey asking about physical activity practices and opinions about promoting physical activity among children attending long day care.

On the two occasions that the research team visit your service:

- At 9am, being present while the research team attach a pedometer to the outer clothing of children aged 3-8 years in your care who have written parental consent to participate in the study.
- Have your interactions with participating children observed and recorded by the research team during the course of the day. Practices only will be recorded, the research team will not identify individual staff members as part of this process.

What are the risks and benefits of participating?

The physical activity program has the capacity to positively influence the health and development of children attending your service through increasing physical activity levels and physical education of children. There are no anticipated risks to you through your services participation in the study.

How will your privacy be protected?

Any information provided will be treated as strictly confidential. Information you provide, and the identity of your service, parents and children will not be revealed to anyone other than the investigators conducting the project. No individual staff will be identified through either the staff survey or observations. All data will be stored securely in a locked cabinet or password protected file. All data will be destroyed 5 years following completion of the study.

How will the information collected be used?

A summary report of the results will be provided to your service. The data collected from this study will also be used for journal publications and conference presentations and to inform future practice for the design of valuable, evidence-based early childhood service based physical activity programs. The

research will also be used by Ms Meghan Finch as part of her Doctoral research thesis. Any publications in peer reviewed journals or conference presentations arising from the study will use summarised data only, ensuring that it will not be possible to identify individuals or participating childcare services.

If you would like more information regarding this study please contact Ms Meghan Finch at Hunter New England Population Health on (02) 4924 6133.

Thankyou for considering this invitation.

Dr Luke Wolfenden University of Newcastle School of Medicine and Public Health Phone: (02) 4985 5168 Luke.Wolfenden@hnehealth.nsw.gov.au	A/Prof Phillip Morgan University of Newcastle Faculty of Education & Arts School of Education Phone: (02) 4921 7265 Phillip.Morgan@newcastle.edu.au	Meghan Finch Program Manager Hunter New England Population Health Phone: (02) 4924 6133 Meghan.finch@hnehealth.nsw.gov.au
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This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference (09/09/16/5.12).

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrand, Manager, Research Ethic and Governance, Hunter New England Human Research Ethics Committee, Hunter New England Health, Locked Bag 1, New Lambton NSW 2305, telephone (02) 49214950, email Hnehrec@hnehealth.nsw.gov.au

Hunter New England Population Health

Direct Contact Details
Dr Luke Wolfenden
Locked Bag 10
Wallsend NSW 2298
Phone: (02) 49855188
Fax: (02) 4924 6490
Email: luke.wolfenden@hnehealth.nsw.gov.au



27 January 2010

The Authorised Supervisor
(name of centre)
(postal address)
(suburb NSW postcode)

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STUDY
INFORMATION FOR AUTHORISED SUPERVISORS

Research Team: Dr Luke Wolfenden, from the University of Newcastle;
Dr Philip Morgan from the University of Newcastle

Dear Authorised Supervisor,

You are invited to take part in the **Good for Kids. Good for Life.** Long Day Care Physical Activity Study which is being conducted by Dr Luke Wolfenden in collaboration with Hunter New England Population Health. This study is investigating ways long day care services can promote and encourage children to be physically active. Data from the study will be used by Ms Meghan Finch towards a Doctoral research thesis under the supervision of Dr Luke Wolfenden.

Your service has been randomly selected from a list of Childrens' services provided by the Department of Community Services.

Why is the research being done?

Children's services play an important role in promoting the health and well being of young children. Participation in physical activity is important for children's healthy growth and development.

The **Good for Kids. Good for Life.** program will be implementing an innovative physical activity strategy in Long Day Care Services in the Hunter Region in 2010. The strategy is based on the most up to date recommendations for the early childhood setting and will provide training, resources and support to services to assist them to extend and enhance their capacity to promote physical activity. The aim of this study is to help us to evaluate this strategy.

Who can participate in the research?

Randomly selected Long Day Care Services in the Newcastle and Lake Macquarie areas will be invited to participate.

What choice do you have?

Participation in this research is entirely your choice, only services who give their informed consent will be included in the study. Child participation in this research is entirely the choice of parents/guardians. Whether or not you decide to participate in this study, the decision will not disadvantage you or parents of your service in any way. Your decision regarding participation will in no way impact on your ability to participate in the Physical Activity program, which will be offered to all long day care services in the Hunter New England Area. A decision to participate is able to be withdrawn at any time without giving a reason.

What would you be asked to do?

If you agree, your service and staff will participate in the Physical Activity program for Long Day Care and strategies to evaluate this program.

Physical Activity Program

The program will focus on promoting and extending opportunities for active play and skill development for children in Long Day Care. As part of the evaluation of the program your service will be randomly allocated to either an intervention or control group. The intervention group will participate in the program during March to June 2010, and the control group during August and September 2010. Participation in the program will require you, as the Authorised Supervisor and staff members to represent your service at a 6 hour physical activity professional development workshop. Staff will have a choice of sessions on different days. Services will also be provided with a resource kit with demonstration DVDs, and practical and fun age specific activity handbooks, the latest information to support development of fundamental movement skills, ie, templates for a physical activity policy, newsletter items, information sheets and ideas for how to engage and communicate with families in relation to physical activity. You will also be provided with two 15 minute support telephone calls from the *Good for Kids. Good for Life.* program and offered additional materials and resources to support your service to implement this strategy.

Evaluation Strategies

All participating services will be asked to participate in the evaluation. If you agree to participate, in January 2010 you will be asked to distribute study information and consent form packages to parents of children aged 3-6 years attending your childcare service. The evaluation will also involve the collection of data, as part of a field visit to your service, and distribution of staff surveys occurring in March/April 2010 and July/August 2010. Staff surveys for services in the intervention group in July 2010, will include additional questions about staff satisfaction with program materials. Information packages and staff surveys will be provided to you by the research team at a time you nominate as convenient. We will also ask that you distribute a reminder letter to parents 1 week following distribution of the information and consent packages and provide a space for a collection box where parents can return completed consent forms, and staff can return completed surveys. Should you require assistance research staff will be able to assist with the distribution and collection of information package and surveys.

Following distribution of information and consent packages to parents, research staff will organise a day to visit your service at a time you consider most convenient. During the visit research staff trained in data collection will:

- Attach a pedometer to the outer clothing of children who have written parental consent to participate in the study. A Pedometer is a small box shaped instrument that is used to measure physical activity by counting steps. They are unobtrusive, lightweight and slightly smaller than a matchbox and will be attached at 9am. The fitting of the pedometers to the children will occur in a public place in the presence of service staff.
- Observe and record physical activities and interactions of participating children over the course of the day and collect information on features of the indoor and outdoor play areas.
- Spend up to 10 minutes with the Authorised Supervisor to collect information on physical activity training of staff, and some characteristics of the service such as how long the service has been in operation and if the service has a physical activity policy.
- Collect completed staff surveys.

Cultural appropriateness for Aboriginal and Torres Strait Islander Children and Families

To ensure cultural appropriateness the study proposal and physical activity program materials have been reviewed by the Good for Kids Aboriginal Health stream staff and recommendations incorporated. For services with Aboriginal Children a one page flyer for attachment to the parent information consent sheet is available. In addition research staff are available to support the dissemination of parent information sheets in a way that you deem appropriate to meet the needs of Aboriginal Families at your service. This may include service visits, information sessions to parents or individual follow-up.

What are the risks and benefits of participating?

The physical activity program has the capacity to positively influence the health and development of children attending your service through increasing physical activity levels and physical education of children. It will also provide professional development for staff in the area of physical activity. There are no anticipated risks to your service through participation in the study.

How will your privacy be protected?

Any information provided will be treated as strictly confidential. Information you provide, and your identity, and the identity of your service, parents and children will not be revealed to anyone other than the investigators conducting the project. All data will be stored securely in a locked cabinet or password protected file. All data will be destroyed 5 years following completion of the study.

How will the information collected be used?

A summary report of the results will be provided to your service. The data collected from this study will also be used for journal publications and conference presentations and to inform future practice for the design of valuable, evidence-based early childhood service based physical activity programs. The research will also be used by Ms Meghan Finch as part of her Doctoral research thesis. Any publications in peer reviewed journals or conference presentations arising from the study will use summarised data only, ensuring that it will not be possible to identify individuals or participating childcare services.

What do you need to do to participate?

Please read this Information Statement and be sure you understand its contents before you consent to participate. If there is anything you do not understand, or you have questions, please contact Ms Meghan Finch.

If you would like to participate, please complete the attached consent form and return in it the enclosed reply paid envelope or fax it to Ms. Meghan Finch on 49246215 within 2 weeks of receipt. A research assistant will contact you in a few weeks time to arrange distribution of information and consent packages.

If you would like more information regarding this study please contact Ms Meghan Finch at Hunter New England Population Health on (02) 4924 6131.

Thankyou for considering this invitation.

Dr Luke Wolfenden University of Newcastle School of Medicine and Public Health Phone: (02) 4985 5168 Luke.Wolfenden@hnehealth.nsw.gov.au	A/Prof Philip Morgan University of Newcastle Faculty of Education & Arts School of Education Phone: (02) 4921 7265 Philip.Morgan@newcastle.edu.au	Meghan Finch Program Manager Hunter New England Population Health Phone: (02) 4924 6133 Meghan.finch@hnehealth.nsw.gov.au
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This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference [09/09/16/5.12].

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrand, Manager, Research Ethic and Governance, Hunter New England Human Research Ethics Committee, Hunter New England Health, Locked Bag 1, New Lambton NSW 2305, telephone (02) 49214950, email Hnehrec@hnehealth.nsw.gov.au

APPENDIX 3.4: PARENT INFORMATION AND CONSENT MATERIALS



Good for Kids. Good for Life.



Physical Activity in Long Day Care Study



Good for kids. Good for life are seeking parents permission for their children to participate in an exciting Physical Activity Study in Long Day Care Services.

The results will help guide Long Day Care Services' physical activity best practice, supporting your children's healthy growth, learning, and development.

Children with parental consent to participate will have the opportunity to wear a pedometer* two times on a designated day at daycare and have trained research staff record their physical activities and interactions, over some periods of the day.

Look out for more information coming over the next week or so.

*A Pedometer is a box shaped instrument that is used to measure physical activity by counting steps. Pedometers are unobtrusive, lightweight and slightly smaller than a matchbox.

Hunter New England Population Health

Direct Contact Details
Dr Luke Wolfenden
Locked Bag 10
Wallsend NSW 2298
Phone: (02) 49855168
Fax: (02) 4924 6490
Email: luke.wolfenden@hnehealth.nsw.gov.au

HUNTER NEW ENGLAND
NSW HEALTH

**GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STUDY
INFORMATION FOR PARENTS**

Version 3, dated 20/01/2010

Research Team: Dr Luke Wolfenden, from the University of Newcastle; Phillip Morgan from the University of Newcastle

You are invited to take part in the *Good for Kids. Good for Life.* Long Day Care Physical Activity Study which is being carried out by Dr Luke Wolfenden with Hunter New England Population Health. This study is looking at ways Long Day Care Services can promote and encourage children to be physically active. Data from the study will be used by Ms Meghan Finch towards a Doctoral degree under the supervision of Dr Luke Wolfenden. Your service has been randomly selected from a list of Children's services provided by the Department of Community Services.

Why is the research being done?

Children's services play an important role in promoting the health and well being of young children. Participation in physical activity is important for children's healthy development. The Good For Kids. Good For Life. program will be implementing a new physical activity strategy in Long Day Care Services in the Hunter region in 2010. The strategy is based on the latest recommendations for the early childhood setting and will provide training, resources and support to services to help them to extend and enhance their ability to promote physical activity. The aim of this study is to evaluate this strategy.

Who can participate in the research?

Parents of children aged 3 to 6 years from randomly selected Long Day Care Services in the Newcastle and Lake Macquarie areas will be invited to give consent for their child to participate.

What choice do I and my child have?

Participation in the study is entirely your choice. Only children whose parents give their informed consent will be included in the study. The final decision on the day is your child's. If you choose not to participate or to end your child's participation in the study this decision will not affect your child's placement at the service and, you and your child will not be disadvantaged in the future in any way.

If you and your child decide to participate you can choose to stop participating in the survey at anytime without giving a reason. If you or your child decide to stop participating we will be able to delete any information you or your child have provided.

What do you and your child have to do?

At Home: parents who are willing to participate will need to complete the attached 'Parents Consent Form' and return it to your child's childcare centre.

At the Service: Your child will be asked to wear a pedometer on two occasions, which will be attached to outer clothing at the hip by trained staff. Staff will clearly explain the process to your child. A Pedometer is a box shaped instrument that is used to measure physical activity by counting steps. Pedometers are unobtrusive, lightweight and slightly smaller than a matchbox. The fitting of the pedometers to children will occur in a public place in the presence of service staff. Your child will wear the pedometer during their time at Long Day Care between the hours of 9am-3pm. Attachment of the pedometer will only occur once, will be a minor disruption to your child's day will take less than a minute. Wearing the pedometer will have no impact on your child's ability to play and participate in activities. Research staff may also, during some periods of the day, observe your child participating in physical activities at the service and record their activities and interactions. All research staff will have appropriate child protection clearance and research activities will occur at the childcare service in the presence of your child's usual childcare service staff.

As part of your service's participation in the *Good for Kids. Good for Life.* physical activity strategy your child will also participate in activities to promote active play and skill development. Your service along with others participating in the evaluation of this program will be randomly allocated to either an intervention or control group. The intervention group will participate in the program during April to May 2010, and the control group during August and September 2010.

What are the risks and benefits of participating?

There are no anticipated risks or benefits to you or your child associated with participating.

When will the information be collected?

Staff will visit the service to conduct the survey in February/March 2010 and again in August 2010. Parents will be asked to give consent now for their children to participate in the survey at both times.

How will your privacy be protected?

Any information provided will be treated as strictly confidential. Information you provide, and your identity, and the identity of your service, parents and children will not be revealed to anyone other than the investigators conducting the project. All data will be stored securely in a locked cabinet or password protected file. All data will be destroyed 5 years following completion of the study.

How will we ensure the well-being of the children?

Prior to attaching the pedometer permission will be asked of each child and they will be told that they can stop wearing the pedometer at any time. Also if research staff or carers notice that participation in the study is concerning your child, a carer will speak with them privately and may decide to withdraw them from the study. All research staff will have appropriate child protection clearance.

How will the information collected be used?

A summary report of the results of the Good for Kids. Good for Life. Physical Activity Survey will be provided to your service for publication within the Long Day Care newsletter. The summary report will not identify individuals or services. Results of the study may be presented at scientific conferences and be published within scientific journals. The research will also be used by Ms Meghan Finch as part of Doctoral research thesis.

What do you need to do to participate?

Please read this Information Statement and be sure you understand its contents before you consent to participate. If you feel your child is of sufficient age to understand what is being asked of them, please discuss the study with your child before making a decision. If there is anything you do not understand, or you have questions, please contact Ms Meghan Finch. If you would like to participate, please complete the attached consent form and place it in the return box at your child's Long Day Care Service within 2 weeks.

If you would like more information regarding this study please contact Ms Meghan Finch at Hunter New England Population Health on (02) 4924 6131.

Thank you for considering this invitation.

Dr Luke Wolfenden University of Newcastle School of Medicine and Public Health Phone: (02) 4985 5168 Luke.Wolfenden@hnehealth.nsw.gov.au	A/Prof Phillip Morgan Faculty of Education & Arts School of Education Phone: (02) 4921 7265 Phillip.Morgan@newcastle.edu.au	Meghan Finch Program Manager Hunter New England Population Health Phone: (02) 4924 6133 Meghan.finch@hnehealth.nsw.gov.au
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This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference [09/09/16/5.12].

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrand, Manager, Research Ethic and Governance, Hunter New England Human Research Ethics Committee, Hunter New England Health, Locked Bag 1, New Lambton NSW 2305, telephone (02) 49214950, email Hnehrec@hnehealth.nsw.gov.au

Hunter New England Population Health



**PARENT CONSENT FORM FOR THE
GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STUDY**

Version 3, dated 20/01/2010

Parents please read, sign and return this form to Long Day Care centre within 2 weeks

I have a child at this day care service who is:

☐ 3 years ☐ 4 years ☐ 5 years ☐ 6 years old.

How many days a week does your child usually attend this day care service?

☐ 1 day ☐ 2 days ☐ 3 days ☐ 4 days ☐ 5 days .
Is your child: ☐ a boy ☐ a girl

What is your residential postcode _____

Is your child from an Aboriginal and/or Torres Strait Islander background?

☐ Yes, Aboriginal ☐ Yes, Torres Strait Islander,
☐ Yes, both Aboriginal and Torres Strait Islander ☐ No

What is the highest qualification that you have completed?

☐ Primary school ☐ Years 7-9 ☐ School Certificate ☐ Higher School Certificate
☐ TAFE certificate or diploma ☐ University / other tertiary institute

On a typical child care day, how much time does your child spend being physically active outside of child care hours?

☐ Zero/none ☐ 1-15 mins ☐ 16-30 mins ☐ 31-60 mins ☐ 61- 120 mins (2 hrs) ☐ 121-180 mins (3 hrs)
☐ Greater than 3 hours

On a typical child care day how much time does your child spend watching television, video, DVD or computer games before and after child care?

☐ Zero/none ☐ 1-15 mins ☐ 16-30 mins ☐ 31-60 mins ☐ 61- 120 mins (2 hrs) ☐ 121-180 mins (3 hrs)
☐ Greater than 3 hours

- I agree for my child to participate in the above research project and give my consent freely
- I understand that the project will be conducted as described in the Information Statement, a copy of which I have retained
- I understand I may stop my child from participating in the project at anytime and do not have to give any reason for ending participation
- I understand that my child may withdraw from the study at anytime.
- I consent to my child wearing a pedometer on two occasions during attendance at childcare and for research staff to record their physical activities and interactions, over some periods of the day.
- I understand that any information provided will remain confidential to the researchers
- I have the opportunity to have questions answered to my satisfaction

Please tick

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Parent/Guardian Name: _____ Parent/Guardian Signature: _____

Date: ____ / ____ /2010 Child Name: _____ Contact phone no _____

This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference [09/09/16/5.12].

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrard, Manager, Research Ethics and Governance, Hunter New England Human Research Ethics Committee, Hunter New England Health, Locked Bag 1, New Lambton NSW 2305, telephone (02) 49214950, email Hnehec@hnehealth.nsw.gov.au

Hunter New England Population Health


 HUNTER NEW ENGLAND
NSW HEALTH
GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STUDY

Version 1, dated 04/11/2009

REMINDER FOR PARENTS

You may have recently received information inviting your child to participate in the ***Good for Kids. Good for Life.*** Long Day Care Physical Activity Study.


The Good For Kids. Good For Life. program will be implementing a new physical activity strategy in Long Day Care Services in the Hunter region in 2010. The strategy is based on the latest physical activity recommendations for young children and will provide training, resources and support to your service to assist them to extend and enhance their ability to promote physical activity. The data collected from your child will also help us to evaluate the success of the program.


If you are interested in having your child take part in this study we encourage you to read through the information included in the pack provided. We also ask that you fill out the consent form and return it to your childcare centre as soon as possible.

Thankyou for considering this invitation.

Yours sincerely

Dr Luke Wolfenden University of Newcastle School of Medicine and Public Health Phone: (02) 4985 5168 Luke.Wolfenden@hnehealth.nsw.gov.au	A/Prof Philip Morgan Faculty of Education & Arts School of Education Phone: (02) 4921 7265 Philip.Morgan@newcastle.edu.au	Meghan Finch Program Manager Hunter New England Population Health Phone: (02) 4924 6133 Meghan.finch@hnehealth.nsw.gov.au
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GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STUDY INFORMATION FOR PARENTS

Version 1, dated 22/10/2009

Please find attached information about the *Good for Kids. Good for Life.* Long Day Care Physical Activity Study.

This study is looking at ways Long Day Care Services can promote and encourage children to be physically active.

The study and physical activity program materials have been reviewed by the Good for Kids Aboriginal Health Stream staff to ensure they are culturally appropriate.

Participation in the study is entirely your choice. Only children whose parents give their permission will be included in the study. If you choose not to participate it will not affect your child's placement at the service and, you and your child will not be disadvantaged in the future in any way.

What does participation involve?

For you:
If you are willing to participate complete the 'Parents Consent Form' with the attached information and return it to your child's long day care centre.

For your child: *While they are at daycare:*

- Wearing a pedometer, attached to outer clothing on two occasions during the day between the hours of 9am-3pm
- Having trained research staff record their physical activities and interactions, over some periods of the day.

A Pedometer is a box shaped instrument that is used to measure physical activity by counting steps. Pedometers are unobtrusive, lightweight and slightly smaller than a matchbox.

Wearing the pedometer will have no impact on your child's ability to play and participate in activities.

All research staff will have appropriate child protection clearance and study activities will happen in the presence of your child's usual childcare service staff.

If you would like more information regarding this study please contact Meghan Finch at Hunter New England Population Health on (02) 4924 6133.

Thank you for considering this invitation.

APPENDIX 3.5: EPAO DATA COLLECTION TOOL

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

HUNTER NEW ENGLAND
NSW HEALTH

Service ID Number: _____

Date: _____

GENERAL INFORMATION

Data collection team members:

Observers name:

Q1a. Observation start time:

_____:____

Q1b. Observation end time:

_____:____

Q2. Ages of children in the room
observed: (mark all that apply)

- ☐ Up to 1 year
- ☐ Between 1 and 2 years
- ☐ Over 2 years and up to 3 years
- ☐ Over 3 years and up to 4 years
- ☐ Over 4 years and up to 6 years

Q3a. Total number of children in the observed
class that day:

Q3b. Number of staff working in the
observed class that day:

Q4. Outdoor physical activity (PA)
play area:

_____ m²

Q5. Weather temperature:

Q5a. Min _____ °C

Q5b. Max: _____ °C

Q6a. Total number of outdoor physical activity
occasions observed: _____

Q5c. Description:

Q6b. Total minutes of active
play time: _____

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

SECTION 1: Activities before LUNCH today**Outdoor activities BEFORE lunch**

Q7. Did the children play outside before lunch today?

- ☐ Yes → Go to Q8
☐ No → Go to Q7a

Q7a. Why was there no outdoor play before lunch today?

- ☐ No outside time was scheduled.
☐ It was too hot
☐ It was too cold
☐ It was raining
☐ The playground/equipment was too wet
☐ Unsure
☐ Other _____

Notes:

Q8. What time did the outdoor play start and end?

	Start time	End time	Minutes	Number of supervising staff	Description
1.					
2.					
3.					
4.					
5.					

Q9. How many total minutes of outdoor play were there before lunch?

_____ minutes

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q10. While the observed classroom was outside before lunch today, did any staff member lead or begin any structured activity? (For example: structured active games, dancing, exercises, gross motor development activities. An occasion is any time a new physical activity was initiated and led by a teacher with a child or group of children)

- ☐ Yes ➔ Go to Q10a
☐ No ➔ Go to Q11

Q10a. For each occasion, how long did each last?

	Start time	End time	Minutes	Optional? (Y / N)	Description
1.					
2.					
3.					
4.					
5.					

Q10b. How many occasions of structured teacher-led physical activities occurred outside before lunch?

_____ occasions

Q10c. How many total minutes of structured teacher-led physical activity were there outside before lunch?

_____ minutes

Q10d. On how many occasions was the structured physical activity optional for children?

_____ occasions

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q11. While the observed classroom was outside before lunch today, were specific structured, adult guided Fundamental Movement Skills (FMS) activities observed? (FMS include jumping, running, galloping, hopping, leaping, side-sliding, catching, underarm-rolling, ball dribbling, striking ball, kicking, over arm throwing)

☐ Yes → Go to Q11a

☐ No → Go to Q12

Q11a. For each occasion, how long did each last?

Start time	End time	Minutes	Optional? (Y / N)	No of children involved	Description	Which of the following did the session include?
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q11b. How many occasions of FMS activities occurred outside before lunch?

_____ occasions

Q11c. How many total minutes of adult-guided FMS activities were there outside before lunch?

_____ minutes

Q11d. On how many occasions were the FMS activities optional for children?

_____ occasions

Q11e. What proportion of children participated in the FMS session/s?

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

**Indoor activities BEFORE lunch**

Q12. While the observed classroom was inside before lunch today, did any staff member lead or begin any structured activity? (For example: structured active games, dancing, exercises, gross motor development activities. An occasion is any time a new physical activity was initiated and led by a teacher with a child or group of children)

- ☐ Yes → Go to Q12a
☐ No → Go to Q13

Q12a. For each occasion, how long did each last?

	Start time	End time	Minutes	Optional? (Y / N)	Description
1.					
2.					
3.					
4.					
5.					

Q12b. How many occasions of structured teacher-led physical activities occurred inside before lunch?

_____ occasions

Q12c. How many total minutes of structured teacher-led physical activity were there inside before lunch?

_____ minutes

Q12d. On how many occasions was the structured physical activity optional for children?

_____ occasions

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q13. While the observed classroom was inside before lunch today, were specific structured, adult guided Fundamental Movement Skills (FMS) activities observed? (FMS include jumping, running, galloping, hopping, leaping, side-sliding, catching, underarm-rolling, ball dribbling, striking ball, kicking, over arm throwing)

☐ Yes → Go to Q13a

☐ No → Go to Q14

Q13a. For each occasion, how long did each last?

Start time	End time	Minutes	Optional? (Y / N)	No of children involved	Description	Which of the following did the session include?
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q13b. How many occasions of FMS activities occurred inside before lunch?

_____ occasions

Q13c. How many total minutes of adult-guided FMS activities were there inside before lunch?

_____ minutes

Q13d. On how many occasions were the FMS activities optional for children?

_____ occasions

Q13e. What proportion of children participated in the FMS session/s?

Q14. While the observed class was inside before lunch today, was there any designated circle time? (Circle time is where the teacher commonly gathers all children onto a rug for learning. This is usually very structured and sedentary e.g. story time, singing songs)

☐ Yes ➔ Go to Q14a

☐ No ➔ Go to Q15

Q14a. This morning, what time did circle time start and end?

	Start time	End time	Minutes	Description
1.				
2.				
3.				

Q14b. How many occasions of circle time were there before lunch?

_____ occasions

Q14c. How many total minutes of circle time were there before lunch?

_____ minutes

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q15. Did children watch TV before lunch today?

- ☐ Yes → Go to Q15a
☐ No → Go to Q16

Q15a. This morning, what time did TV time start and end?

	Start time	End time	Minutes	Educational? (Y / N)	Description
1.					
2.					
3.					

Q15b. How many occasions of TV time were there before lunch?

_____ occasions

Q15c. How many total minutes of TV time were there before lunch?

_____ minutes

Q15d. Was the TV used only for viewing educational programs?

- ☐ Yes
☐ No

Q16. Was video game playing or computer game playing observed before lunch?

- ☐ Yes → Go to Q16a
☐ No → Go to Q17

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q16a. This morning, what time did computer/video game playing start and end?

	Start time	End time	Total minutes	Educational? (Y / N)	Description
1.					
2.					
3.					

Q16b. How many occasions of computer/video game playing were there before lunch?

_____ occasions

Q16c. How many total minutes of video game playing or computer game playing were there before lunch?

_____ minutes

Q16d. Were they being used for educational purposes only?

- ☐ Yes
☐ No

Q16e. How many different children used the computer/video games before lunch?

_____ children

Q17. Excluding circle time and TV time, before lunch today was there any seated time (where the majority of children were seated)?

- ☐ Yes → Go to Q17a
☐ No → Go to Q18

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q17a. This morning, what time did seated time start and end?

	Start time	End time	Minutes	>30 minutes? (Y / N)	Description
1.					
2.					
3.					

Q17b. How many occasions of seated time were there before lunch?

_____ occasions

Q17c. How many total minutes of seated time were there before lunch?

_____ minutes

Q17d. On how many occasions before lunch was seated time greater than 30 minutes in duration?

_____ occasions

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Place a tally in the appropriate box when observing each event before lunch.

	Number of times (tally)	Total number of times	Number of staff (tally)	Total number of staff
Q18. Staff restricting active play as punishment				
Q19. Staff joining in active play				
Q20. Staff providing prompts to initiate or increase physical activity				
Q21. Staff providing prompts to decrease physical activity				
Q22. Staff providing positive statements about physical activity				

Q23. Before lunch, were any extra curricular (special) physical activity programs provided to the children by external groups or staff?

- ☐ Yes → Go to Q23a
☐ No → Go to Q24

Q23a. Were any active alternatives provided for those children that did not participate?

- ☐ Yes
☐ No

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____



SECTION 2: Lunch and Nap time TODAY

Q24. What time did lunch start and end?

Start time	End time	Total minutes	Description

Q25. What time did nap time start and end?

Start time	End time	Total minutes	Description

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

SECTION 3: Activities after lunch and nap time TODAY**Outdoor activities AFTER lunch****Q26. Did the children play outside after lunch today?**

- ☐ Yes ➔ Go to Q27
☐ No ➔ Go to Q26a

Q26a. Why was there no outdoor play after nap time today?

- ☐ No outside time was scheduled.
☐ It was too hot
☐ It was too cold
☐ It was raining
☐ The playground/equipment was too wet
☐ Unsure
☐ Other _____

Notes:**Q27. What time did the outdoor play start and end?**

	Start time	End time	Minutes	Number of supervising staff	Description
1.					
2.					
3.					
4.					
5.					

Q28. How many total minutes of outdoor play were there before lunch?

_____ minutes

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q29. While the observed classroom was outside after lunch today, did any staff member lead or begin any structured activity? (For example: structured active games, dancing, exercises, gross motor development activities. An occasion is any time a new physical activity was initiated and led by a teacher with a child or group of children)

☐ Yes ➔ Go to Q29a

☐ No ➔ Go to Q30

Q29a. For each occasion, how long did each last?

	Start time	End time	Minutes	Optional? (Y / N)	Description
1.					
2.					
3.					
4.					
5.					

Q29b. How many occasions of structured teacher-led physical activities occurred outside after lunch?

_____ occasions

Q29c. How many total minutes of structured teacher-led physical activity were there outside after lunch?

_____ minutes

Q29d. On how many occasions was the structured physical activity optional for children?

_____ occasions

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q30. While the observed classroom was outside after lunch today, were specific structured, adult guided Fundamental Movement Skills (FMS) activities observed? (FMS include jumping, running, galloping, hopping, leaping, side-sliding, catching, underarm-rolling, ball dribbling, striking ball, kicking, over arm throwing)

☐ Yes → Go to Q30a

☐ No → Go to Q31

Q30a. For each occasion, how long did each last?

Start time	End time	Minutes	Optional? (Y / N)	No of children involved	Description	Which of the following did the session include?
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q30b. How many occasions of FMS activities occurred outside after lunch?

_____ occasions

Q30c. How many total minutes of adult-guided FMS activities were there outside after lunch?

_____ minutes

Q30d. On how many occasions were the FMS activities optional for children?

_____ occasions

Q30e. What proportion of children participated in the FMS session/s?

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

**Indoor activities AFTER lunch**

Q31. While the observed classroom was inside after lunch today, did any staff member lead or begin any structured activity? (For example: structured active games, dancing, exercises, gross motor development activities. An occasion is any time a new physical activity was initiated and led by a teacher with a child or group of children)

- ☐ Yes → Go to Q31a
☐ No → Go to Q32

Q31a. For each occasion, how long did each last?

	Start time	End time	Minutes	Optional? (Y / N)	Description
1.					
2.					
3.					
4.					
5.					

Q31b. How many occasions of structured teacher-led physical activities occurred inside after lunch?

_____ occasions

Q31c. How many total minutes of structured teacher-led physical activity were there inside after lunch?

_____ minutes

Q31d. On how many occasions was the structured physical activity optional for children?

_____ occasions

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q32. While the observed classroom was inside after lunch today, were specific structured, adult guided Fundamental Movement Skills (FMS) activities observed? (FMS include jumping, running, galloping, hopping, leaping, side-sliding, catching, underarm-rolling, ball dribbling, striking ball, kicking, over arm throwing)

☐ Yes → Go to Q32a

☐ No → Go to Q33

Q32a. For each occasion, how long did each last?

Start time	End time	Minutes	Optional? (Y / N)	No of children involved	Description	Which of the following did the session include?
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above
						<input type="radio"/> Warm up activity <input type="radio"/> A focus on developing at least one FMS <input type="radio"/> Cool down activity <input type="radio"/> The provision of skill specific feedback e.g. use of verbal cues, error detection and correction <input type="radio"/> Extension and challenge experiences for different levels <input type="radio"/> Staff modelling and demonstration <input type="radio"/> None of the above

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q32b. How many occasions of FMS activities occurred inside after lunch?

_____ occasions

Q32c. How many total minutes of adult-guided FMS activities were there inside after lunch?

_____ minutes

Q32d. On how many occasions were the FMS activities optional for children?

_____ occasions

Q32e. What proportion of children participated in the FMS session/s?

Q33. While the observed class was inside after lunch today, was there any designated circle time?
 (Circle time is where the teacher commonly gathers all children onto a rug for learning. This is usually very structured and sedentary e.g. story time, singing songs)

☐ Yes ➔ Go to Q33a

☐ No ➔ Go to Q34

Q33a. This afternoon, what time did circle time start and end?

	Start time	End time	Minutes	Description
1.				
2.				
3.				

Q33b. How many occasions of circle time were there after lunch?

_____ occasions

Q33c. How many total minutes of circle time were there after lunch?

_____ minutes

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q34. Did children watch TV after lunch today?

- ☐ Yes → Go to Q34a
☐ No → Go to Q35

Q34a. This afternoon, what time did TV time start and end?

	Start time	End time	Minutes	Educational? (Y / N)	Description
1.					
2.					
3.					

Q34b. How many occasions of TV time were there after lunch?

_____ occasions

Q34c. How many total minutes of TV time were there after lunch?

_____ minutes

Q34d. Was the TV used only for viewing educational programs?

- ☐ Yes
☐ No

Q35. Was video game playing or computer game playing observed after lunch?

- ☐ Yes → Go to Q35a
☐ No → Go to Q36

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q35a. This afternoon, what time did computer/video game playing start and end?

	Start time	End time	Minutes	Educational? (Y / N)	Description
1.					
2.					
3.					

Q35b. How many occasions of computer/video game playing were there after lunch?

_____ occasions

Q35c. How many total minutes of video game playing or computer game playing were there after lunch?

_____ minutes

Q35d. Were they being used for educational purposes only?

- ☐ Yes
☐ No

Q35e. How many different children used the computer/video games after lunch?

_____ children

Q36. Excluding circle time and TV time, after lunch today was there any seated time (where the majority of children were seated)?

- ☐ Yes → Go to Q36a
☐ No → Go to Q37

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q36a. This afternoon, what time did seated time start and end?

	Start time	End time	Minutes	>30 minutes? (Y / N)	Description
1.					
2.					
3.					

Q36b. How many occasions of seated time were there after lunch?

_____ occasions

Q36c. How many total minutes of seated time were there after lunch?

_____ minutes

Q36d. On how many occasions after lunch was seated time greater than 30 minutes in duration?

_____ occasions

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Place a tally in the appropriate box when observing each event after lunch.

	Number of times (tally)	Total number of times	Number of staff (tally)	Total number of staff
Q37. Staff restricting active play as punishment				
Q38. Staff joining in active play				
Q39. Staff providing prompts to initiate or increase physical activity				
Q40. Staff providing prompts to decrease physical activity				
Q41. Staff providing positive statements about physical activity				

Q42. Before lunch, were any extra curricular (special) physical activity programs provided to the children by external groups or staff?

- ☐ Yes → Go to Q42a
☐ No → Go to Q43

Q42a. Were any active alternatives provided for those children that did not participate?

- ☐ Yes
☐ No

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

**SECTION 3: Centre environment**

Q43. Was a TV present in the observed room?

- ☐ Yes
☐ No

Q44. Does the centre have a VCR/DVD player present in the observed room?

- ☐ Yes
☐ No

Q45. Does the centre have a computer available for use by children?

- ☐ Yes
☐ No

Q46. Does the centre have a video game system available for use by children?

- ☐ Yes
☐ No

Please indicate where these pieces of physical activity equipment are located.

Q47. <u>Fixed</u> Play Equipment		Indoors only	Outdoors only	Both indoors & outdoors	Not present
a.	Balancing surfaces (balance beams, boards etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b.	Basketball/netball hoop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c.	Climbing structures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d.	Sandpit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e.	See-saw	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f.	Slides	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g.	Swinging equipment (swings, rope etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h.	Tricycle or bike track	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i.	Tunnels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j.	Trampoline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k.	Vegetable garden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q48. <u>Portable</u> Play Equipment		Indoors only	Outdoors only	Both indoors & outdoors	Not present
a.	Ball play equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b.	Climbing structures (ladders, frames)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c.	Floor play equipment (tumbling mats, carpet squares)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d.	Jumping play equipment (skipping ropes, hula hoops)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e.	Parachute	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f.	Push/pull toys that require the children to stand when playing (wagon, scooters, prams)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g.	Riding toys (tricycles, cars)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h.	Rocking and twisting toys (rocking horse)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i.	Sand/water play toys (buckets, scoops, shovels)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j.	Slides	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k.	Twirling play equipment (ribbons, scarves, batons)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l.	Batting equipment (foam bats, light weight cricket bats)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m.	Foot prints (stones, bricks, tiles, wood blocks)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n.	Aiming equipment (goals, poles with baskets, targets)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o.	Mini trampolines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p.	Balancing equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q.	Trucks and cars	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Please indicate if the outdoor playground environment has each of the following (tick all that apply)

Q49. Outdoor Playground Environment		
a.	Grass and vegetation	<input type="radio"/>
b.	Trees	<input type="radio"/>
c.	Dirt gardens	<input type="radio"/>
d.	Artificial turf	<input type="radio"/>
e.	Manufactured soft fall	<input type="radio"/>
f.	Playground markings (lines drawn e.g. hop scotch)	<input type="radio"/>
g.	Flat surface	<input type="radio"/>
h.	Surface height difference between play areas, stairs or ramps	<input type="radio"/>
i.	Fixed playground equipment	<input type="radio"/>

Q50. Was outdoor running space:

- ☐ Unobstructed with plenty of space for group games (chasey, stuck in the mud)
- ☐ Some obstruction, but space was adequate for individual play (running, skipping)
- ☐ Plenty of space for play, but obstructed with play equipment
- ☐ Little running space or completely obstructed

Q51. Was indoor play space suitable for:

- ☐ Quiet play (room is small and not a lot of room for movement)
- ☐ Limited movement/some active play (able to translocate by walking, skipping, hopping, jumping)
- ☐ All activities (easily able to perform all gross motor activities)

Q52. Did staff limit or restrict outdoor play area in a way that substantially affected active play? (more than 1/3 of total play space or equipment)

- ☐ Yes → Go to Q52a
- ☐ No → Go to Q53

Q52a. How many times per day?

_____ times

Notes:

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q53. Were any posters, pictures or displayed books about physical activity present at the centre during the observation?

- ☐ Yes ➔ Go to Q53a
☐ No ➔ Go to Q54

Q53a. How many posters, pictures or books were observed?

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

**SECTION 4: Authorised supervisor interview and document review****Notes:****Operational Characteristics:****Q54. How long has the service been in operation?**

_____ years _____ months

Q55. How many children aged 3-6 years are enrolled at service?

_____ children

Q56. How many children aged 3-6 are enrolled to attend your service today?

_____ children

Physical Activity Policy:**Q57. Does the centre have a written policy on physical activity?**

- ☐ Yes → Go to Q57a
- ☐ No → Go to Q58

Q57a. What areas does the policy cover? (Obtain a photocopy or fax to 49246215 or email to Meaghan.Finch@hnehealth.nsw.gov.au)

- ☐ Meeting children's physical Activity Requirements
- ☐ Development of FMS
- ☐ Limits on SSR
- ☐ Sedentary/inactive activities
- ☐ Educating families about physical activity
- ☐ Physical activity curriculum, teaching and learning activities
- ☐ Evaluation of physical activity strategies

Physical Activity Education for Children, Parents and Staff:**Q58. Does the centre provide physical activity training/in-service for staff?**

- ☐ Yes → Go to Q58a
- ☐ No → Go to Q59

Q58a. How often per year is physical activity training provided for staff?

- ☐ 2 times/year or more
- ☐ 1 time/year
- ☐ Less than 1 time/year

LONG DAY CARE PHYSICAL ACTIVITY SURVEY

Service ID Number: _____

Date: _____

Q58b. What was the content of this training/s?

Q59. Does the centre have a documented physical activity curriculum or program for kids?

- ☐ Yes → Go to Q59a
☐ No → Go to Q60

Q59a. What is the content of the curriculum or program? (Obtain a photocopy or fax to 49246215 or email to Meghan.Finch@hnehealth.nsw.gov.au)

Q60. Are any extra curricular (special) physical activity programs provided to the children by external groups or staff? (e.g. jungle sports, Fitness Kids)

- ☐ Yes → Go to Q60a
☐ No → Go to Q61

Q60a. How often does this occur?

_____ times per year

Q60b. Are any active alternatives provided for those children who do not participate?

- ☐ Yes
☐ No

Q61. Does the centre have a documentation of parent physical activity education/resources or workshop materials? (e.g. handouts, information sheets or newsletters)

- ☐ Yes → Go to Q61a
☐ No → Go to Q62

Q61a. What was the content of these resources? (If possible, obtain a photocopy or fax to 49246215 or email to Meghan.Finch@hnehealth.nsw.gov.au)

Q62. Approximately what size (in m²) is your playground area?_____ m²

APPENDIX 3.6: STAFF QUESTIONNAIRE

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

HUNTER NEW ENGLAND
NSW HEALTH

ID Number _____

Version 3, dated 20/01/10

The **Good For Kids. Good For Life.** program is implementing a physical activity strategy in Long Day Care Services in the Hunter region in 2010. The strategy will provide training, resources and support to services to assist them to extend and enhance their capacity to promote physical activity. We are currently evaluating this strategy, part of which involves seeking feedback from staff working in long day care, who have participated in this program.

So that we can evaluate all aspects of the program we would appreciate it if you could complete this survey. The survey asks about your practices, opinions about physical activity among children attending long day care, and, your views on the acceptability of the program. If not specified please answer for the child age group that you usually care for. The survey will take 20 minutes to complete and will be coded by ID number only, so all answers are completely confidential.

Ages of children you care for:

(Tick all that apply)

- ☐ Up to 1 year
- ☐ Between 1 and 2 years
- ☐ Between 2 and 3 years
- ☐ Between 3 and 4 years
- ☐ Between 4 and 5 years
- ☐ Between 5 and 6 years

Unless specified please answer the questions in this survey in relation to the age group of children you usually care for, as identified here.

Your Date of Birth:

_____/_____/_____
Day Month Year

Today's Date:

_____/_____/_____
Day Month Year

Qualifications held:

- ☐ University trained teacher
- ☐ TAFE Qualifications in early childhood including:
Certificate III in Children Services,
Diploma of CS, or
Advanced Diploma in Children's Services
- ☐ Not formally trained
- ☐ Other, please describe _____

In an average week, how many days do you work at this Long Day Care Service?

- ☐ 1 day
- ☐ 2 days
- ☐ 3 days
- ☐ 4 days
- ☐ 5 days

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

These questions are asking about your daily practices related to physical activity, movement skill development, sedentary behaviours, and use of small screen recreation among children in your care.

Please mark the answer that applies

Q1. On a usual day do you join in and participate with children during child initiated free active play?

We define joining in during child initiated free active play as times when a staff member is actively engaged with a child during physically active play but not leading the activity. This would include times where a staff member role models active play by playing ball with a child or running around with children. This does not include times where a staff member is pushing a child on a swing while talking to another staff member, or general supervision while standing still.

- ☐ No → Go to Q2
- ☐ Yes → Go to Q1b

Q1b. On a usual day how often do you join in and participate with children during their free active play?

- ☐ All of the time
- ☐ Most of the time
- ☐ Some of the time
- ☐ Rarely

Q2. On a usual day do you provide verbal prompts to increase children's physical activity?

(E.g. saying things like 'run faster', 'good throw', or 'show me how you can do that again', 'how high can you jump?')

- ☐ No → Go to Q3
- ☐ Yes → Go to Q2b

Q2b. On a usual day how often do you provide verbal prompts to increase children's physical activity?

- ☐ All of the time
- ☐ Most of the time
- ☐ Some of the time
- ☐ Rarely

Q3. Do you allocate specific time to conduct structured adult guided activities during which children explore and practice fundamental movement skills?

Fundamental movement skills are basic gross motor movement skills. Examples include running, catching, jumping, kicking, galloping, leaping, hopping, and underarm and overarm throwing. We define structured, adult guided, fundamental movement activities as allocated time during the day where the teacher would lead children to participate in play based activities that focus on development of one or more fundamental movement skills.

- ☐ No → Go to Q4
- ☐ Yes → Go to Q3a

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

Q3a. How often do you usually conduct specific structured, adult guided activities during which children explore and practice fundamental movement skills?

- ☐ 2 times per day or more
- ☐ Once per day
- ☐ 4 times per week
- ☐ 3 times per week
- ☐ 2 times per week
- ☐ Once per week
- ☐ Less than once per week
- ☐ Sporadically

Q3b. When you implement these activities do they usually include any of the following (tick all that apply):

- ☐ Conducting a warm up activity
- ☐ The teacher/carer modelling or demonstrating a fundamental movement skill to children
- ☐ Play based activities/games that include opportunity for children to practice one fundamental movement skill
- ☐ Conducting a cool down activity
- ☐ The teacher/carer providing skill specific feedback to children as they participate - e.g. verbal prompts tailored to the child's individual skill level
- ☐ None of the above

Q3c. Approximately how much time does this structured fundamental movement skill activity usually take to implement?

<input type="text"/>	Hours	<input type="text"/>	<input type="text"/>	Minutes	or	<input type="radio"/> Unsure
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Q4. Over the course of a usual day, other than meal or nap times, on how many occasions would the majority of children be sitting still for longer than 30 minutes at a time?

This includes times where children are seated while playing or group activities with children sitting still on the floor.

- ☐ Never
- ☐ Once per day
- ☐ 2 times per day
- ☐ 3 times per day
- ☐ 4 times per day
- ☐ 5 times per day or more

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

Q5. Over the course of any usual week do children sit and watch DVDs, television, videos, play computer games or use video games consoles?

- ☐ No → Go to Q6
☐ Yes → Go to Q5a

Q5a. How often does this usually occur?

- ☐ Daily
☐ 4 times per week
☐ 3 times per week
☐ 2 times per week
☐ Once per week
☐ Less than once per week
☐ Sporadically

Q5b. On each occasion, how long would children usually spend watching the DVDs, television, videos, play computer games or use video games consoles?

<input type="text"/>	Hours	<input type="text"/>	<input type="text"/>	Minutes	or	<input type="radio"/> Unsure
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We are aware that there is lots of information around about children's physical activity levels, these questions are just asking you to tell us how much time you think young children, should spend in physical activity and being sedentary or inactive across the whole day, not just while they are in care.

These questions relate to recommendations for children across the whole day, not just during their time in care.

Q6. What do you think is the minimum recommended amount of time that children, aged 1-5 years should be physically active per day? This can be accumulated in several bouts rather than in one block, and includes activity that may be accumulated while in care and at home.

<input type="text"/>	Hours	<input type="text"/>	<input type="text"/>	Minutes	or	<input type="radio"/> Unsure
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Q7. What do you think is the maximum recommended amount of time children, aged between 2 and 5 years, should spend sitting and watching television and other electronic media per day?

We define, television or electronic media as, watching television (broadcast, videos or DVDs) or using the computer, or video games for recreation, not education, particularly when children are not doing anything else that is physically active e.g. dancing or movement.

<input type="text"/>	Hours	<input type="text"/>	<input type="text"/>	Minutes	or	<input type="radio"/> Unsure
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GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

Q8. What do you think is the maximum recommended amount of time children younger than 2 years of age, should spend sitting and watching television and other electronic media per day?

<input type="text"/>	Hours	<input type="text"/> <input type="text"/>	Minutes	or	<input type="radio"/> Unsure
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Q9. What do you think is the maximum recommended amount of time preschool children, aged between 2 and 5 years, should be sedentary, or kept inactive, with the exception of sleeping?

We define sedentary behaviours/activities as any time children spend sitting still such as during group time, and time spent watching television (broadcast, videos or DVDs) or playing computer or video games, excluding nap time and meal time. This would include times where staff put toys on a table and children are only allowed to sit at the table and play and group activities with children seated on the floor.

<input type="text"/>	Hours	<input type="text"/> <input type="text"/>	Minutes	or	<input type="radio"/> Unsure
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GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

<i>Please tell us if you Strongly Disagree, Disagree, Agree or Strongly Agree with the following statements by circling the appropriate number</i>				
	Strongly Disagree	Disagree	Agree	Strongly Agree
Q10. Young children naturally develop fundamental movement skills, without teacher led assistance, as part of healthy growth and development.	1	2	3	4
Q11. I have a role to play in ensuring children meet physical activity recommendations while they are in care.	1	2	3	4
Q12. I have a role to play in limiting the time children spend watching TV or playing video games while in care.	1	2	3	4
Q13. I have a role to play in monitoring and limiting time children spend sitting still (other than meal and nap times), while in care.	1	2	3	4
Q14. I am confident in my ability to encourage children to meet physical activity recommendations while in care.	1	2	3	4
Q15. I have adequate knowledge about how I can appropriately encourage children to meet physical activity recommendations while in care.	1	2	3	4
Q16. I have a role to play in conducting daily structured, adult guided activities during which children explore and practice fundamental movement skills.	1	2	3	4
Q17. I have sufficient knowledge on how to appropriately conduct structured, adult guided activities during which children explore and practice fundamental movement skills.	1	2	3	4
Q18. I am confident in my ability to conduct structured, adult guided activities during which children explore and practice fundamental movement skills.	1	2	3	4
Q19. I have sufficient knowledge about strategies to appropriately limit time children spend sitting still (other than meal and nap times), while in care.	1	2	3	4
Q20. I have sufficient skills to appropriately limit time children spend sitting still (other than meal and nap times), while in care.	1	2	3	4
Q21. It is a priority for staff to develop children's fundamental movement skills while in care.	1	2	3	4

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

Q22. Which of the following are barriers to ensuring children meet physical activity recommendations while they are in care? (tick all that apply)

- ☐ not enough time
- ☐ inadequate equipment
- ☐ inadequate indoor play space
- ☐ inadequate outdoor play space
- ☐ competing programming and academic learning priorities
- ☐ lack of knowledge/confidence relating to statutory public liability or regulations
- ☐ safety concerns
- ☐ my fitness level
- ☐ lack of interest/motivation
- ☐ no barriers
- ☐ other _____

Q23. Which of the following are barriers to conducting daily structured adult guided activities during which children explore and practice fundamental movement skills? (tick all that apply)

- ☐ not enough time
- ☐ inadequate equipment
- ☐ inadequate indoor play space
- ☐ inadequate outdoor play space
- ☐ competing program and academic learning priorities
- ☐ statutory public liability or regulations
- ☐ safety concerns
- ☐ my fitness level
- ☐ lack of interest/motivation
- ☐ no barriers
- ☐ other _____

Q24. Which best describes your knowledge and use of the physical activity information in the Get Up & Grow: Healthy eating and physical activity for early childhood resources?

(These resources were released in June 2009 by the Commonwealth Government, and are designed to be used in a wide range of early childhood settings by families, staff and carers. These resources include a director/coordinator book, a staff and carer book, a cooking for children book, a family book, posters, brochures and stickers)

- ☐ Aware of and have used these resources in relation to physical activity practices at my service
- ☐ Aware of and have read through the physical activity sections but have not used the resources
- ☐ Aware of but have not read through or used the physical activity information
- ☐ Not aware of the physical activity information
- ☐ Unsure

Q25. In the last month approximately how many children or staff have been injured requiring documentation?

number of children or staff injured

or

☐ Unsure

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

**THE FOLLOWING QUESTIONS (#26-38) WERE
INCLUDED AT FOLLOW-UP FOR THE INTERVENTION SERVICES ONLY:**

These questions are asking you to tell us how useful you have found the Good for Kids. Good for Life. physical activity program in supporting you to promote physical activity and fundamental movement skill development of children in your care.

As part of the Good for Kids. Good for Life. physical activity program your service received an I Move We Move resource kit containing several books including a Guide and Physical Activity Handbooks for different age groups, Activity Cards and Lanyards.

Q26. Which best describes your knowledge of the Guide book from the *Good for Kids I Move We Move* resource kit?

- ☐ Aware and have read through
- ☐ Aware but have not read through
- ☐ Not aware
- ☐ Unsure

Q27. Have you used any of the information in the *Good for Kids I Move We Move* Guide book?

- ☐ Yes → Go to Q27a
- ☐ No → Go to Q28

Q27a. Please tell us if you Strongly Agree, Agree, Disagree or Strongly Disagree with the following statements regarding your use of this resource (please circle the appropriate number).

	Strongly Disagree	Disagree	Agree	Strongly Agree
i. The information in the Guide is easy to understand	1	2	3	4
ii. The information in the Guide is appropriate to the long day care setting	1	2	3	4
iii. The information in the Guide can be used to help our service meet licensing and accreditation requirements	1	2	3	4

Q28. Which best describes your knowledge of the Activity Handbooks from the *Good for Kids I Move We Move* resource kit?

- ☐ Aware and have read through
- ☐ Aware but have not read through
- ☐ Not aware
- ☐ Unsure

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

Q29. Have you used any of the information in the *Good for Kids I Move We Move* Activity Handbooks? (The Activity Handbooks are 3 separate aged specific guides that are designed to make it easy as possible to encourage physical activity experiences for children).

- ☐ Yes → Go to Q29a
☐ No → Go to Q30

Q29a. Please tell us if you Strongly Agree, Agree, Disagree or Strongly Disagree with the following statements regarding your use of this resource (please circle the appropriate number).

	Strongly Disagree	Disagree	Agree	Strongly Agree
i. The information in the Activity Handbook can be applied in the long day care setting	1	2	3	4
ii. The information in the Activity Handbook is easy to use	1	2	3	4
iii. Children found the activities from the Handbook enjoyable	1	2	3	4
iv. I used information in the Handbook to conduct a specific, adult guided fundamental movement skills activity	1	2	3	4
v. The activities in the Handbook were age and developmentally appropriate	1	2	3	4

Q30. Which best describes your knowledge of the Activity Cards from the *Good for Kids I Move We Move* resource kit? (The Activity Cards are a set of A4 cards designed to make it as easy as possible for staff to facilitate games that develop children's fundamental movement skills).

- ☐ Aware and have used
☐ Aware but have not used
☐ Not aware
☐ Unsure

Q31. Have you used any of the *Good for Kids I Move We Move* Activity Cards?

- ☐ Yes → Go to Q31a
☐ No → Go to Q32

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

Q31a. Please tell us if you Strongly Agree, Agree, Disagree or Strongly Disagree with the following statements regarding your use of the Activity Cards (please circle the appropriate number).

	Strongly Disagree	Disagree	Agree	Strongly Agree
i. The Activity Cards are easy to use	1	2	3	4
ii. Children found the activities in the cards enjoyable	1	2	3	4
iii. I used the Activity Cards when conducting specific, adult guided fundamental movement skills activities	1	2	3	4
iv. The activities in the handbook were age and developmentally appropriate	1	2	3	4
v. I found using the Activities Cards enjoyable	1	2	3	4

Q32. Which best describes your knowledge of the Lanyards from the *Good for Kids I Move We Move* resource kit? (Lanyards are worn by staff and have cards with pictures of fundamental movement skills)

- ☐ Aware and have used
- ☐ Aware but have not used
- ☐ Not aware
- ☐ Unsure

Q33. Have you used the *Good for Kids I Move We Move* Lanyards?

- ☐ Yes ➔ Go to Q33a
- ☐ No ➔ Go to Q34

Q33a. Please tell us if you Strongly Agree, Agree, Disagree or Strongly Disagree with the following statements regarding your use of the Lanyards (please circle the appropriate number).

	Strongly Disagree	Disagree	Agree	Strongly Agree
i. The Lanyards were easy to use	1	2	3	4
ii. I used the Lanyards when conducting specific, adult guided fundamental movement skills activities	1	2	3	4
iii. The lanyards were useful when conducting specific, planned adult guided fundamental movement skills activities	1	2	3	4
iv. I used the lanyards when supervising children	1	2	3	4

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

during free active play				
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Q34. Which best describes your knowledge of the *Good for Kids I Move We Move* online training?

- ☐ Aware of
☐ Not aware
☐ Unsure

Q35. Did you complete the *Good for Kids I Move We Move* online training?

- ☐ Yes ➔ Go to Q35a
☐ No ➔ Go to Q36

Q35a. Please tell us if you Strongly Agree, Agree, Disagree or Strongly Disagree with the following statements regarding your use of this resource (please circle the appropriate number).

	Strongly Disagree	Disagree	Agree	Strongly Agree
i. The information in the online training was useful	1	2	3	4
ii. I could apply the information in the online training to my day to day practices	1	2	3	4
iii. I would recommended the I Move We Move online training to other children's services staff	1	2	3	4

Q36. Did you participate in the *Good for Kids I Move We Move* training workshop?

- ☐ Yes ➔ Go to Q36a
☐ No ➔ Go to Q37

Q36a. Please tell us if you Strongly Agree, Agree, Disagree or Strongly Disagree with the following statements regarding your use of this resource (please circle the appropriate number).

	Strongly Disagree	Disagree	Agree	Strongly Agree
i. The information covered in the training was useful	1	2	3	4
ii. I learned new information at the training that I could apply in my day to day practice	1	2	3	4
iii. I learned new skills in the training that could be applied in my long day care setting	1	2	3	4
iv. I would recommended the I Move We Move training to other children's services staff	1	2	3	4

GOOD FOR KIDS. GOOD FOR LIFE. PHYSICAL ACTIVITY STAFF SURVEY

Q37. Please tell us if you Strongly Agree, Agree, Disagree or Strongly Disagree with the following statements regarding your participation in the *Good for Kids I Move We Move* program (please circle the appropriate number).

	Strongly Disagree	Disagree	Agree	Strongly Agree
i. The children attending our service benefited from participation in the program	1	2	3	4
ii. I benefited from participation in this program	1	2	3	4
iv. I would recommended the I Move We Move program to other children's services staff	1	2	3	4

Q38. Did you implement any of the following strategies as part of your services participation in the *Good for Kids. Good for Life. physical activity strategy*?

- ☐ Distribute to parents the Good for Kids. physical activity strategy parent promotion flyer "*What's Happening in our Service?*"
- ☐ Displayed photos of children participating in fundamental movement skills activities and physically active play
- ☐ Put up displays or posters promoting physical activity
- ☐ Included information or recommendations on physical activity, small screen recreation or sedentary time in our service newsletter
- ☐ Other. Please describe: _____

Thank you for helping us evaluate the Good for Kids. Good for Life. physical activity program.

**APPENDIX 3.7:
LDC PA STUDY TRAINING MANUAL**

**Good for Kids Good for Life
Long Day Care Physical Activity
Study**

TRAINING and PROCEDURES MANUAL

August 2010

Contents

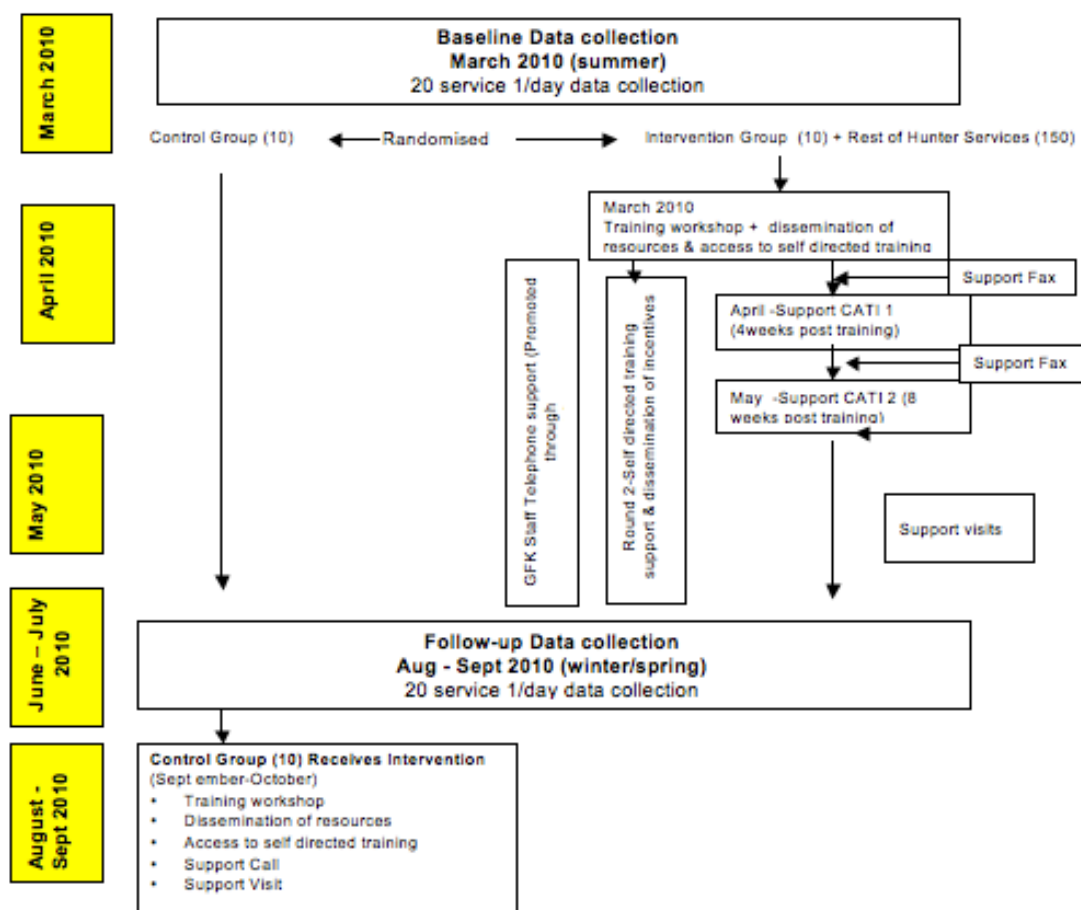
- 1. Overview of Long Day Care Physical Activity Study**
- 2. Preparation for the Visits**
- 3. Data Collection Tasks**
- 4. Data Collection Protocol Summary**
- 5. Pedometer Placement Instructions**
- 6. Authorised Supervisor Interview**
- 7. Measuring the Outdoor Play Area**
- 8. Definitions**
- 9. Tricky Things**
- 10. Sample Forms and Data Collection Tools**

1. Overview of Long Day Care Physical Activity Study

Aim

- To evaluate the Good for Kids Children's Services physical activity strategy
- Physical activity levels of children attending Long Day Care aged 3-6.
- Staff practices
- Service environment

Physical Activity Study Timeline



2. Preparation for the Visits

Please bring the following items with you each day you attend a pre-school or LDC:

- Photo ID badge
- Sunscreen, hat and sunglasses
- Lunches (please exclude nuts and eggs)
- Closed in comfortable shoes
- GFK shirt

Before you leave Population Health, ensure you have:

- A list of contact phone numbers
- List of consenting children from Jannah complete with pedometer ID allocation
- 2 copies of EPAO tool
- Pedometer step count sheets
- Spare parent reminder letters
- Spare staff surveys
- Clip board, pens and pacers
- Map and directions to the preschool or LDC and Authorised Supervisor contact details
- Car keys
- Fully charged mobile phone

These will be in a large clear container in Jannah's office

3. Data Collection Tasks

1. Collect remaining parent reminder letter slips and mark off names of those who have completed
2. Greet parents on their arrival and check that they have completed the reminder slip. If not, provide them with an additional slip.
3. Collect and mark off completed staff surveys, distribute spare surveys if required
4. Pedometer attachment (according to previously allocated ID numbers)
5. Pedometer reset - 9am
6. Conduct EPAO observations
 - *Observe staff and child interactions*
 - *Authorised Supervisor interview*
 - *Assess components of the service environment*
 - *Measure playground*
6. Remove pedometers at 3pm and record step counts

Task allocation on the day:

Team member 1 = EPAO observer, Team member 2 = support person, Team Member 3 = XXXX or xxxx

Task	Who is doing what	Time-frame
Collect parent reminder letter slips, greet parents on arrival and check they have completed slip	All team members	Before 9am and then as children arrive
Collect and mark off completed staff surveys, distribute additional surveys if required	Team member 2	By lunch time
Pedometer attachment according to ID	All team members	Before 9am and then as children arrive
Reset all pedometers and attach cable ties	Team members 2 and 3	At exactly 9am and then as children arrive. Team member 3 not required after 10:30am.
<i>Observe staff and child interactions</i>	Team member 1	From exactly 9am – 3pm Time free during meal and nap time (however record timings)
<i>Conduct Authorised Supervisor Interview</i>	Team member 1	At time suitable to Authorised Supervisor (preferably nap time or meal time)
<i>Assess components of the service environment</i>	Team member 1	During nap time or after 3pm
<i>Measure play ground</i>	Team member 1 and 2	During nap time or after 3pm
Remove pedometers and record step counts	All team members	At exactly 3pm

4. Physical Activity Study Baseline Field Data Collection Protocol

Activity	Instructions	Equipment
1. Collect remaining parent reminder letter slips	<ul style="list-style-type: none"> Collect any parent reminder letter slips from Authorised Supervisor or collection box Tick off on Pedometer ID Allocation Sheet Greet parents on their arrival and ask if they have completed a reminder slip – if not, provide them with one (note this is only for those children who already have consent from baseline) Staff at the service will be able to assist in helping to identify parents who have not completed this. 	<ul style="list-style-type: none"> Folder Pedometer ID Allocation sheets (with names of consenting children) Pens
2. Collect and mark off completed staff surveys	<ul style="list-style-type: none"> Collect any completed staff surveys and mark off on primary contact staff list Write name of staff that have not yet completed survey on slip, and service and staff ID on blank staff survey and envelope and leave with Authorised Supervisor or hand to staff during the day 	<ul style="list-style-type: none"> Primary contact staff list Spare copies of staff survey (name slip attached and reply paid envelope)
3. Pedometer attachment	<ul style="list-style-type: none"> Select the pedometer with the corresponding number according to the Pedometer ID Allocation Sheet (IMPORTANT) - all children will have an ID already allocated to them, they must get the correct pedometer) Pedometers should then be either clipped onto the waistband of the child's shorts/pants/skirt or onto an elastic belt and positioned directly above the right knee. Ensure that it sits in an upright position and does not lean forwards or sideways Ensure the safety leash is attached to prevent dropping pedometers Stamp child's hand 	<ul style="list-style-type: none"> Pen Pedometers Waist bands Stamp Pedometer ID Allocation Sheet Spare batteries
4. Pedometer "reset to zero" 9am	<ul style="list-style-type: none"> Ask children to line up (can ask staff to help with this if required) Reset all pedometers to zero and close Place a cable tie around each pedometer, secure tightly and trim the "tail" using scissors 	<ul style="list-style-type: none"> Cable ties Scissors
5. Complete Environmental Policy Assessment Observation (EPAO)	<ul style="list-style-type: none"> Complete EPAO between 9am and 3pm Conduct Authorised Supervisor interview at a time suitable to them (e.g. during nap time) Conduct environment audit checklists during nap time or meal time Draw and measure playground during nap time or meal time 	<ul style="list-style-type: none"> Pen Stopwatch Measuring tape EPAO forms
6. Remove pedometers 3pm	<ul style="list-style-type: none"> Ask children to line up Remove pedometer and cable tie and open Write step count on Step Count Data Collection Sheet Give child stamp 	<ul style="list-style-type: none"> Step Count Data Collection Sheet Pen Stamp/Stickers

5. Pedometer Placement Instructions

Pedometer Placement and Removal Instruction Sheet

For most pedometers, the best place to wear them is midway between the hip and belly button of the right leg. The pedometer will only accurately count steps if it is on straight (not on an angle), and if the waistband/belt that it is attached to is fairly snug. A loose waist band will result in an inaccurate step count.

1. The pedometer should be clipped onto the waistband of the child's pants/skirt etc. If the child is not wearing suitable clothing (e.g. dress, loose waistband) use one of the elastic waistbands provided. This waistband should be placed half way between the child's hip and belly button and directly above the right knee. Ensure that it sits in an upright position and does not lean forward or sideways.



2. The pedometer will have a circle sticker on it that is numbered – this is the pedometer ID. Ensure that this number matches up to the ID previously allocated on the pedometer ID sheet for each individual child.
3. At 9am: Ensure the pedometer is reset to 0. Press the reset button to do this. Attach a cable tie so that the pedometer cannot be opened.
4. Once the pedometer is reset with cable tie on, it is correctly placed on the child and the ID number recorded, the child can resume usual activity.
5. Instruct the children to wear the pedometer for the whole day and not to try to open the box. Let the children know that you will take it off them at the end of the day, before they go home.
6. Ask the children to let you or a teacher know if the pedometer comes off.
7. Tell the children that if they keep their pedometers on all day and do not take them off they will get a stamp or sticker.
8. At 3pm: Ask staff if they can get all children wearing a pedometer to line up in a row.
9. Take the pedometers off the children and record the step counts of each. To do this one person is to remove the pedometer from the child hand it to the second person who will record the step count as indicated on the display screen, and corresponding pedometer ID on the step count results sheet.
10. Thank the child and ask them if they would like a sticker or stamp.
11. Once all pedometers and elastic belts have been removed from the all the participating children, thank the children and staff for their assistance.
12. Pack neatly all belts and pedometer in the allocated box.

If there are any questions or concerns please contact Jannah Prigg on 492 46510.

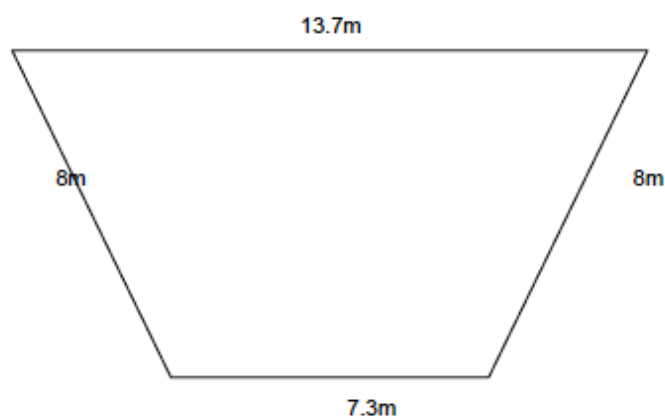
6. Authorised Supervisor Interview

- Speak with the Authorised Supervisor in the morning after you arrive for data collection and arrange a suitable time to conduct the interview (explain it will only take 10 minutes – they may recall the interview from when it was conducted at baseline)
- Preferably conduct during nap or meal times or after 3pm
- It is important to ask the Authorised Supervisor ALL questions in the EPAO – do not skip over any.
- It is also important to take copies of all relevant documentation if possible. If photocopying is not available – ask the Authorised Supervisor to email to Meghan.Finch@hnehealth.nsw.gov.au or fax to 49246215
- If the AS will be emailing/faxing – ensure Jannah is aware to follow this up

7. Measuring the Outdoor Play Area

1. Draw a picture of all outdoor play spaces that are available for use by children.
2. Draw the perimeters only; do not include location of fixed play equipment.
3. Using the tape measure, measure each side of the play area and mark that on the drawing.
4. Ensure that the Authorised Supervisor is asked in the interview whether they know the size on the outdoor play area (in m²)

Example drawing:



8. Definitions

Term	What we mean...
Total active play time	The total number of minutes of active play time including indoor and outdoor, structured and non-structured.
Total number of physical activity occasions observed	The total number of physical activity occasions throughout the day. Can be indoor and outdoor, structured and non-structured.
Structured physical activity	Structured physical activity must be initiated and led by a teacher. An occasion is any time a new physical activity was started and led by a teacher with a child or group of children. Can be planned or spontaneous. E.g. structured active games, dancing, exercises, gross motor development activities.
Fundamental Movement Skills (FMS)	FMS are basic gross motor movement skills. E.g. running, catching, jumping, kicking, galloping, leaping, hopping, ball dribbling, side-sliding, striking a ball, underarm rolling and over arm throwing (see lanyards).
Specific structured adult guided Fundamental Movement Skills (FMS) activities	A specific structured teacher led activity during which children explore and practice one or more Fundamental Movement Skill (FMS). Includes allocated time during the day where staff lead children to participate in play based activities that focus on development of one or more FMS. The FMS session may involve a warm up and cool down activity. The FMS activity will include a focus on at least one FMS, skill specific feedback (e.g. use of verbal cues, error detection and correction), extension and challenge experiences for different levels and may include staff modelling and demonstration.
Staff joining in active play	Staff member joining in with active play that the children initiated and are leading. Staff acting as a role model. Not teacher led. This should be an activity that the children already started and the staff member joined in the children's game. E.g. staff member role modelling active play by playing ball with a child, running around with children, riding bikes with children, walking along the balance beam. Common examples are staff skipping with a group of skipping children; kicking a passing ball back to children; playing hide and seek with children when staff didn't initiate game and wasn't leading the game. This does not include times where a staff member is pushing a child on a swing while talking to another staff member, or general supervision while standing still.
Verbal prompts to initiate or increase physical activity	Staff member verbally prompting children to increase or initiate physical activity. E.g. "run faster", "good throw", "show me how you can do that again", "how high can you jump", "can you hop on one foot", "show me how you walk along the balance beam", "show me how you fly like a bird".
Prompts to decrease physical activity	Staff member verbally prompts children to decrease or cease physical activity. This includes prompts for safety reasons. For example - a policy at many centres is no running inside – this is still counted as a prompt to decrease physical activity. E.g. "slow down", "give it a rest", "don't climb on the slide", "no running without shoes on".
Positive statements	Staff member provides positive comments about physical activity.

about physical activity	E.g. "good throw!" "running is fun", "I like the way you kicked that ball!", "excellent hopping!", "I love the way you danced to Wombat Wobble"
Circle time	Staff member usually gathers all children onto a rug or other designated area for learning. This is usually a very structured period of time that is usually sedentary but can involve more intense activities. E.g. story time, group learning, school readiness activities, singing a song on the floor
Sedentary activities	Activities that are not physically active. Does not include nap and meal times (however the timings of these must still be recorded). E.g. reading a story, watching television, playing computer games, singing songs seated in a circle, teacher pulling out activities and children have to sit at tables and play, children having to sit or lay on their beds during nap time if not sleeping.

9. Tricky Things

Issue	Solution
Working out total number of children observed in the class	If more than 1 classroom - write the number of children in the observed class (the room with the most children wearing pedometers). If just 1 classroom - write the total number in that class – including children ineligible for study (those without consent to wear pedometers).
Counting the number of staff	Count the number of staff there for the majority of the day working in the observed room (e.g. if another staff member comes and replaces someone else then count as 1 staff member).
Working out the ages of children in class	If more than 1 room, include the ages of children only in the observed room.
Working out the total outdoor PA occasions observed	Occasions of outdoor free play (if structured occurs during outdoor free play this is not counted as separate occasion). Write notes if structured activity occurs outdoors separately to other free play (e.g. if a teacher takes children outside for an FMS activity from indoors).
What is structured PA and what is not?	Structured PA by external physical activity providers (e.g. fitness Kids) is not counted. Count as structured PA if a teacher starts and leads an activity with only one child. E.g. A teacher gives walking stilts to a child, helps them to get on and then instructs them to walk.
Working out what is a structured FMS session	Count as an FMS session if teacher focuses on developing at least 1 FMS – the session must also include staff demonstration and feedback by staff to children on how they are doing the skill. The emphasis is on giving children the opportunity to practice a skill and teacher providing feedback. This makes it different to a structured activity where children may be active as part of a game but it is not specific to an FMS skill. Other elements such as warm up, cool down, extension and challenge experiences do not have to be present to count it as an FMS session. Any staff practices (e.g. prompts, positive statements etc) are not counted if they occur during a structured FMS session.
Timing outdoor active play and transitions	Time outdoor active play until all children are asked to sit down/line up to go inside (i.e. no opportunity to play). Do not count transition time between outdoor/indoor as either outdoor or indoor free play.
How do we work out total minutes of active play time?	This includes: - Any outdoor free active play time (include any structured activity that happens during outdoor play – do not count twice). - Any structured activity (including FMS sessions) that happens indoors.
Working out seated time	Note: need to record both of the following: 1 - Time all occasions where the majority (more than half) of children are participating in a seated activity regardless of duration. 2 – Count the number of times where seated activity exceeds 30 minutes in duration.
Nap time – how do I record it?	Nap time starts when children are asked to lie on their beds by the teacher. Nap time finishes when the majority of children are awake (even if they have to stay on their beds or participate in sedentary activity) Please make notes on timing and numbers of children
Nap time – what is counted as sedentary?	Make observations based on what the majority of children are doing. Count as sedentary if the majority of children are awake and made to stay seated on their beds. Count as sedentary if the majority of children are allowed to get up but must do quiet indoor free activities that are sedentary such as craft, reading.

Working out how many children participated in computer/video games	Only count the number of <u>different</u> children. E.g. if a child had 2 turns on the computer count as 1 child.
What does staff restricting active play as punishment look like?	Includes time outs. If the same child is excluded from active play more than once, count and include each occasion
Meal times	Don't count seated meals (lunch, morning tea) as sedentary activities. Morning tea starts when the majority of children are seated (stop timing for outdoor play at this time) If less than half of children are seated keep timing for outdoor play and take notes. Lunch/morning tea ends when the first child gets up and moves onto the next activity.

10. Sample Forms and Data Collection Sheets

Pedometer ID Allocation Sheet

Service ID 1234 Data Collection Date 01/01/01

This number will already be here and will correspond to a number on a coloured dot on the back of the pedometer

No. of Participants	Child Name	Gender	Pedometer ID number	Reminder letter completed?	Comments (sick, belt etc)
1.	Fred Smith	M	5	✓	
2.	John Peters	M	19	✓	Belt
3.	Susie Smith	F	12	✓	
4.	Mia Finch	F	8		
5.	Alyssa Robinson	F	2		Absent
6.	Cameron Tucker	M	11	✓	
7.	Bilbo Pearson	M	23	✓	
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					

Tick here once reminder letter slip completed. Try to follow up parents that have not yet completed a reminder slip

Write here any important notes, including if the child is wearing an elastic waistband

Step Count Data Collection SheetService ID 1234 Data Collection Date 01/01/01

No. of Participants	PEDOMETER ID	STEP COUNT
1.	5	5505
2.	19	6987
3.	12	7756
4.	8	4569
5.	2	2368
6.	11	5412
7.	23	6930
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		

This number will be written on a coloured dot on the back of the pedometer

Write the number here that you read off the pedometer at 3pm

APPENDIX FOUR:

APPENDIX 4.1: PROSPERO REGISTRATION

UNIVERSITY of York
Centre for Reviews and Dissemination

NHS
National Institute for
Health Research

PROSPERO International prospective register of systematic reviews

Review title and timescale

- 1 **Review title**
Give the working title of the review. This must be in English. Ideally it should state succinctly the interventions or exposures being reviewed and the associated health or social problem being addressed in the review.
A systematic review of physical activity interventions in centre based childcare: meta-analysis of outcome effects for pragmatic versus explanatory study designs
- 2 **Original language title**
For reviews in languages other than English, this field should be used to enter the title in the language of the review. This will be displayed together with the English language title.
- 3 **Anticipated or actual start date**
Give the date when the systematic review commenced, or is expected to commence.
01/09/2014
- 4 **Anticipated completion date**
Give the date by which the review is expected to be completed.
31/07/2015
- 5 **Stage of review at time of this submission**
Indicate the stage of progress of the review by ticking the relevant boxes. Reviews that have progressed beyond the point of completing data extraction at the time of initial registration are not eligible for inclusion in PROSPERO. This field should be updated when any amendments are made to a published record.

The review has not yet started ☒

Review stage	Started	Completed
Preliminary searches	No	Yes
Piloting of the study selection process	No	Yes
Formal screening of search results against eligibility criteria	No	Yes
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

Provide any other relevant information about the stage of the review here.

Review team details

- 6 **Named contact**
The named contact acts as the guarantor for the accuracy of the information presented in the register record.
Ms Finch
- 7 **Named contact email**
Enter the electronic mail address of the named contact.
meghan.finch@hnehealth.nsw.gov.au
- 8 **Named contact address**
Enter the full postal address for the named contact.
Locked bag 10 Wallsend NSW Australia 2287
- 9 **Named contact phone number**
Enter the telephone number for the named contact, including international dialing code.
0249246131
- 10 **Organisational affiliation of the review**
Full title of the organisational affiliations for this review, and website address if available. This field may be completed as 'None' if the review is not affiliated to any organisation.

Hunter New England Population Health

Website address:

<http://www.hnehealth.nsw.gov.au/hneph>

11 Review team members and their organisational affiliations

Give the title, first name and last name of all members of the team working directly on the review. Give the organisational affiliations of each member of the review team.

Title	First name	Last name	Affiliation
Ms	Meghan	Finch	Hunter New England Population Health, Hunter New England Local Health District, Newcastle, NSW 2287, Australia 2 School of Medicine and Public Health, University of Newcastle, Newcastle, NSW 2308, Australia
Dr	Sze Lin	Yoong	School of Medicine and Public Health, University of Newcastle, Callaghan, NSW 2308, Australia
Ms	Jannah	Jones	School of Medicine and Public Health, University of Newcastle, Callaghan, NSW 2308, Australia
Dr	Luke	Wolfenden	1School of Medicine and Public Health, University of Newcastle, Callaghan, NSW 2308, Australia 2Priority Research Centre for Health Behaviour (PRCHB), University of Newcastle, Callaghan, NSW 2308, Australia
Dr	John	Wiggers	3Hunter New England Population Health, NSW Health, Wallsend, NSW 2287, Australia 1School of Medicine and Public Health, University of Newcastle, Callaghan, NSW 2308, Australia 2Priority Research Centre for Health Behaviour (PRCHB), University of Newcastle, Callaghan, NSW 2308, Australia 3Hunter New England Population Health, NSW Health, Wallsend, NSW 2287, Australia

12 Funding sources/sponsors

Give details of the individuals, organizations, groups or other legal entities who take responsibility for initiating, managing, sponsoring and/or financing the review. Any unique identification numbers assigned to the review by the individuals or bodies listed should be included.

This work was supported by Hunter New England Population Health and the Hunter Medical Research Institute (HMRI).

13 Conflicts of interest

List any conditions that could lead to actual or perceived undue influence on judgements concerning the main topic investigated in the review.

Are there any actual or potential conflicts of interest?

Yes

Authors MF, JJ, LW and JW are authors on an intervention paper that is likely to be identified and included in the review

14 Collaborators

Give the name, affiliation and role of any individuals or organisations who are working on the review but who are not listed as review team members.

Title	First name	Last name	Organisation details
-------	------------	-----------	----------------------

Review methods

- 15 **Review question(s)**
State the question(s) to be addressed / review objectives. Please complete a separate box for each question.
To examine describe the effects of pragmatic and explanatory studies of the effects of interventions targeting physical activity among children 0-6 attending childcare services

To examine the extent to which study and intervention characteristics influence physical activity outcomes.

To describe any unintended adverse effects of interventions on childcare services, services staff or children and describe the cost or cost effectiveness of such interventions.
- 16 **Searches**
Give details of the sources to be searched, and any restrictions (e.g. language or publication period). The full search strategy is not required, but may be supplied as a link or attachment.
The Cochrane Central Register of Controlled trials (CENTRAL) in the Cochrane Library, MEDLINE, EMBASE, PsycINFO, ERIC, CINAHL, SCOPUS, and SPORTDiscus. Publications published in a peer reviewed journal in English. No limit was set on date of publication. Reference lists of previous reviews will be searched for potential studies missed in the initial literature searches.
- 17 **URL to search strategy**
If you have one, give the link to your search strategy here. Alternatively you can e-mail this to PROSPERO and we will store and link to it.
http://www.crd.york.ac.uk/PROSPEROFILES/19096_STRATEGY_20150311.pdf

I give permission for this file to be made publicly available
Yes
- 18 **Condition or domain being studied**
Give a short description of the disease, condition or healthcare domain being studied. This could include health and wellbeing outcomes.
Physical activity levels
- 19 **Participants/population**
Give summary criteria for the participants or populations being studied by the review. The preferred format includes details of both inclusion and exclusion criteria.
Children aged under 6 years with no diagnosed diseases or health problems
- 20 **Intervention(s), exposure(s)**
Give full and clear descriptions of the nature of the interventions or the exposures to be reviewed
Interventions with at least one intervention component included with the intent of increasing the physical activity level of children. Interventions to promote physical activity, prevent unhealthy weight gain, promote fundamental movement skill development or bone health and will be eligible. Interventions could be curricula, environmental, organisational or policy related and may include quality improvement initiatives, education and training, performance feedback, prompts and reminders, implementation resources, financial incentives, communication and social marketing strategies, professional networking, the use of opinion leaders or implementation consensus processes. Interventions could be singular or multi-component and delivered by research staff, childcare service staff or any other organization or expert.
- 21 **Comparator(s)/control**
Where relevant, give details of the alternatives against which the main subject/topic of the review will be compared (e.g. another intervention or a non-exposed control group).
Any alternate intervention to increase physical activity, standard care, 'no intervention' control group, attention control or wait-list control.
- 22 **Types of study to be included initially**
Give details of the study designs to be included in the review. If there are no restrictions on the types of study design eligible for inclusion, this should be stated.
Randomised controlled trials (RCTs), including cluster-randomised controlled trials.

- 23 Context
Give summary details of the setting and other relevant characteristics which help define the inclusion or exclusion criteria.
Interventions carried out in centre based childcare (e.g. preschool, long day care, kindergarten)
- 24 Primary outcome(s)
Give the most important outcomes.
Objectively measured physical activity among children 0-6 (for example, pedometer or accelerometer step counts, moderate to vigorous physical activity and heart rate monitoring)

Give information on timing and effect measures, as appropriate.
- 25 Secondary outcomes
List any additional outcomes that will be addressed. If there are no secondary outcomes enter None.
None

Give information on timing and effect measures, as appropriate.
- 26 Data extraction, (selection and coding)
Give the procedure for selecting studies for the review and extracting data, including the number of researchers involved and how discrepancies will be resolved. List the data to be extracted.
Author MF screened abstracts and titles. Full texts of manuscripts obtained for all potentially eligible trials were independently assessed for eligibility by MF and JJ against the inclusion criteria. Discrepancies regarding assessment of eligibility between reviewers were resolved by consensus. In instances where the eligibility of studies was not resolved via consensus, a decision was made by a third reviewer. Authors MF and SY, not blind to author or journal information will independently extract information from included trials. Information will be recorded in a data-extraction form developed based on the Cochrane Public Health Group Methods Manual. Discrepancies between reviewers in data extraction will be resolved by consensus or if required via a third reviewer. Further all trials will be independently assessed as primarily explanatory, combined or pragmatic using the pragmatic-explanatory continuum indicator summary (PRECIS) checklist by authors MF and SY. Information transcribed into data extraction forms will include: i) Study characteristics including eligibility, country, and participant characteristics. ii) Characteristics of the intervention including: type; period, modalities, personnel, intensity (frequency and duration); strategies/components, and use of theory. iii) Physical activity outcomes, including the method of assessment, outcome classification, data collection period (during care/over full day), follow-up period and effect size. iv) Intervention costs or adverse outcomes.
- 27 Risk of bias (quality) assessment
State whether and how risk of bias will be assessed, how the quality of individual studies will be assessed, and whether and how this will influence the planned synthesis.
Risk of bias will be assessed at the study level by Authors MF and JJ using the risk of bias tool described in the Cochrane Handbook. A third reviewer will adjudicate on discrepancies between risk of bias assessment that could not be resolved via consensus.
- 28 Strategy for data synthesis
Give the planned general approach to be used, for example whether the data to be used will be aggregate or at the level of individual participants, and whether a quantitative or narrative (descriptive) synthesis is planned. Where appropriate a brief outline of analytic approach should be given.
Findings will be narratively examined with regard to study and intervention characteristics and pragmatic-explanatory classification. For effect size we will report the differences in the changes between the intervention and control groups. Statistical tests with correspondent p values or 95% confidence intervals will be included when available. Where studies are sufficiently homogeneous and report a comparable outcome measures, Meta-analysis will be performed using comparative meta-analysis software to synthesise trial results using a random effects model.
- 29 Analysis of subgroups or subsets
Give any planned exploration of subgroups or subsets within the review. 'None planned' is a valid response if no subgroup analyses are planned.
The impact of the PRECIS classification of pragmatic and explanatory trials on outcome effect will be examined in a subgroup analyses.

Review general information

- 30 Type of review
Select the type of review from the drop down list.
Intervention
- 31 Language
Select the language(s) in which the review is being written and will be made available, from the drop down list. Use the control key to select more than one language.
English
- Will a summary/abstract be made available in English?
Yes
- 32 Country
Select the country in which the review is being carried out from the drop down list. For multi-national collaborations select all the countries involved. Use the control key to select more than one country.
Australia
- 33 Other registration details
Give the name of any organisation where the systematic review title or protocol is registered together with any unique identification number assigned. If extracted data will be stored and made available through a repository such as the Systematic Review Data Repository (SRDR), details and a link should be included here.
- 34 Reference and/or URL for published protocol
Give the citation for the published protocol, if there is one.
Give the link to the published protocol, if there is one. This may be to an external site or to a protocol deposited with CRD in pdf format.
- I give permission for this file to be made publicly available
Yes
- 35 Dissemination plans
Give brief details of plans for communicating essential messages from the review to the appropriate audiences. Do you intend to publish the review on completion?
Yes
- 36 Keywords
Give words or phrases that best describe the review. (One word per box, create a new box for each term)
Systematic review
Physical Activity
Childcare
- 37 Details of any existing review of the same topic by the same authors
Give details of earlier versions of the systematic review if an update of an existing review is being registered, including full bibliographic reference if possible.
- 38 Current review status
Review status should be updated when the review is completed and when it is published.
Ongoing
- 39 Any additional information
Provide any further information the review team consider relevant to the registration of the review.
- 40 Details of final report/publication(s)

UNIVERSITY of York
Centre for Reviews and Dissemination

NHS
National Institute for
Health Research

This field should be left empty until details of the completed review are available.
Give the full citation for the final report or publication of the systematic review.
Give the URL where available.

APPENDIX 4.2: DETAILED SEARCH TERMS AND SEARCH STRATEGY

Detailed search terms

Database	Search term
Cochrane library Central	'Exercis*' or "physical* inactive*" or "physical* activit*" or "Movement skill*" or "Motor skill*" or "Motor Activ*" or "physical education" or "physical fitness" or sedentary or "life style" or lifestyle or leisure or sport* or danc* in Title, Abstract, Keywords and "pre school*" or preschool* or childcare or "child care" or daycare or "day care" or "early child*" or nursery or nurseries or kinder* in Title, Abstract, Keywords and "health education" or "health promotion" or policy or policies or promot* or educat* or program* or prevention* or train* or ("physical activity*" w/6 intervention*) or ("physical inactivity*" w/6 intervention*) in Title, Abstract, Keywords
ERIC	(Random* or "clinical trial*" or placebo* or "research design*" or "intervention stud*" or "evaluation stud*" or "comparative stud*" or "longitudinal stud*" or "cross over stud*" or "latin square" or "time series" or (before near/2 after near/3 (stud* or trial* or design*)) or ((singl* or doubl* or trebl* or tripl*) near/5 (blind* or mask*)) or "matched communities" or "matched schools" or "matched populations" or control* or "comparison group*" or "control group*" or "matched pairs" or "outcome stud*" or quasiexperimental or "quasi experimental" or "pseudo experimental" or nonrandomi* or "non randomi*" or "pseudo randomi*" or "quasi randomi*" or prospective* or volunteer*) AND (Exercis* or "physical* inactiv*" or "physical* activ*" or "Movement skill*" or "Motor skill*" or "Motor Activ*" or "physical education" or "physical fitness" or sedentary or "life style" or lifestyle or leisure or sport* or danc*) AND ("pre school*" or preschool* or childcare or "child care" or daycare or "day care" or "early child*" or nursery or nurseries or kinder*) AND ("health education" or "health promotion" or policy or policies or promot* or educat* or program* or prevention* or train* or ("physical activity*" w/6 intervention*) or ("physical inactivity*" near/6 intervention*)) Separate searches in abstract, title, subject, identifier fields, then de-duplicated
SCOPUS	ABS TITLE ((random* OR "clinical trial*" OR placebo* OR "research design*" OR "intervention stud*" OR "evaluation stud*" OR "comparative stud*" OR "longitudinal stud*" OR "cross over stud*" OR "latin square" OR "time series" OR (before W/2 after W/3 (stud* OR trial* OR design*)) OR ((singl* OR doubl* OR trebl* OR tripl*) W/5 (blind* OR mask*)) OR "matched communities" OR "matched schools" OR "matched populations" OR control* OR "comparison group*" OR "control group*" OR "matched pairs" OR "outcome stud*" OR quasiexperimental OR "quasi experimental" OR "pseudo experimental" OR nonrandomi* OR "non randomi*" OR "pseudo randomi*" OR "quasi randomi*" OR prospective* OR volunteer*) AND (exercis* OR "physical* inactiv*" OR "physical* activ*" OR "Movement skill*" OR "Motor skill*" OR "Motor Activ*" OR "physical education" OR "physical fitness" OR sedentary OR "life style" OR lifestyle OR leisure OR sport* OR danc*) AND ("pre

school*" OR preschool* OR childcare OR "child care" OR daycare
 OR "day care" OR "early child*" OR nursery OR nurseries OR
 kinder*) AND ("health education" OR "health promotion" OR policy
 OR policies OR promot* OR educat* OR program* OR prevention*
 OR train* OR ("physical activity*" W/6 intervention*) OR (
 "physical inactivity*" W/6 intervention*))

SPORTDISCUS (random* OR "clinical trial*" OR placebo* OR "research design*" OR "intervention stud*" OR "evaluation stud*" OR "comparative stud*" OR "longitudinal stud*" OR "cross over stud*" OR "latin square" OR "time series" OR (before n2 after n3 (stud* OR trial* OR design*)) OR ((singl* OR doubl* OR trebl* OR tripl*) n5 (blind* OR mask*)) OR "matched communities" OR "matched schools" OR "matched populations" OR control* OR "comparison group*" OR "control group*" OR "matched pairs" OR "outcome stud*" OR quasiexperimental OR "quasi experimental" OR "pseudo experimental" OR nonrandomi* OR "non randomi*" OR "pseudo randomi*" OR "quasi randomi*" OR prospective* OR volunteer*) AND (exercis* OR "physical* inactiv*" OR "physical* activ*" OR "Movement skill*" OR "Motor skill*" OR "Motor Activ*" OR "physical education" OR "physical fitness" OR sedentary OR "life style" OR lifestyle OR leisure OR sport* OR danc*) AND ("pre school*" OR preschool* OR childcare OR "child care" OR daycare OR "day care" OR "early child*" OR nursery OR nurseries OR kinder*) AND ("health education" OR "health promotion" OR policy OR policies OR promot* OR educat* OR program* OR prevention* OR train* OR ("physical activity*" n6 intervention*) OR ("physical inactivity*" n6 intervention*))

Separate searches in abstract, title, Keywords, subject heading fields, then de-duplicated

Search Strategies:
Impact of pragmatic and explanatory study designs on outcomes of physical activity interventions conducted in centre based childcare

- All Searches conducted 10th -12th September 2014
- Search strategies saved in Debbie Booth's database profile (search name begins "Luke Wolfenden – PA and Centre Based Childcare")

Database Results

Database Name	# records identified	# records after de-duplication
CENTRAL	492	257
CINAHL	2744	2519
Cochrane – Other Reviews	35	30
Cochrane Reviews	10	9
Embase	1351	913
Dissertations & Theses	226	201
ERIC	295	258
Medline	733	691
Medline In Progress	61	30
PsycINFO	252	159
Scopus	1443	932
SportDiscus	515	399

Database(s): MEDLINE 1946 to Present with Daily Update

Search Strategy:

#	Searches	Results
1	randomized controlled trial.pt.	387833
2	controlled clinical trial.pt.	89766
3	Random Allocation/	82137
4	Double-Blind Method/	129423
5	single-blind method/	19938
6	Placebos/	33366
7	*Research Design/	24013
8	intervention studies/	7093
9	evaluation studies/	200388
10	Comparative Study/	1703346
11	exp Longitudinal Studies/	897038
12	cross-over studies/	35327
13	clinical trial.tw.	76776
14	clinical trial.pt.	495178
15	latin square.tw.	3346
16	(time adj series).tw.	14286
17	(before adj2 after adj3 (stud* or trial* or design*)).tw.	8900
18	((singl* or doubl* or trebl* or tripl*) adj3 (blind* or mask)).tw.	125374
19	placebo*.tw.	155481
20	random*.tw.	671338
21	(matched communities or matched schools or matched populations).tw.	172
22	control*.tw.	2478812
23	(comparison group* or control group*).tw.	285347
24	matched pairs.tw.	3924
25	(outcome study or outcome studies).tw.	5410
26	(quasiexperimental or quasi experimental or pseudo experimental).tw.	5594
27	(nonrandomi* or non randomi* or pseudo randomi* or quasi randomi*).tw.	16932
28	prospectiv*.tw.	425689
29	volunteer*.tw.	144256
30	or/1-29	5258048
31	exp exercise/	123131
32	Physical* inactiv*.mp.	3824
33	Physical* activ*.mp.	33709
34	Movement skill*.mp.	118
35	Motor skills/	19861
36	exp Motor Activity/	202365
37	(physical education and training).mp.	12161
38	exp "Physical Education and Training"/	13581
39	exp physical fitness/	22354
40	sedentary.tw.	16687

41	exp life style/	66166
42	exp leisure activities/	168711
43	exp sports/	130920
44	exp dancing/	1905
45	dancing.mp.	2509
46	{exercise* adj aerobic*}.tw.	99
47	sport*.tw.	39290
48	{("lifestyle" or life-style) adj3 activ*}.tw.	3060
49	or/31-48	419508
50	pre-school*.tw.	3522
51	preschool*.tw.	17883
52	Child Day Care Centers/	4300
53	childcare.tw.	1133
54	child care.tw.	4918
55	day care.tw.	5743
56	daycare.tw.	733
57	early child*.tw.	15778
58	{nursery or nurseries}.tw.	7476
59	Kinder*.tw.	4605
60	or/50-59	377578
61	exp Health Education/	137839
62	exp Health Promotion/	55622
63	Organizational Policy/	12708
64	Public Policy/	28929
65	exp Health Policy/	83670
66	exp Inservice Training/	24392
67	promot*.tw.	585109
68	educat*.tw.	357438
69	program*.tw.	537496
70	prevention*.tw.	341831
71	{policy or policies}.tw.	137501
72	train*.tw.	307652
73	{physical activity* adj3 intervention*}.tw.	3516
74	{physical inactivity* adj3 intervention*}.tw.	47
75	or/61-74	2063018
76	30 and 49 and 60 and 75	733

Database(s): Embase Classic+Embase 1947 to 2014 September 08

Search Strategy:

#	Searches	Results
1	randomized controlled trial/	351812
2	controlled clinical trial/	387077
3	randomization/	63423
4	double blind procedure/	119947
5	single blind procedure/	18804
6	placebo/	262388
7	Research Design.mp. or *methodology/	36011
8	intervention study/	20746
9	evaluation study/	5221
10	comparative study/	633870
11	longitudinal study/	69916
12	crossover procedure/	40434
13	clinical trial.tw.	111336
14	clinical trial.pt.	0
15	latin square.tw.	3743
16	(time adj series).tw.	18362
17	(before adj2 after adj3 (stud* or trial* or design*)).tw.	12412
18	((singl* or doubl* or trebl* or tripl*) adj3 (blind* or mask)).tw.	168913
19	placebo*.tw.	211418
20	random*.tw.	920835
21	(matched communities or matched schools or matched populations).tw.	222
22	control*.tw.	3380882
23	(comparison group* or control group*).tw.	420171
24	matched pairs.tw.	5383
25	(outcome study or outcome studies).tw.	7969
26	(quasiexperimental or quasi experimental or pseudo experimental).tw.	7311
27	(nonrandomi* or non randomi* or pseudo randomi* or quasi randomi*).tw.	22252
28	prospectiv*.tw.	609784
29	volunteer*.tw.	188899
30	or/1-29	5324269
31	exp exercise/	232171
32	Physical* inactiv*.mp.	5718
33	physical activity/	84306
34	Movement skill*.mp.	183
35	Motor skill*.mp. or motor performance/	52527
36	exp motor activity/	394838
37	"physical education and training".mp.	113
38	physical education/	11237
39	physical fitness.mp. or fitness/	32388
40	sedentary lifestyle/ or sedentary.mp.	25023

41	lifestyle/	74000
42	Leisure Activities.mp. or leisure/	23057
43	exp sport/	108798
44	dancing/	2747
45	dancing.mp.	3492
46	(exercise* adj aerobic*).tw.	145
47	sport*.tw.	62485
48	((("lifestyle" or life-style) adj3 activ*).tw.	4580
49	or/31-48	915636
50	pre-school*.tw.	5530
51	preschool*.tw.	23028
52	day care/	9682
53	childcare.tw.	1525
54	child care.tw.	5687
55	day care.tw.	7533
56	daycare.tw.	1128
57	early child*.tw.	22397
58	(nursery or nurseries).tw.	10447
59	Kinder*.tw.	7109
60	or/50-59	81379
61	exp health education/	239921
62	health promotion/	70352
63	("organizational policy" or "organisational policy").mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]	137
64	Public Policy.mp.	7872
65	exp health care policy/	145145
66	in service training/	13899
67	promot*.tw.	742349
68	educat*.tw.	492532
69	program*.tw.	738147
70	prevention*.tw.	475471
71	(policy or policies).tw.	179643
72	train*.tw.	440156
73	(physical activity* adj6 intervention*).tw.	4698
74	(physical inactivity* adj6 intervention*).tw.	56
75	or/61-74	2748381
76	30 and 49 and 60 and 75	1351

Database(s): PsycINFO 1806 to September Week 1 2014

Search Strategy:

#	Searches	Results
1	randomized controlled trial.mp.	7369
2	controlled clinical trial.mp.	908
3	Random Allocation.mp.	146
4	("double blind method" or "double blind procedure").mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]	184
5	("single blind method" or "single blind procedure").mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]	5
6	exp Placebo/	3534
7	Research Design.mp. or Experimental Design/	17633
8	"intervention stud*".mp.	3824
9	evaluation stud*.mp.	1875
10	Comparative Stud*.mp.	11162
11	exp Longitudinal Studies/	15204
12	cross-over stud*.mp.	450
13	clinical trial.tw.	7917
14	Clinical Trials/	6909
15	latin square.tw.	435
16	(time adj series).tw.	4874
17	(before adj2 after adj3 (stud* or trial* or design*)).tw.	1553
18	((singl* or doubl* or trebl* or tripl*) adj3 (blind* or mask)).tw.	18678
19	placebo*.tw.	29592
20	random*.tw.	121357
21	(matched communities or matched schools or matched populations).tw.	59
22	control*.tw.	458628
23	(comparison group* or control group*).tw.	62591
24	matched pairs.tw.	967
25	(outcome study or outcome studies).tw.	3820
26	(quasiexperimental or quasi experimental or pseudo experimental).tw.	5679
27	(nonrandomi* or non randomi* or pseudo randomi* or quasi randomi*).tw.	1204
28	prospectiv*.tw.	40523
29	volunteer*.tw.	27544
30	or/1-29	645936
31	exp Exercise/	15555
32	Physical* inactiv*.mp.	927
33	exp Physical Activity/	21606
34	Movement skill*.mp.	117
35	exp Motor Skills/	3129
36	Motor Activ*.mp.	5328
37	"physical education and training".mp.	15
38	exp Physical Education/	3002

39	exp Physical Fitness/	2894
40	sedentary.mp.	3324
41	exp Lifestyle/	7397
42	exp Recreation/ or exp Leisure Time/ or leisure activ*.mp.	28223
43	exp Sports/	13361
44	exp Dance/	1344
45	dancing.mp.	1228
46	(exercise* adj aerobic*).tw.	27
47	sport*.tw.	19964
48	((("lifestyle" or life-style) adj3 activ*).tw.	1111
49	or/31-48	83823
50	exp Preschool Education/ or exp Preschool Students/ or pre-school.mp.	12118
51	preschool*.mp.	36123
52	exp Child Day Care/ or exp Day Care Centers/	2809
53	exp Child Care/ or childcare.mp.	8321
54	child care.mp.	10169
55	day care.tw.	3903
56	daycare.tw.	1113
57	early child*.tw.	16778
58	exp Nursery Schools/ or exp Nursery School Students/	769
59	exp Kindergarten Students/ or Kinder*.mp.	19437
60	or/50-59	78044
61	exp Health Education/	13445
62	exp Health Promotion/	13381
63	(Organizational Policy or organisational policy).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]	211
64	Public Policy.mp. or exp Government Policy Making/	34973
65	exp Health Care Policy/ or Health Policy.mp.	9333
66	exp Inservice Training/	2814
67	promot*.tw.	104409
68	educat*.tw.	340144
69	program*.tw.	275663
70	prevention*.tw.	78389
71	(policy or policies).tw.	94803
72	train*.tw.	230124
73	(physical activity* adj6 intervention*).tw.	1793
74	(physical inactivity* adj6 intervention*).tw.	26
75	or/61-74	853740
76	30 and 49 and 60 and 75	252

Database(s): MEDLINE In-Process & Other Non-Indexed Citations

Search Strategy:

#	Searches	Results
1	randomized controlled trial*.mp.	8111
2	controlled clinical trial*.mp.	1534
3	Random*.mp.	70800
4	("double blind method" or "double blind procedure").mp.	35
5	("single blind method" or "single blind procedure").mp.	7
6	Placebo*.mp.	9333
7	Research Design.mp.	1262
8	"intervention stud* ".mp.	1167
9	evaluation stud*.mp.	440
10	Comparative Stud*.mp.	6099
11	exp Longitudinal Studies/	3
12	cross-over stud*.mp.	247
13	clinical trial.tw.	7173
14	Clinical Trials/	0
15	latin square.tw.	219
16	(time adj series).tw.	2474
17	(before adj2 after adj3 (stud* or trial* or design*)).tw.	653
18	((singl* or doubl* or trebl* or tripl*) adj3 (blind* or mask)).tw.	7010
19	(matched communities or matched schools or matched populations).tw.	15
20	control*.tw.	217332
21	(comparison group* or control group*).tw.	25786
22	matched pairs.tw.	287
23	(outcome study or outcome studies).tw.	392
24	(quasiexperimental or quasi experimental or pseudo experimental).tw.	826
25	(nonrandomi* or non randomi* or pseudo randomi* or quasi randomi*).tw.	1436
26	prospectiv*.tw.	32958
27	volunteer*.tw.	7643
28	or/1-27	296751
29	Exercise.mp.	13346
30	Physical* inactiv*.mp.	506
31	Physical* Activ*.mp.	6378
32	Movement skill*.mp.	19
33	Motor Skill*.mp.	370
34	Motor Activ*.mp.	526
35	(physical education and training).mp.	36
36	physical fitness.mp.	550
37	sedentary.mp.	1793
38	exp Life Style/	1
39	leisure activ*.mp.	160
40	sport*.mp.	5432

41	danc*.mp.	540
42	(exercise* adj aerobic*).tw.	13
43	(("lifestyle" or life-style) adj5 activ*).tw.	389
44	or/29-43	24739
45	pre-school*.tw.	255
46	preschool*.tw.	1294
47	Child Day Care Centers.mp.	6
48	childcare.tw.	122
49	child care.tw.	256
50	day care.tw.	325
51	daycare.tw.	88
52	early child*.tw.	1351
53	(nursery or nurseries).tw.	460
54	Kinder*.tw.	368
55	or/45-54	4017
56	Health Education.mp.	1846
57	Health Promotion.mp.	1898
58	("organizational policy" or "organisational policy").mp.	16
59	Public Policy.mp.	520
60	Health Policy.mp.	1354
61	Inservice Training.mp.	29
62	promot*.tw.	50271
63	educat*.tw.	33300
64	program*.tw.	49637
65	prevention*.tw.	27630
66	(policy or policies).tw.	13343
67	train*.tw.	31556
68	(physical activity* adj6 intervention*).tw.	544
69	(physical inactivity* adj6 intervention*).tw.	6
70	or/56-69	169204
71	28 and 44 and 55 and 70	61

CINAHL

#	Query	Results
S75	S29 AND S48 AND S59 AND S74	2,744
S74	S60 OR S61 OR S62 OR S63 OR S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72 OR S73	1,156,383
S73	program*	280,007
S72	educat*	477,639
S71	(physical inactivity* n6 intervention*)	23
S70	(physical activity* n6 intervention*)	2,180
S69	train*	123,603
S68	(policy or policies)	108,480
S67	prevention*	409,313
S66	promot*	102,662
S65	"Inservice Training"	92
S64	(MH "Health Policy+")	38,701
S63	(MH "Public Policy")	14,027
S62	(MH "Organizational Policies") OR (MH "School Policies")	9,939
S61	(MH "Health Promotion") OR "Health Promotion"	42,315
S60	(MH "Health Education") OR "Health Education"	30,152
S59	S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58	151,020
S58	"Kinder**"	1,433
S57	(MH "Schools, Nursery") OR "nursery or nurseries"	821
S56	early child*	11,210
S55	daycare	282
S54	day care	6,721
S53	child care	9,932
S52	childcare	783
S51	(MH "Child Day Care") OR "Child Day Care Centers"	1,924
S50	pre-school*	901
S49	"preschool**"	132,388
S48	S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47	286,634
S47	((("lifestyle" or life-style) n3 activ*)	1,341
S46	sport*	33,987
S45	(exercise* n1 aerobic*)	4,961
S44	dancing	2,166
S43	(MH "Dancing+")	2,109
S42	(MH "Sports+")	47,111

S41	(MH "Leisure Activities+")	40,979
S40	(MH "Life Style+")	132,983
S39	(MH "Life Style, Sedentary") OR "sedentary"	6,413
S38	(MH "Physical Fitness+")	10,476
S37	(MH "Physical Education and Training")	1,969
S36	"physical education and training"	1,973
S35	(MH "Motor Activity")	7,626
S34	(MH "Motor Skills")	6,150
S33	"Movement skills"	72
S32	(MH "Physical Activity")	20,913
S31	"physical* inactiv*"	1,356
S30	(MH "Exercise+")	65,157
S29	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28	1,108,312
S28	volunteer*	27,520
S27	prospectiv*	274,831
S26	(nonrandomi* or non randomi* or pseudo randomi* or quasi randomi*)	5,355
S25	(quasiexperimental or quasi experimental or pseudo experimental)	8,070
S24	(outcome study or outcome studies)	10,109
S23	matched pairs	891
S22	(comparison group* or control group*)	51,850
S21	control*	675,740
S20	(matched communities or matched schools or matched populations)	172
S19	random*	188,362
S18	placebo*	31,522
S17	((singl* or doubl* or trebl* or tripl*) n3 (blind* or mask)) or mask)).	47,361
S16	(before n2 after n3 (stud* or trial* or design*))	2,593
S15	(time n1 series)	3,056
S14	latin square	121
S13	clinical trial*	143,533
S12	"cross-over studies"	57
S11	(MH "Prospective Studies+") OR "Longitudinal Studies"	247,736
S10	(MH "Comparative Studies")	78,697
S9	(MH "Evaluation Research") OR "evaluation studies"	20,760
S8	(MH "Experimental Studies") OR "intervention studies"	17,856
S7	(MH "Study Design") OR "Research Design"	29,138
S6	(MH "Placebos")	8,958

S5	(MH "Single-Blind Studies")	8,509
S4	(MH "Double-Blind Studies")	30,112
S3	(MH "Random Assignment")	38,204
S2	(MH "Clinical Trials+")	181,064
S1	(MH "Randomized Controlled Trials")	33,686

COCHRANE LIBRARY

- Reviews – 10
- Other Reviews – 35
- Trials (CENTRAL) - 492

'Exercis* or "physical* inactiv*" or "physical* activit*" or "Movement skill*" or "Motor skill*" or "Motor Activ*" or "physical education" or "physical fitness" or sedentary or "life style" or lifestyle or leisure or sport* or danc* in Title, Abstract, Keywords and "pre school*" or preschool* or childcare or "child care" or daycare or "day care" or "early child*" or nursery or nurseries or kinder* in Title, Abstract, Keywords and "health education" or "health promotion" or policy or policies or promot* or educat* or program* or prevention* or train* or ("physical activity*" w/6 intervention*) or ("physical inactivity*" w/6 intervention*) in Title, Abstract, Keywords

ERIC - 295

(Random* or "clinical trial*" or placebo* or "research design*" or "intervention stud*" or "evaluation stud*" or "comparative stud*" or "longitudinal stud*" or "cross over stud*" or "latin square" or "time series" or (before near/2 after near/3 (stud* or trial* or design*)) or ((singl* or doubl* or trebl* or tripl*) near/3 (blind* or mask*)) or "matched communities" or "matched schools" or "matched populations" or control* or "comparison group*" or "control group*" or "matched pairs" or "outcome stud*" or quasiexperimental or "quasi experimental" or "pseudo experimental" or nonrandomi* or "non randomi*" or "pseudo randomi*" or "quasi randomi*" or prospective* or volunteer*) AND (Exercis* or "physical* inactiv*" or "physical* activit*" or "Movement skill*" or "Motor skill*" or "Motor Activ*" or "physical education" or "physical fitness" or sedentary or "life style" or lifestyle or leisure or sport* or danc*) AND ("pre school*" or preschool* or childcare or "child care" or daycare or "day care" or "early child*" or nursery or nurseries or kinder*) AND ("health education" or "health promotion" or policy or policies or promot* or educat* or program* or prevention* or train* or ("physical activity*" w/6 intervention*) or ("physical inactivity*" near/6 intervention*)) Separate searches in abstract, title, subject, identifier fields, then de-duplicated

Dissertations and Theses - 226

(Random* or "clinical trial*" or placebo* or "research design*" or "intervention stud*" or "evaluation stud*" or "comparative stud*" or "longitudinal stud*" or "cross over stud*" or "latin square" or "time series" or (before near/2 after near/3 (stud* or trial* or design*)) or ((singl* or doubl* or trebl* or tripl*) near/3 (blind* or mask*)) or "matched communities" or "matched schools" or "matched populations" or control* or "comparison group*" or "control group*" or "matched pairs" or "outcome stud*" or quasiexperimental or "quasi experimental" or "pseudo experimental" or nonrandomi* or "non randomi*" or "pseudo randomi*" or

"quasi randomi*" or prospective* or volunteer*) AND (Exercis* or "physical* inactiv*" or "physical* activ*" or "Movement skill*" or "Motor skill*" or "Motor Activ*" or "physical education" or "physical fitness" or sedentary or "life style" or lifestyle or leisure or sport* or danc*) AND ("pre school*" or preschool* or childcare or "child care" or daycare or "day care" or "early child*" or nursery or nurseries or kinder*) AND ("health education" or "health promotion" or policy or policies or promot* or educat* or program* or prevention* or train* or ("physical activity*" near/6 intervention*) or ("physical inactivity*" near/6 intervention*))

Separate searches in abstract, title, index term (Keyword), subject heading fields, then de-duplicated

SCOPUS - 1443

ABS TITLE ((random* OR "clinical trial*" OR placebo* OR "research design*" OR "intervention stud*" OR "evaluation stud*" OR "comparative stud*" OR "longitudinal stud*" OR "cross over stud*" OR "latin square" OR "time series" OR (before W/2 after W/3 (stud* OR trial* OR design*)) OR ((singl* OR doubl* OR trebl* OR tripl*) W/3 (blind* OR mask*)) OR "matched communities" OR "matched schools" OR "matched populations" OR control* OR "comparison group*" OR "control group*" OR "matched pairs" OR "outcome stud*" OR quasiexperimental OR "quasi experimental" OR "pseudo experimental" OR nonrandomi* OR "non randomi*" OR "pseudo randomi*" OR "quasi randomi*" OR prospective* OR volunteer*) AND (exercis* OR "physical* inactiv*" OR "physical* activ*" OR "Movement skill*" OR "Motor skill*" OR "Motor Activ*" OR "physical education" OR "physical fitness" OR sedentary OR "life style" OR lifestyle OR leisure OR sport* OR danc*) AND ("pre school*" OR preschool* OR childcare OR "child care" OR daycare OR "day care" OR "early child*" OR nursery OR nurseries OR kinder*) AND ("health education" OR "health promotion" OR policy OR policies OR promot* OR educat* OR program* OR prevention* OR train* OR ("physical activity*" W/6 intervention*) OR ("physical inactivity*" W/6 intervention*)))

SPORTDISCUS - 515

(random* OR "clinical trial*" OR placebo* OR "research design*" OR "intervention stud*" OR "evaluation stud*" OR "comparative stud*" OR "longitudinal stud*" OR "cross over stud*" OR "latin square" OR "time series" OR (before n2 after n3 (stud* OR trial* OR design*)) OR ((singl* OR doubl* OR trebl* OR tripl*) n3 (blind* OR mask*)) OR "matched communities" OR "matched schools" OR "matched populations" OR control* OR "comparison group*" OR "control group*" OR "matched pairs" OR "outcome stud*" OR quasiexperimental OR "quasi experimental" OR "pseudo experimental" OR nonrandomi* OR "non randomi*" OR "pseudo randomi*" OR "quasi randomi*" OR prospective* OR volunteer*)

AND (exercis* OR "physical* inactiv*" OR "physical* activ*" OR "Movement skill*" OR "Motor skill*" OR "Motor Activ*" OR "physical education" OR "physical fitness" OR sedentary OR "life style" OR lifestyle OR leisure OR sport* OR danc*)

AND ("pre school*" OR preschool* OR childcare OR "child care" OR daycare OR "day care" OR "early child*" OR nursery OR nurseries OR kinder*)

AND ("health education" OR "health
promotion" OR policy OR policies OR promot* OR educat* OR program* OR prevention* OR train* OR
("physical activity*" n6 intervention*) OR ("physical inactivity*" n6 intervention*)))

Separate searches in abstract, title, Keywords, subject heading fields, then de-duplicated

APPENDIX 4.3: DATA EXTRACTION FORM

Data extraction form

A systematic review of physical activity interventions in centre based childcare:
Meta- analysis of outcome effects for pragmatic versus explanatory study designs

Data extractor:	Date:

Notes on using a data extraction form:

- Be consistent in the order and style you use to describe the information for each report.
- Record any missing information as unclear or not described, to make it clear that the information was not found in the study report(s), not that you forgot to extract it.
- Include any instructions and decision rules on the data collection form, or in an accompanying document. It is important to practice using the form and give training to any other authors using the form.

First Author:	Publication Year:
Study title:	
Location (country, region):	
sample (number of services / children	
Notes: Report details/IDs? of other reports of this study (e.g. duplicate publications, follow-up studies)	

1. General Information

describe the duration, components, delivery, focus info all in the intervention description.

i)

Aims, recruitment and eligibility	Location
Aim of intervention, targeted population group <i>What was the problem that this intervention was designed to address? What is the population group targeted?</i>	

Methods of recruitment of participants <i>How were potential participants approached and invited to participate?</i>	
Inclusion/exclusion criteria for participation in study	

Intervention(s) characteristics	Location
intervention type (environmental or organizational)	
Intervention period (weeks, months)	
Intervention Mode of delivery was the intervention delivered by staff or experts (characteristics of those delivering the intervention)	
Intervention frequency (e.g., contact time number of intervention contacts/sessions)	
Intervention duration (e.g., number sessions over a given period, e.g 15 mins)	
Intervention strategies/components (the content or elements of the intervention (techniques) Briefly describe the intervention	

Theory base <i>Was the intervention described as theory-based? What theory was used?</i>	

Control group	Location
Control group type (e.g. wait list, usual care, attention control):	
If applicable complete the following:	
Control group setting (<i>hospital, participants home</i>):	
Control group intervention type (<i>environmental or organizational</i>)	
Control group delivery mode (circle then tick)	
Control group Intervention period (<i>weeks, months</i>)	
Control group Intervention Mode of delivery was the intervention delivered by staff or experts (<i>characteristics of those delivering the intervention</i>)	
Control group Intervention frequency (e.g., contact time <i>number of intervention contacts/sessions</i>)	
Control group Intervention strategies/components (the content or elements of the intervention (techniques) <i>Briefly describe the intervention</i>	

Theory base <i>Was the intervention described as theory-based? What theory was used?</i>	
Outcomes	Location
Primary outcome <i>Briefly describe the primary outcome of the study (e.g. enhance QOL, PA)</i>	
Physical Activity Behaviour(s) <i>Describe what physical activity behavior(s) were assessed and describe the method of assessment *e.g. mins/week of aerobic activity – Physical Activity Recall (PAR).</i>	
<i>Were the methods of assessment described as valid and reliable?</i>	
PA Outcome classification <i>Describe why PA was measured (e.g. as a primary outcome, secondary outcome, to check compliance with the intervention, to include as a covariate).</i>	
Data collection period <i>(during care/recess period/over full day, ie waking hours)</i>	
Follow up periods <i>Please specify when physical activity/diet behaviours were measured in terms of time since baseline and time since intervention.</i> <i>e.g. 6 months post-baseline (2 months post-intervention)</i>	

Analysis	Location
Analysis (please describe in brief the primary analysis method) (e.g. Ancova, with baseline PA as a covariate).	
Describe the Method used for accounting for missing data (e.g. intention-to-treat analysis, completers analysis)	
Power/sample size calculation (e.g power was based on mins/wk as the primary outcome. To detect a 15 minute change in PA between groups with 80% power, we would need 38 participants in each group).	
Mediation analysis conducted?	
Yes No Not reported	
Moderation analysis conducted?	
Yes No Not reported	
Cost analysis conducted?	
Yes No Not reported	

Results	
Recruitment, withdrawal and participant characteristics	Location
Response rate - services <i>What percentage of selected services agreed to participate?</i>	
Response rate - children <i>What percentage of selected individuals agreed to participate?</i>	
N <i>How many participants were randomly assigned? Le what was the sample size at the beginning of the study</i>	
Withdrawals and drop-outs <i>How many people withdrew/dropped out from the study? Were there differences between the study groups?</i>	
Age (mean, SD):	
Gender: % female	

2. Results

DICHOTOMOUS		PRE INTERVENTION		POST INTERVENTION		Adjusted effect and a measure of it's variability (eg for dichotomous this could be an odds ratio or risk ratio with 95% CI)				CHANGE FROM BASELINE % and a measure of it's variability(SD and/or, SE and/or, 95%CI)			
Outcome	Timing of outcome (days/month)	Intervention	observed n (# of events)	Total N	%	observed n (# of events)	Total N	%	Effect (describe and provide the point estimate)	SD	SE	95 % CI	
		Intervention A											
		Intervention B											
		Comparison											

CONTINUOUS		Intervention	N pre	N post	PRE INTERVENTION			POST INTERVENTION			Adjusted effect and a measure of it's variability (SD and/or, SE and/or, 95%CI) – eg for cluster trials			CHANGE FROM BASELINE			
Outcome	Timing of outcome (days/month)				mean	SD	SE	95% CI	mean	SD	SE	95% CI	effect size	SD	SE	95% CI	At 16 weeks follow-up
				N													
		Intervention A															
		Intervention B															
		Comparison															

*although pre-intervention estimates of outcome were based on a sample of 48 intervention and 51 control

Notes (These are published in the table Characteristics of Included Studies)

For example:

	Yes / No / Attempted	NOTES / DETAILS
Contact with author?	Yes / No	
Power calculation?	Yes / No	
Record if the study was translated from a language other than English.	Yes / No	Language:
Record if the study was a duplicate publication.	Yes / No	

** END OF DATA EXTRACTION FORM **

APPENDIX 4.4: PRECIS CODING FORM AND TOOLKIT

Name of coder _____

Author _____ Year _____

Article _____

	Domain	Score	Rationale
1	Eligibility Criteria		
2	Recruitment Path		
3	Setting		
4	Organisation intervention		
5	Flex of experimental intervention – Delivery		
6	Flex of experimental intervention – Adherence		
7	Follow up		
8	Outcome		
9	Analysis		

PRECIS-2 toolkit

We would be very grateful if users would give us feedback on using PRECIS-2: just click on "Contact us". These PRECIS-2 criteria are constantly being reviewed and we welcome your input.

How to use PRECIS-2 - Designing trials that are fit for purpose

We think there are four steps to using PRECIS-2, which may be iterative depending on what you discover after going through the steps.

Step 1: Why are you doing your trial?

Your first step is to be clear about why you are doing your trial. Are you:

1. Aiming to take an explanatory approach to answer the question 'Can this intervention work under ideal conditions?'
2. Aiming to take a pragmatic approach and answer the question 'Does this intervention work under usual conditions?'

Both approaches to trial design have their place but trialists should be clear which path they are on. As Schwartz and Lellouch pointed out, trialists have often taken the first approach by default rather than as a considered judgement.

Step 2: Consider your trial design choices for each of the nine PRECIS-2 domains

This step is explained in more detail for each domain later on.

Step 3: Score 1 to 5 for these choices made in Step 2 and/or mark on the PRECIS-2 wheel

Having considered your design choices in Step 2, the PRECIS-2 wheel is used to record how pragmatic or explanatory these choices are for each domain. Each domain is a 5-point Likert scale:

1. Very explanatory
2. Rather explanatory
3. Equally pragmatic/explanatory
4. Rather pragmatic
5. Very pragmatic

A table can be used in conjunction with the PRECIS "wheel" or instead of the wheel to give rationale for scores. You can use this to assist discussion with trial collaborators.

Step 4: Review your PRECIS-2 wheel

Review your design choices (Step 2) on the PRECIS-2 wheel to see whether they will produce a trial that will support the aim identified in Step 1. Go back to Step 2 and modify your design choices if required.

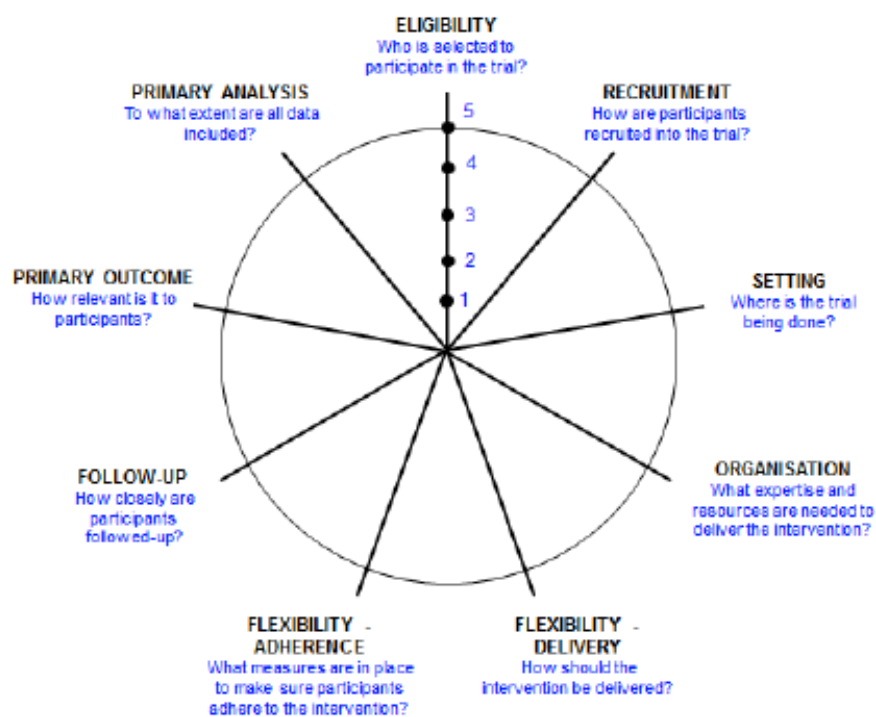
PRECIS-2 wheel

Table 2: PRECIS-2 scores for trial domains

	Domain	Score	Rationale
1	Eligibility Criteria		
2	Recruitment Path		
3	Setting		
4	Organisation intervention		
5	Flex of experimental intervention – Delivery		
6	Flex of experimental intervention – Adherence		
7	Follow up		
8	Outcome		
9	Analysis		

The PRECIS-2 Domains

The NINE PRECIS-2 domains are:

- **Eligibility** – to what extent are the participants in the trial similar to those who would receive this intervention if it was part of usual care? For example, score 5 for very pragmatic criteria essentially identical to those in usual care; score 1 for a very explanatory approach with lots of exclusions (e.g. those who don't comply, respond to treatment, or are not at high risk for primary outcome, are children or elderly), or uses many selection tests not used in usual care.
- **Recruitment** – how much extra effort is made to recruit participants over and above what that would be used in the usual care setting to engage with patients? For example, score 5 for very pragmatic recruitment through usual appointments or clinic; score 1 for a very explanatory approach with targeted invitation letters, advertising in newspapers, radio plus incentives and other routes that would not be used in usual care.
- **Setting** – how different is the setting of the trial and the usual care setting? For example, score 5 for a very pragmatic choice using identical settings to usual care; score 1, for a very explanatory approach with only a single centre, or only specialised trial or academic centres.
- **Organisation** – how different are the resources, provider expertise and the organisation of care delivery in the intervention arm of the trial and those available in usual care? For example, score 5 for a very pragmatic choice that uses identical organisation to usual care; score 1 for a very explanatory approach if the trial increases staff levels, gives additional training, require more than usual experience or certification and increase resources.
- **Flexibility (delivery)** – how different is the flexibility in how the intervention is delivered and the flexibility likely in usual care? For example, score 5 for a very pragmatic choice with identical flexibility to usual care; score 1 for a very explanatory approach if there is a strict protocol, monitoring and measures to improve compliance, with specific advice on allowed co-interventions and complications.
- **Flexibility (adherence)** – how different is the flexibility in how participants must adhere to the intervention and the flexibility likely in usual care? For example, score 5 for a very pragmatic choice involving no more than usual encouragement to adhere to the intervention; score 1 for a very explanatory approach that involves exclusion based on adherence, and measures to improve adherence if found wanting. In some trials eg surgical trials where patients are being operated on or Intensive Care Unit trials where patients are being given IV drug therapy, this domain is not applicable as there is no compliance issue after consent has been given, so this score should be left blank.
- **Follow-up** – how different is the intensity of measurement and follow-up of participants in the trial and the likely follow-up in usual care? For example, score 5 for a very pragmatic approach with no more than usual follow up; score 1 for a very explanatory approach with more frequent, longer visits, unscheduled visits triggered by primary outcome event or intervening event, and more extensive data collection.
- **Primary outcome** – to what extent is the trial's primary outcome relevant to participants? For example, score 5 for a very pragmatic choice where the outcome is of obvious importance to participants; score 1 for a very explanatory approach using a surrogate, physiological outcome, central adjudication or use assessment expertise that is not available in usual care, or the outcome is measured at an earlier time than in usual care.
- **Primary analysis** – to what extent are all data included in the analysis of the primary outcome? For example, score 5 for a very pragmatic approach using intention to treat with all available data; score 1 for a very explanatory analysis that excludes ineligible post-randomisation participants, includes only completers or those following the treatment protocol.

Notes

"Participants" include patients or other individual recipients of an intervention, and/or providers of the intervention. This may include individual participants and/or one or more levels of clusters. For example, in a trial of a continuing education intervention, participants may be health professionals and trained instructors and the trial may be randomised into clusters at the level of the instructor.

During the design process, if there is uncertainty over how explanatory or pragmatic a domain is, then we suggest the score for this domain should be left blank. This will then highlight uncertainty and encourage discussion. If PRECIS-2 is used to look at how pragmatic included trials are in systematic reviews then a score of 3 may be chosen if there is inadequate information. This is different to the "3 = equally pragmatic/explanatory".

Example: PRECIS-2 wheel.

Little P, Moore M, Kelly J, Williamson I, Leydon G, McDermott L, Mullee M, Stuart B: Ibuprofen, paracetamol, and steam for patients with respiratory tract infections in primary care: pragmatic randomised factorial trial. *BMJ* 2013, 347:f6041.

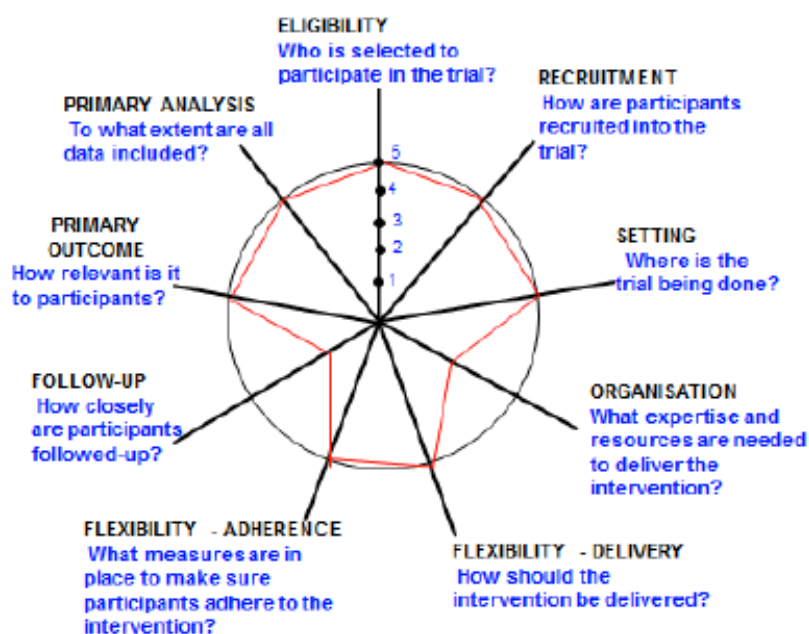


Table – PRECIS-2 scores for trial domains

	Domain	Score	Rationale
1	Eligibility Criteria	5	Patients ≥ 3 with acute respiratory tract infections. Exclusions not common cold but severe respiratory tract infections, peptic ulcer and asthma. But even asthma patients who were not sensitive to ibuprofen or aspirin eligible. Pregnant or breast feeding women are discouraged from taking ibuprofen when pregnant but can take as low a dose as possible of Paracetamol but as both being tested in the trial cannot include this group as participants. If include visually impaired increase organisation of trial (as in carers have to assist diary completion) but that would be norm and usual if prescribed ibuprofen or Paracetamol or steam treatment in usual care, so just easier for trialists to exclude. Small proportion of participants – so why exclude? Depressed and people with psychosis unreliable diary fillers, concerned with other things.
2	Recruitment Path	5	Patients presenting to GP or nurse in primary care with respiratory tract infections as diagnosed by health professional. Easy to recruit to but time pressures in busy winter clinics prevented recruitment and meant non-recruitment logs poorly completed.
3	Setting	5	Identical setting to usual care setting - primary care where patients usually go for advice and treatment.
4	Organisation Intervention	3	Information sheets given out to participants. This is not usual practice, would it be if trial had shown this helped? Need more staff for follow up of trial participants to get diary results so more extensive data collection than usual. Otherwise no difference in provider expertise and organisation of care delivery.
5	Flex of experimental Intervention – Delivery	5	Full flexibility

Table – PRECIS-2 scores for trial domains (continued)

6	Flex of experimental Intervention – Adherence	5	Compliance measured with diary – “reasonably good” participants free to “not-comply” with advice. Little impact of advising patients to take analgesics regularly. No measures to improve compliance
7	Follow up	2	Participants Followed up one month – usual care no follow up. Patients come back to GP if problems. Trial more extensive data collection - patients telephoned day two to three to check for any problems with diary completion. If no diary after 2 weeks then mailed reminder and then phoned as necessary to document outcomes using validated questionnaire.
8	Outcome	5	Very relevant to participants - Mean symptom severity on days 2-4. Symptoms 0 (no problem) to 6 (as bad as they can be 7 in abstract). Completed in diary at end of day – children with parents or participants.
9	Analysis	5	ITT no matter whether compliance.

APPENDIX 4.12

RISK OF BIAS FORM

A systematic review of physical activity interventions in centre based childcare: Meta- analysis of outcome effects for pragmatic versus explanatory study designs

Data extractor:		Date:	

First Author:		Publication Year:	

Study title:			

Notes: Report details/IDs? of other reports of this study (e.g. duplicate publications, follow-up studies)			

1. Risk of Bias assessment

See [Chapter 8](#) of the Cochrane Handbook. Additional domains may be required for non-randomised studies.

Domain	Risk of bias			Support for judgement (Include direct quotes where available with explanatory comments)	Location in text (pg & %/fig/table/other)
	Low risk	High risk	Unclear		
Random sequence generation (selection bias) Describe the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Domain	Risk of bias	Support for judgement <i>(include direct quotes where available with explanatory comment)</i>	Location in text <i>(see B)</i>
Allocation concealment <i>(selection bias) Describe the method used to conceal the allocation sequence in sufficient detail to determine whether intervention allocations could have been foreseen in advance of, or during, enrolment.</i>	<div>Low risk<input type="checkbox"/></div> <div>High risk<input type="checkbox"/></div> <div>Unclear<input type="checkbox"/></div>		
Blinding of participants and personnel <i>(performance bias) any, to blind study participants and personnel from knowledge of which intervention a participant received. Provide any information relating to whether the intended blinding was effective. I.e. state if any concerns about the way the blinding was carried out)</i>	<div><input type="checkbox"/></div> <div><input type="checkbox"/></div> <div><input type="checkbox"/></div>	Outcome group: All/	

Domain	Risk of bias	Support for judgement <i>(include direct quotes where available with explanatory comment)</i>	Location in text <i>(see B)</i>
Blinding of participants and personnel <i>(if separate judgement by outcome(s) required)</i>	<div>Low risk</div> <div>High risk</div> <div>Unclear</div> <div><input type="checkbox"/></div> <div><input type="checkbox"/></div> <div><input type="checkbox"/></div>	Outcome group:	
Blinding of outcome assessment <i>(detection bias) Describe all measures used, if any, to blind data collectors, statisticians) from knowledge of which intervention a participant received. Provide any information relating to whether the intended blinding was effective. (V2: i.e. state if any concerns about the way the blinding was carried out)</i>	<div>Data collection personnel</div> <div><input type="checkbox"/></div> <div><input type="checkbox"/></div> <div><input type="checkbox"/></div> <div>Statisticians</div> <div><input type="checkbox"/></div> <div><input type="checkbox"/></div> <div><input type="checkbox"/></div>	Outcome group: All/	

Domain	Risk of bias	Support for judgement <i>(include direct quotes where available with explanatory comment)</i>	Location in text <i>(see B)</i>
Blinding of outcome assessment <i>(If separate judgement by outcome/s required)</i>	Low risk <input type="checkbox"/> High risk <input type="checkbox"/> Unclear <input type="checkbox"/>	Outcome group:	
Incomplete outcome data <i>(attrition bias) Assessments should be made for PA outcome/s of interest only. Include brief justification only.</i>	Low risk <input type="checkbox"/> High risk <input type="checkbox"/> Unclear <input type="checkbox"/>		

Domain	Risk of bias	Support for judgement <i>(include direct quotes where available with explanatory comment)</i> Outcome group:	Location in text <i>(see B)</i>
Incomplete outcome data <i>(attrition bias)</i> <i>(If separate judgement by outcome(s) required)</i>	Low risk <input type="checkbox"/> High risk <input type="checkbox"/> Unclear <input type="checkbox"/>		
Selective outcome reporting? <i>(reporting bias)</i> Criteria: Reporting of results against each stated aim / objective and measure – AND No reporting of results in addition to those stated in aims / objectives Assessments should be made for each main outcome (or class of outcomes). “Selective Outcome” i.e. reporting primary outcomes that were not pre-specified, or failing to report pre-specified primary outcomes.	Low risk <input type="checkbox"/> High risk <input type="checkbox"/> Unclear <input type="checkbox"/>		

Domain	Risk of bias	Support for judgement <i>(include direct quotes where available with explanatory comment)</i>	Location in text <i>(see B)</i>
<p>Other bias</p> <p>Was the study apparently free of other problems that could put it at a high risk of bias?</p> <p>e.g. Influence of interim results, protocol deviation, intervention randomisation, inappropriate administration pre-IV administration, contamination, insufficient IV delivery, insensitive outcome instrument, selective reporting, fraud, inappropriate funding influence.</p> <p>For example (only):</p> <p>Were the intervention and control groups comparable at baseline? Handbook states problem if there is "extreme baseline imbalance"... but relating to "outcome", or factors associated with outcome</p> <p>: "Baseline imbalance in factors that are strongly related to outcome measures can cause bias in the intervention effect estimate (i.e. not ALL factors – only those relevant) if further baseline imbalance is present (that could exaggerate intervention effects, then it should be noted).</p> <p>Have measures been taken with the study to protect against contamination? See the Cochrane Handbook 8.14.1.6 Further examples of potential biases.</p>	<p>Low risk <input type="checkbox"/></p> <p>High risk <input type="checkbox"/></p> <p>Unclear <input type="checkbox"/></p>		

Domain	Risk of bias	Support for judgement <i>(include direct quotes where available with explanatory comment)</i>	Location in text <i>(for R)</i>
Other quality indicators (i.e. potential sources of imprecision) For example: •Were outcome measurement tools (of interest) validated? •Are the outcome measures of interest reliable? Notes:			

** END OF DATA EXTRACTION FORM **

APPENDIX FIVE:

APPENDIX 5.1:
GRANT LETTER

10-24



4 November 2009

Dr Luke Wolfenden
University of Newcastle
School of Medicine and Public Health
University Drive
CALLAGHAN NSW 2308

Dear Luke,

The Hunter Medical Research Institute received 45 applications for 2009/10 Project Grant funding. These applications were subjected to rigorous peer review by a multidisciplinary panel consisting of A/Prof Eileen McLaughlin, A/Prof Jeorg Mattes, Dr Ian Wright, Prof John Attia, Dr Marita Lynagh, A/Prof Ulrich Schall, Dr Nikki Verrills, A/Prof Tony Quail, Conjoint A/Prof Zu Dong Zhang, Prof John Rostas, A/Prof Peggy Horn and myself.

The Panel selected 18 grants they considered of sufficient standard to be funded. The total funding for Project Grants in 2009 was \$615,000.

I am pleased to inform you that your application "**A randomised controlled trial of an intervention to increase child physical activity during attendance at childcare.**" was selected for funding. The panel recommended a grant of **\$24,547** for your project. **This project is supported by HMRI.**

An account for this amount will be established through the Office for Research at the University of Newcastle. Please contact Kim Jacobs on 02 4921 4030 for details about accessing these funds.

Unless written approval to the contrary is obtained from the Director of HMRI, all funds must be expended by December 31, 2010. **Funding of a grant will be withheld if ethics and/or safety approvals of the project are required, but have not been obtained by the applicant within 6 months of the grant being awarded.** These funds may be returned to the funding pool at the discretion of the Director of HMRI if ethics / safety approval is not obtained within the 6 month time frame.

You will be required to provide six monthly reports to HMRI to enable HMRI to provide feedback to the donors about the research they are supporting. Reports should be submitted six months into the project and every six months thereafter until the project is completed. It is expected that any publications arising from this research will acknowledge support from HMRI. It is also expected that you will make yourself available to assist HMRI with publicity concerning this research so that we can continue to support health and medical researchers in the Hunter.

In partnership with our community



HUNTER NEW ENGLAND
NSW@HEALTH

Lookout Road, New Lambton
Locked Bag 1
HRMC NSW 2310
P 02 4921 4030
F 02 4985 5909
E info@hmri.net.au
W www.hmri.net.au
ABN 27 081 436 919



This year the HMRI Research Council determined that all applicants, whether successful or unsuccessful, should be advised of the comments offered by the judging panel to aid with the project. The following comments are offered by the selection panel as feedback on your application.

- The panel felt that the likelihood of further funding with a successful pilot study was very high.
- The panel felt the project would obtain more comprehensive results if the study was conducted over 24 hours, as opposed to just pre-school hours.
- The panel thought more accurate information may be obtained if pre and post intervention assessments were carried out, eg. assessing hand-eye coordination skills.
- The panel felt the study could be set up to determine the long term benefits of the intervention. The panel would have liked to see the study set up for future follow up of the cohort a couple of years down the track as opposed to one month.
- It was noted that the Design Effect should be 2 not 1.59.
- The panel felt the researchers should consider control measures in terms of the Day Care Centres and the issues associated with ensuring they continue to stick to normal day to day routines. Control measures also need to be assessed in terms of the children keeping pedometers on.

On behalf of HMRI I congratulate you on your application and wish you every success with your research.

Yours sincerely,

Professor Maree Gleeson
Director

In partnership with our community



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA




HUNTER NEW ENGLAND
NSW HEALTH

Lookout Road, New Lambton
Locked Bag 1
HRMC NSW 2310
P 02 4921 4030
F 02 4985 5909
E info@hmri.net.au
W www.hmri.net.au
ABN 27 081 436 919

APPENDIX SIX:

APPENDIX 6.1:

AUTHORISED SUPERVISOR QUESTIONNAIRE – FOLLOW-UP

<p style="text-align: center;">Intervention group services</p> <p style="text-align: center;">Telephone survey of Authorised Supervisors</p> <p>SERVICE NAME _____</p> <p>SERVICE ID _____</p>	  
--	---

Hello, my name is _____, I work for the Good for Kids. Good for Life program. I am wondering whether (*Authorised Supervisor*) is available at the moment?

☐ Yes ☐ No ➔ When might be a suitable time to call back _____

↓

You may recall receiving an information letter about this call, which was posted to you in the last week or so.

This information letter was to let you know that we are inviting Authorised Supervisors who participated in the *Good for Kids. Good for Life* physical activity study to participate in a final telephone survey.

The survey is voluntary. If you choose to participate, you can complete the survey now or at a later time that is convenient to you.

The survey will take approximately 15 minutes of your time and ask you about your usual physical activity practices and policies at your service.

Would you like to participate?

☐ Yes ☐ No ➔

Not a problem. Thank you again for your participation in the physical activity study and look forward to sharing the results with you in 2011.

↓

**Go to next page
and begin survey**

Service ID _____

Thank you for participating in this final survey.

I will be asking you some questions about your service's physical activity practices.

Please answer the questions according to what usually happens at your service. They are not meant to be specifically just about today.

These questions are not intended as an audit, but as a way for us get an overall picture of your services policies and practices. This will allow us to tailor the Good for Kids program towards services' needs.

Q1. Does your service have a written policy on physical activity? (Choose one answer)

☐ No ☐ Yes ➔

Q1a Does your policy specifically refer to any of the following?
(Tick all that apply)

**Go to
Q2**

- ☐ Meeting children's PA requirements
- ☐ Development of FMS
- ☐ Limits on SSR & TV
- ☐ Staff training in PA
- ☐ Educating families about PA
- ☐ PA curriculum teaching & activities
- ☐ Evaluation PA strategies
- ☐ Don't know

Q2. Between the hours of 9am-3pm, how much time do children spend in a form of structured physical activities that are led and initiated by staff such as group activities, dancing, exercises, gross motor activities or planned FMS activities?

Definition: Structured physical activity must be initiated and led by a teacher. This includes only occasions of teacher led activities, such as active games, dancing, FMS or gross motor development activities
Can be planned or spontaneous.

(Hours /Minutes) _____

Service ID _____

Q3. Are these structured activities usually optional for children?

☐ Yes – some activities☐ Yes – all activities

Q3a. Other

☐ No**Go to
Q4**Q4. Between the hours of 9am-3pm, how many usual occasions are available for children to spend engaging structured physical activity that is led and initiated by staff at your service?

No. of Occasions _____

**Question 5
Next page**

Service ID _____

This question is specifically about staff led and initiated activities related to fundamental movement skill development.

Q5. Does your service carry out planned, adult-guided sessions or activities to facilitate children's exploration and development of FMS?

Definition: this would be a specific structured teacher led activity during which children explore and practice one or more FMS. The FMS session may involve a warm up and cool down activity.

The FMS session will include a focus on at least one FMS, skill specific feedback (e.g. use of verbal cues, error detection and correction), extension and challenge experiences for different levels and should include staff modeling and demonstration.

☐ Yes


Q5a. How often do FMS sessions usually occur?

No. of Occasions (day/week/month – please specify)

☐ No

**Go to Q6
on page 6**

Q5b. What is the usual length of these sessions?

Hours/minutes _____

Service ID _____

Q5c. Are FMS sessions optional for children?

☐ Yes – some sessions☐ Yes – all sessions☐ No

Q5c.1 What percentage of children would usually participate in FMS sessions?



Now go to Q5d

Q5d. Specifically, how often do they include each of the following components? Answer each

<input type="radio"/> Warm up & cool down activities	Always	Very Often	Rarely	Never
<input type="radio"/> A focus on developing at least one FMS	Always	Very Often	Rarely	Never
<input type="radio"/> Skill specific feedback	Always	Very Often	Rarely	Never
<input type="radio"/> Extension and challenge experiences	Always	Very Often	Rarely	Never
<input type="radio"/> Staff modelling and demonstration	Always	Very Often	Rarely	Never

Service ID _____

Q6. Between the hours of 9am-3pm how much time do children usually have available to spend in child-initiated, outdoor, free physically active play?

Hours/Minutes _____

Q7. Between the hours of 9am-3pm, how many occasions during a usual day are children given the opportunity to participate in child initiated, outdoor free physically active play?

No. of Occasions _____

Q8. On a usual day do staff join in and participate with children during child initiated free active play?

Definition: Staff member joining in with active play that the children initiated and are leading. Staff acting as a role model. Not teacher led. This should be an activity that the children already started and the staff member joined in the children's game.

This does not include times where a staff member is pushing a child on a swing while talking to another staff member, or general supervision while standing still.

☐ Yes



☐ No

Go to
Q9



Q8a. How many staff usually join in and participate with children during child initiated free active play?

- ☐ All staff
- ☐ Most staff
- ☐ Some staff

Q8b. How often do staff usually join in and participate with children during child initiated free active play?

- ☐ All of the time
- ☐ Most of the time
- ☐ Some of the time

Service ID _____

Q9. On a usual day, do staff provide verbal prompts to encourage and extend children's activity during child initiated free physically active play? An example would be saying things like 'run hard', 'good throw', or 'can you do it again'?

Definition: Staff member verbally prompting children to increase or initiate physically active play

E.g. "run faster", "good throw", "show me how you can do that again", "how high can you jump", "can you hop on one foot", "show me how you walk along the balance beam", "show me how you fly like a bird"

☐ Yes



☐ No

Go to
Q10



Q9a. How many primary staff would usually provide verbal prompts?

- ☐ All staff
- ☐ Most staff
- ☐ Some staff

Q9b. How often would staff usually provide verbal prompts?

- ☐ All of the time
- ☐ Most of the time
- ☐ Some of the time

The next few questions are about the play environment at your centre for 3-5 year old children.

Q10. Which best describes your usual indoor play area? (choose one answer only)

- ☐ Quiet play only - no room for movement
- ☐ Space for limited movement or some active play
- ☐ Space easily expanded by equipment & furniture
- ☐ Space for all activities with a big open room

These questions refer to aspects of the playground environment for 3-5 year old children located outdoors.

Q11. Which best describes your outdoor play area?

- ☐ Large space for running and physically active play
- ☐ Large space but equipment limits individual running
- ☐ Obstructed areas limiting physically active play

Service ID _____

Q12. Specifically, does your outdoor playground environment have any of the following? (tick all that apply)

- ☐ Grass & vegetation
- ☐ Trees
- ☐ Dirt gardens
- ☐ Artificial turf
- ☐ Manufactured soft fall
- ☐ Playground markings
- ☐ Flat surface
- ☐ Surface height differences between play areas
- ☐ Fixed playground equipment
- ☐ None of the above

Q13. On a usual day what is the number of staff supervising 3 – 5 year old children (or the preschool room) during their outdoor play?

Number of staff _____

The next few questions are about activities where children are sitting still or sedentary this does not include meal or nap times.

Q14. On a usual day, between the hours of 9am and 3pm, how much time do children usually spend in a form of teacher initiated and led group or circle time where the majority of children are sitting still?

This includes times where a teacher gathers all children onto a rug or other designated area for seated learning activities.

For example story time, group learning, school readiness activities, singing a song on the floor

Hours/minutes _____

Service ID _____

Q15. Between the hours of 9am-3pm, how many occasions do children usually spend in a form of teacher initiated and led group or circle time where the majority of children are sitting still?

No. of Occasions _____

Q16. Does your service have any of the following equipment for 3-5 year old children:
(tick all that apply)

- ☐ Television
- ☐ DVD or video player
- ☐ Computer
- ☐ Video game console (Play Station, Wii or Xbox)
- ☐ None of the above

Q16a Between the hours of 9am-3pm, how much of your usual daily operating time is available for 3-5 year old children to watch television, videos or DVDs or play computer games where they may sit still?

Hours/Minutes _____

**If they answer is none
of the above, Go to Q17**



Q16b Between the hours of 9am-3pm on a usual day, how often are children aged 3-5 years old allowed to watch television, videos or DVDs or play computer games where they are sitting still?

No of Occasions _____

Service ID _____

Q17. Excluding circle time and TV/Computer/Video game time referred to above.

Between the hours of 9am-3pm how much time do children usually spend engaging child initiated activities where the majority of children are sitting still?

This includes times where a teacher has put out activities where children sit at tables and play, for example play dough, drawing or painting.

Or when children sit or lay on their beds and participate in quiet seated activities if they are not sleeping during nap time.

Hours/Minutes _____

Q18. Between the hours of 9am-3pm, how many occasions during a usual day do children usually spend engaging child initiated activities where the majority of children are sitting still

No. of Occasions _____

The next questions are about occasions during the day where the majority of children are sitting still for more than 30 minutes at a time.

This includes both child initiated and teacher led activities (such as circle or group time) and TV time.

Q19. On a usual day, between the hours of 9am and 3pm, and excluding meal and nap times, how many occasions during the day would this occur?

No. of Occasions _____

Service ID _____

The final questions are regarding child injuries at your service. This information is only being asked so that we can assess the safety of the *I Move We Move* program for children.

Q20. Do you keep a record of any child injuries that occur at your service?

☐ Yes



Q20a. What is the number of injuries recorded at your service in:

☐ No

March 2010 _____

Go to
Q21

August 2010 _____



Q21. Can you estimate the number of injuries that occurred in your service in:

March 2010 _____

August 2010 _____

That concludes the survey.



We would like to thank you again for your participation in the study and look forward to sharing the results with you in 2011.

APPENDIX SEVEN:

APPENDIX 7.1: ETHICS APPROVAL – HNEHREC 2006

27 September 2006

Dr J Wiggers
Director
HNE Population Health Wallsend Campus

Dear Dr Wiggers,

Re: HNE Kids Healthy Eating and Physical Activity Program (06107/26/4.04)

Thank you for submitting the above project which was first considered by the Hunter New England Human Research Ethics Committee at its meeting held on 26 July 2006. This Human Research Ethics Committee is constituted and operates in accordance with the National Health and Medical Research Council's *National Statement on Ethical Conduct in Research Involving Humans* and the *CPMP/ICH Note for Guidance on Good Clinical Practice*.

As part of the procedure for ethical approval of research involving humans in Hunter New England Health the above protocol was reviewed by the Rural Research Methods Support Group, an advisory Committee of the Hunter New England Human Research Ethics Committee.

I am pleased to advise that following receipt of the requested clarifications and changes to the recruitment documentation by the Professional Officer, the Hunter New England Human Research Ethics Committee has granted ethical approval of the above project.

The following documentation has been reviewed and approved by the Hunter New England Human Research Ethics Committee:

- The Hunter New England School Children Health Survey information letter for Principals and consent form — Years 2,4 and 6: component 2 (attachment 9, version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey information letter for Principals and consent form — Years 8 and 10: component 2 (attachment 10, version 1 dated 7 July 2006);
- The Hunter New England Childcare Health Survey information letter for Directors and consent form (attachment 11, version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey information letter for Liaison Teacher (attachment 12 version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey information letter for Liaison Carer (attachment 13 version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey information for Canteen Managers (attachment 14 version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey School Canteen Reminder letter (attachment 15 version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey invitation letter for Principals (attachment 16 version 1 dated 7 July 2006);
- The Hunter New England Childcare Health Survey invitation letter for Directors (attachment 17, version 1 dated 7 July 2006);

Hunter New England Human Research Ethics Committee

(Locked Bag No 1)
(New Lambton NSW 2305)
Telephone (02) 48214 950 Facsimile (02) 48214 818
Email: Nicole.aerrandehnehealth.nsw.aov.au
Michelle.I.aneehnghe.alth.nsw.gov.au
<http://intra.net.hne.health.nsw.gov.au/ethics/researchethics.html>
<http://www.hnehealth.nsw.gov.au/ethics/researchethics.html>

- The Hunter New England School Children Health Survey information sheet for Children Year 4 (attachment 18, version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey information sheet for Children Year 6 (attachment 19, version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey information sheet for Children Year 8 and 10 (attachment 20, version 1 dated 7 July 2006);
- The Hunter New England Childcare Health Survey information sheet and consent form for Parents/Guardians of children in childcare (attachment 21, version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey information sheet and consent form for Kinder, Year 2 and 4 Parents/Guardians (attachment 22 version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey information sheet and consent form for Year 6, 8 and 10 Parents/Guardians (attachment 23 version 1 dated 7 July 2006);
- The Hunter New England Childcare Health Survey reminder letter for Parents/Guardians of children in childcare (attachment 24, version 1 dated 7 July 2006);
- The Hunter New England School Children Health Survey reminder letter for Parents/Guardians of children in childcare (attachment 25, version 1 dated 7 July 2006);
- The Parents with Children in Childcare Questionnaire (attachment 1);
- Questionnaire for Parents/Guardians of School Children in years K, 2 and 4 (attachment 2);
- Parents with Older Children Questionnaire (attachment 3);
- School Children's Health Survey – Year 6 Student Questionnaire (attachment 4);
- School Children's Health Survey – Year 8 and 10 Student Questionnaire (attachment 5);
- The Childcare CATI script (attachment 6);
- The School CATI script (attachment 7);
- The Hunter New England Region School Canteen Survey (attachment 8);

For the protocol HNE Child Obesity Prevention Program: Child and Parent Surveys

Approval from the Hunter Area Research Ethics Committee for the above protocol is given for a maximum of 5 years from the date of this letter, after which a renewal application will be required if the protocol has not been completed.

The *National Statement on Ethical Conduct in Research Involving Humans*, (1999), which the Committee is obliged to adhere to, include the requirement that the committee monitors the research protocols it has approved. In order for the Committee to fulfil this function, it requires:

- a report of the progress of the above protocol be submitted at 12 monthly intervals. Your review date is **September 2007**. A proforma for the annual report will be sent two weeks prior to the due date.
- A final report be submitted at the completion of the above protocol, that is after data analysis has been completed and a final report compiled. A proforma for the final report will be sent two weeks prior to the due date.

Hunter New England Human Research Ethics Committee

(Locked Bag No 1)
(New Lambton NSW 2305)
Telephone (02) 49214 950 Facsimile (02) 49214 818
Email: Nicole.gerrand@hnehealth.nsw.gov.au
Michelle.lane@hnehealth.nsw.gov.au
<http://intra.net.hne.health.nsw.gov.au/ethics/researchethics.htm>
<http://www.hnehealth.nsw.gov.au/ethics/researchethics.html>

- All variations or amendments to this protocol, including amendments to the Information Sheet and Consent Form, must be forwarded to and approved by the Hunter New England Human Research Ethics Committee prior to their implementation.
- The Principal Investigator will immediately report anything which might warrant review of ethical approval of the project in the specified format, including:
 - any serious or unexpected adverse events
 - Adverse events, however minor, must be recorded as observed by the Investigator or as volunteered by a participant in this protocol. Full details will be documented, whether or not the Investigator or his deputies considers the event to be related to the trial substance or procedure.
 - Serious adverse events that occur during the study or within six months of completion of the trial at your site should be reported to the Professional Officer of the Hunter New England Human Research Ethics Committee as soon as possible and at the latest within 72 hours.
 - Copies of serious adverse event reports from other sites should be sent to the Hunter New England Human Research Ethics Committee for review as soon as possible after being received.
 - Serious adverse events are defined as:
 - Causing death, life threatening or serious disability.
 - Cause or prolong hospitalisation.
 - Overdoses, cancers, congenital abnormalities whether judged to be caused by the investigational agent or new procedure or not.
 - unforeseen events that might affect continued ethical acceptability of the project.
- If for some reason the above protocol does not commence (for example it does not receive funding); is suspended or discontinued, please inform Dr Nicole Gerrand, the Professional Officer of the Hunter New England Human Research Ethics Committee as soon as possible.

The Hunter New England Human Research Ethics Committee also has delegated authority to approve the commencement of this research on behalf of the Hunter New England Area Health Service. This research may therefore commence.

Should you have any queries about your project please contact Dr Nicole Gerrand as per her contact details at the top of the previous page. The Hunter New England Human Research Ethics Committee Terms of Reference, Standard Operating Procedures, membership and standard forms are available from the Hunter New England Area Health Service website:

Intranet address is: <http://intranet.hne.health.nsw.gov.au/ethics/researchethics.htm>

Internet address is: <http://www.hnehealth.nsw.gov.au/ethics/researchethics.html>

Hunter New England Human Research Ethics Committee

(Locked Bag No 1)
(New Lambton NSW 2305)
Telephone (02) 49214 950 Facsimile (02) 49214 818
Email: Nicole.gerrand@hnehealth.nsw.gov.au
Michelle.lane@hnehealth.nsw.gov.au
<http://intranet.hne.health.nsw.gov.au/ethics/researchethics.html>
<http://www.hnehealth.nsw.gov.au/ethics/researchethics.html>

Please quote 06107/26/4.04 in all correspondence.

The Hunter New England Human Research Ethics Committee wishes you every success in your research.

Yours faithfully

For  Dr M Parsons
Chair
Hunter New England Human Research Ethics Committee

Hunter New England Human Research Ethics Committee

(Locked Bag No 1)
(New Lambton NSW 2305)
Telephone (02) 49214 950 Facsimile (02) 49214 818
Email: Nicole.gerrand@hnehealth.nsw.gov.au
Michellie.lane@hnehealth.nsw.gov.au
<http://internet.hnehealth.nsw.gov.au/ethics/researchethics.html>
<http://www.hnehealth.nsw.gov.au/ethics/researchethics.html>

APPENDIX 7.2: SERVICE INVITATION AND RECRUITMENT LETTER – BASELINE

Hunter New England Population Health**Direct Contact Details**

Phone: (02) 49855188 Fax: (02) 4924 6048
Email: PHEnquiries@hnehealth.nsw.gov.au

20 March 2009

The Authorised Supervisor
Wangi Peter Pan Kindergarten
12 Dobell Drive
WANGI WANGI NSW 2267

Dear Authorised Supervisor

**HUNTER NEW ENGLAND CHILDCARE HEALTH SURVEY
INFORMATION FOR AUTHORISED SUPERVISORS**

You are invited to take part in the Hunter New England Childcare Health Survey which is being conducted by Dr John Wiggers from Hunter New England Population Health. Hunter New England Health with the support from stakeholders has been successful in gaining funding to implement a program to improve the health of children in the Hunter New England Area. The program will run for five years between 2006 and 2010. The purpose of the project is to promote physical activity and healthy eating in children.

Children's services have an important role to play in promoting the health of children. We have consulted with the Department of Community Services within the region to identify what opportunities exist for children's services to be involved in the program.

We understand that children's services already have a number of systems and practices in place that are conducive to children developing healthy lifestyles. However, we would like to identify if there are more ways in which we can enhance the capacity of children's services (Long Day Care and Preschool) to encourage children's consumption of healthy foods and drinks and participation in physical activity.

We will be contacting you via telephone in two weeks time to ask you to complete a telephone survey to identify your current policies and practices related to child healthy eating and physical activity. Your number will be obtained from the Department of Community Services. If you would like to participate in this component of the study, please indicate this to staff from Hunter New England Population Health when they contact you.

The telephone survey will include brief questions to collect information about your service's current; policies, facilities and equipment, physical activity learning experiences, programming, staff training, knowledge and attitudes, and communication with parents. The telephone survey should take approximately 25 minutes to complete.

Hunter New England Area Health Service
Hunter New England Population Health
ABN 24 500 842 605

Locked Bag 10
Wallsend NSW 2287
Phone (02) 4924 6477 Fax (02) 4924 6490
Email PHEnquiries@hnehealth.nsw.gov.au
www.hnehealth.nsw.gov.au

The information collected will enable us to identify and provide you with some support and resources to assist your service to promote healthy eating and physical activity to children. The support may include teaching resources, example programs and policy documents, and a contact person for children's services to obtain further information or advice.

Any information provided by Authorised Supervisors of children's services will be treated as strictly confidential. Only the research team will have access to the completed surveys. The survey information will be stored in a secure facility and kept in the strictest confidence, as required by law. All information transferred electronically will be done in a file which is password protected. It will not be possible to identify individuals from any publication arising from the research.

Your participation in this process is voluntary. Whether or not you decide to participate, your decision will not disadvantage you or your service in anyway. If you do participate, you may withdraw from the research at any time without giving a reason and you will have the option of withdrawing any information you have provided.

A summary report of the results of the Hunter New England Childcare Health Survey will be provided to your service. The report will not identify any individuals or children's services. Results of the study may also be presented at scientific conferences and be published within scientific journals. No other children's service will be able to find out the results of your service and no individuals will be able to be identified in any report or publication by the program.

If there is anything that you do not understand, or you would like further information, please contact Rebecca Hodder on (02) 4924 6373.

Thank you for considering this invitation.

Yours sincerely

Dr John Wiggers
Director
Hunter New England Population Health

This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference: 06/07/26/4.04

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrand, Professional Officer (Research Ethics), Hunter New England Human Research Ethics Committee, Hunter New England Health, Locked Bag 1, New Lambton NSW 2305, telephone (02) 4921 4950, email Nicole.Gerrand@hnehealth.nsw.gov.au

Hunter New England Population Health**Direct Contact Details**

Phone: (02) 4924 6477 Fax: (02) 4924 6490
Email: PHEnquiries@hnehealth.nsw.gov.au

20 April 2009

The Authorised Supervisor
The Alphabet Academy
34 Kuringai Chase
MT COLAH NSW 2079

Dear Authorised Supervisor

**CHILDREN'S SERVICES HEALTH SURVEY
INFORMATION FOR AUTHORISED SUPERVISORS**

In 2006, your service participated in the research project identified above which is being conducted by Dr John Wiggers from Hunter New England Population Health. The purpose of the project is to identify opportunities for Children's Services to promote physical activity and healthy eating in children. The purpose of this correspondence is to thank you for participating in the original survey, and to invite you to participate in an additional survey.

We understand that Children's Services already have a number of systems and practices in place that are conducive to children developing healthy lifestyles. However, we would like to identify if there are more ways in which we can enhance Children's Services' capacity to encourage children to consume healthy foods and drinks, and participate in physical activity.

We will be contacting you via telephone in two weeks time to invite you to participate in a similar survey to the one you participated in previously. The purpose of this additional survey is to identify the current policies and practices in the early childhood care and education sector relating to healthy eating and physical activity. Your number was previously obtained from the Department of Community Services. If you would like to participate, please indicate this to staff from Hunter New England Population Health when they contact you.

The telephone survey will include brief questions to collect information about your service's current policies, facilities and equipment, physical activity learning experiences, programming, staff training, knowledge and attitudes, and communication with parents. The telephone survey should take approximately 35 minutes to complete.

Any information provided by Authorised Supervisors will be treated as strictly confidential. Only the research team will have access to the completed surveys. The questionnaires will be stored in a secure facility and kept in the strictest confidence, as required by law. All information transferred electronically will be done in a file which is password protected. It will not be possible to identify individuals from any publication arising from the research.

Your participation in this research is voluntary. Whether or not you decide to participate, your decision will not disadvantage you or your service in anyway. If you do participate, you may withdraw from the research at any time without giving a reason and you will have the option of withdrawing any information you have provided.

A summary report of the results of the survey will be provided to your service. The report will not identify any individuals or Children's Services. Results of the study may also be presented at

Hunter New England Area Health Service
Hunter New England Population Health
ABN 24 500 842 605

Locked Bag 10
Wallsend NSW 2287
Phone (02) 4924 6477 Fax (02) 4924 6490
Email PHEnquiries@hnehealth.nsw.gov.au

scientific conferences and be published within scientific journals. No other childcare centre will be able to find out the results of your centre and no individuals will be able to be identified in any report or publication by the program. Your childcare centre will be invited to participate in the telephone survey again in 2010.

If there is anything that you do not understand, or you would like more information, please contact Dr Luke Wolfenden on (02) 4985 5168.

Yours sincerely

Dr John Wiggers
Director
Hunter New England Population
Health

This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference: 06/07/26/4.04

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrand, Professional Officer (Research Ethics), Hunter New England Human Research Ethics Committee, Hunter New England Health, Locked Bag 1, New Lambton NSW 2305, telephone (02) 4921 4950, email Nicole.Gerrand@hnehealth.nsw.gov.au

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AREA qt .

Hello, my name is ^_INTVR^ and I am calling from
Hunter New England Area Health Service (HNEAHS).

The **Authorized Supervisor (AS)** of your service was recently sent a letter regarding a children's services health survey. We are calling to speak with the **AS** regarding this and they should be expecting our call.

- Is now a convenient time to speak with them?
- 1 Speaking to that person
- 2 Person called to phone
- 3 Person not avail (record on log sheet)

4 Time not suitable (record on log sheet)
 5 Other (record on log sheet)
 .R Refused

AS available

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INTRO1=5

OK, thank you for your time.

[Do not ask, but record reason if given]

Other reason

***** OPEN ENDED ENTRY ITEM

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To whom am I speaking?

(INTERVIEWER: Record name on logsheet if different)

The letter advised that we would be contacting you soon regarding
 a health survey that concerns opportunitites for childrens services to
 promote physical activity and healthy eating to children.

***** INFORMATION SCREEN ITEM

INFO 1 INTRO2a 8

NOLAB

MODULE SUBMODUL

Introl=1 and AREA=1

To whom am I speaking?

(INTERVIEWER: Record name on logsheet if different)

The letter advised that we would be contacting you soon regarding
 a health survey that concerns opportunitites for childrens services to
 promote physical activity and healthy eating to children.

This survey will help with the evaluation of the **GOOD FOR KIDS**

PROGRAM.

***** INFORMATION SCREEN ITEM

INFO 1 INTRO3 10

NOLAB

MODULE SUBMODUL

INTRO1=2 and AREA=0

Hello my name is ^_INTVR_^ and I'm from

Hunter New England Area Health Service (HNEAHS).

To whom am I speaking?

(INTERVIEWER: Record name on logsheet if different)

We recently sent you a letter advising you that we would be contacting you soon regarding a childrens services health survey that concerns opportunities for childcare centres to promote **Physical Activity (PA)** and **Healthy Eating (HE)** to children.

***** INFORMATION SCREEN ITEM

INFO 1 INTRO3a 10

NOLAB

MODULE SUBMODUL

INTRO1=2 and AREA=1

Hello my name is ^_INTVR_^ and I'm from Hunter New England Area

Health Service (HNEAHS). To whom am I speaking?

(INTERVIEWER: Record name on logsheet if different)

We recently sent you a letter advising that we would be contacting you soon regarding a childcare health survey that concerns opportunities for childcare centres to promote physical activity and healthy eating to children. This survey will help with the evaluation of the **Good For Kids Program**.

***** INFORMATION SCREEN ITEM

CHCE 1 3 INTRO4 1 _MAKE_

NOLAB

MODULE SUBMODUL

INTRO1 in (3 4)

Could you suggest a more convenient time for me to call back?

1 Yes [Record in Log Sheet]

2 No

.R Refused

***** SINGLE CHOICE - CATI VERSION

INFO 1 INFO1 1

NOLAB

MODULE SUBMODUL

INTRO4 in (1 2 .R)

OK, thanks for your time.

***** INFORMATION SCREEN ITEM

CHCE 1 3 INTRO5 3 _MAKE_

LABEL

MODULE SUBMODUL

INTRO2a=1 or INTRO2=1 or INTRO3=1 or INTRO3a=1

The call will take about approximately 30 minutes.

Is now a good time for you or would you like me to call back later?

- 1 Yes/Appropriate
- 2 No/Call back later
- .R Refused

Appropriate time

***** SINGLE CHOICE - CATI VERSION *****

INFO 1 INTRO6 4

NOLAB

MODULE SUBMODUL

INTRO5=2

Could you suggest another time that we can call you back?

[Make arrangements for a call back and record on Log Sheet]

Thank you very much for your time. Goodbye.

***** INFORMATION SCREEN ITEM *****

INFO 1 INTRO7 1

NOLAB

MODULE SUBMODUL

INTRO5=.R

Thank you very much for your time. Goodbye.

***** INFORMATION SCREEN ITEM *****

INFO 1 INFO2 4

NOLAB

MODULE SUBMODUL

AREA=1 and INTRO5=1

Your service may have received information or attended nutrition

and/or

physical activity training provided by ***Good for Kids. Good for Life.***

We understand that children's services have a number of systems and

practices in place which encourage children to develop healthy

lifestyles.

***** INFORMATION SCREEN ITEM *****

INFO 1 INFO3 7

NOLAB

MODULE SUBMODUL

AREA=1 and INFO2=1

In order to provide children's services with the most appropriate support we need to ask you some questions about your services' current policies, practices, equipment, learning experiences, staff training, knowledge and attitudes, and communication with parents around physical

activity and healthy eating. We will also be asking questions to gain your feedback about whether the Good for Kids program has been beneficial or relevant for your service.

***** INFORMATION SCREEN ITEM *****

INFO 1 INFO4 6

NOLAB

MODULE SUBMODUL

AREA=0 and INTRO5=1

We would like to identify if there are more ways in which we can

enhance **CS** capacity to promote **PA**

to children. We will ask you some questions about your services

current policies, practices, equipment, learning experiences, staff training, knowledge and attitudes, and communication with parents around physical activity.

***** INFORMATION SCREEN ITEM

INFO 1 INFO5 8

NOLAB

MODULE SUBMODUL

AREA=0 and INFO4=1

These questions are not intended as an audit, but as a way for us

to tailor programs towards the needs of **CS**. Data will remain

confidential. If you would like to check the legitimacy of this

call you can contact the **HNEAHS** - Population Health on 02 4924 6166.

This will connect you with a recorded message that lists all projects

currently being conducted by us. We will send you a report about the survey that includes a summary of results from all services that participated in the survey.

***** INFORMATION SCREEN ITEM

NULL 1 NULL1 1

NOLAB

MODULE SUBMODUL

INFO3=1 or INFO5=1

Introduction to call/survey

***** INFORMATION SCREEN ITEM

MULT 1 3 GROUP 2 3

MLTLB

MODULE SUBMODUL

INFO6=1

Which of the following age groups does your centre care for?

[Note to interviewer- Read out each response option]

1 0 to 2 years

2 2 to 3 years

3 3 to 5 years

Age groups at centre

0 to 2 years

2 to 3 years

3 to 5 years

*****MULTIPLE CHOICE - CATI

VERSION*****

TABL 1 20 CSD2 5 time24 hhmm5.0

LABEL

MODULE SUBMOD 4

GROUP gt '000'

What are your hours of operation? (Opening time to closing time).

INTERVIEWERS: USE 24 HOUR TIME

1pm is 13:00	3pm is 15:00	5pm is 17:00
2pm is 14:00	4pm is 16:00	6pm is 18:00]
RANGE	64800	
opening time		18000
43200		
closing time		45000
72000		

click here -->

Don't know B 1

Opening hours

*****TABLE ENTRY ITEM - NO BUTTONS

INFO 1 CSD3 6

NOLAB

MODULE SUBMODUL

CSD2 gt .

So, this means you are open for ^CSD2^ hours (and min) a day.

[Note: INTERVIEWERS if wrong, go back to table to change opening and closing times - still click at the 'click here -->' place to get changes entered. Use hours 'Conversion table' (Can Refer to Training Manual)]

***** INFORMATION SCREEN ITEM

NUM 1 CSD5 3 MM QINFORM QFORMAT

LABEL

MODULE SUBMODUL

CSD3=1

How many days a week are you open?

[Note: INTERVIEWERS, If don't know then enter 99]

0 7

0 99

How many days a week open

***** NUMERIC OR DATE ENTRY - CATI VERSION

NUM 1 CSD6 3 MM QINFORM QFORMAT

LABEL

MODULE SUBMODUL

CSD5 gt .

Overall, how many children are enrolled at your service?

[Note: INTERVIEWERS, If don't know then enter 999]

0 400

0 999

Number of children enrolled

***** NUMERIC OR DATE ENTRY - CATI VERSION

INFO 1 INFO7 4

NOLAB

MODULE SUBMODUL

CSD6 gt . and AREA=1

The **G4Ks** program is committed to providing a culturally appropriate service for all children, considering individual

differences and making provision for children of Aboriginal and Torres Strait Islander background.

***** INFORMATION SCREEN ITEM

INFO 1 INFO8 2

NOLAB

MODULE SUBMODUL

INFO7=1 or (CSD6 gt . and AREA=0)

The next two questions are about whether any children at your service are of Aboriginal or Torres Strait Islander origin.

***** INFORMATION SCREEN ITEM

CHCE 1 4 CSD7 2 _MAKE_

LABEL

MODULE SUBMODUL

INFO8=1

Are you aware of any children of Aboriginal or Torres Strait Islander origin enrolled at your service?

1 Yes

2 No

3 Don't know

.R Refused

Any Aboriginal or Torres Strait children

***** SINGLE CHOICE - CATI VERSION

NUM 1 CSD8 4 MM QINFORM QFORMAT

LABEL

MODULE SUBMODUL

CSD7=1

How many children of Aboriginal or Torres Strait Islander origin are enrolled at your service?

[Note: INTERVIEWERS, If don't know then enter 999]

0 200

0 999

How many Aboriginal or Torres Strait children

***** NUMERIC OR DATE ENTRY - CATI VERSION

NUM 1 SEPA1 4 MM QINFORM QFORMAT

LABEL

MODULE SUBMODUL

CSD8 gt . or CSD7 in (2 3 .R)

On a usual day, say today, how many primary contact staff are working at your centre?

[Note: INTERVIEWERS, If don't know then enter 999]

0 50

0 999

How many Aboriginal or Torres Strait children

***** NUMERIC OR DATE ENTRY - CATI VERSION

INFO 1 INFO9 4

NOLAB

MODULE SUBMODUL

SEPA1 gt .

Next I would like to ask you some questions on your service's policies about **PA**.

Please refer to Definition of Terms.

***** INFORMATION SCREEN ITEM

CHCE 1 3 PPA1 1 _MAKE_

LABEL

MODULE SUBMODUL

INFO9=1

Does your service have a written policy on **PA**?

1 Yes

2 No

3 Don't know

PA Policy

***** SINGLE CHOICE - CATI VERSION

MULT 1 11 PPA2 7

10

MLTLB

MODULE SUBMODUL

PPA1=1

I'm now going to ask you about the specific content of your

PA policy.

Does your policy specifically refer to each of the following?

[Note: INTERVIEWERS, Please read out and get an answer

to each item in the list]

1 Meet children's **PA** requirements

2 Development of **FMS**

3 Limits on **SSR** & TV

4 Limits on time children spend being sedentary

5 Staff training in **PA**

6 Communicating messages to families about **PA**

7 **PA** curriculum teaching & activities

8 Evaluating **PA** strategies

9 Physical activity promoting environments

10 Integrating PA learning experiences across KLA's

-11 Don't know

Specific content of **PA** policy

Meet children's **PA** requirements

Development of **FMS**

Limits on **SSR** & TV

Limits on time children spend being sedentary

Staff training in **PA**

Communicating messages to families about **PA**

PA curriculum teaching & activities

Evaluating **PA** strategies

Physical activity promoting environments

Integrating PA learning experiences across KLA's

Don't know

*****MULTIPLE CHOICE - CATI

VERSION*****

CHCE 1 4 PPA2a 1 _MAKE_

LABEL

MODULE SUBMODUL

PPA1 in (2,3)

Is physical activity included within any other policies at your service?

1 Yes

2 No

3 Don't know

.R Refused

PA in any other policy

***** SINGLE CHOICE - CATI VERSION

MULT 1 11 PPA2b 4 10

MLTLB

MODULE SUBMODUL

PPA2a=1

I'm now going to ask you about the specific content of the physical activity items in this policy.

Does the policy refer to each of the following?

[Note to interviewer: Please read out and get an answer to each item]

1 Meet children's **PA** requirements

2 Development of **FMS**

3 Limits on **SSR** & TV

4 Limits on time children spend being sedentary

5 Staff training in **PA**

6 Communicating messages to families about **PA**

7 **PA** curriculum teaching & activities

8 Evaluating **PA** strategies

9 Physical activity promoting environments

10 **Integrating** PA learning experiences across KLA and program areas

-11 Don't know

Specific content of **PA** policy

Meet children's **PA** requirements

Development of **FMS**

Limits on **SSR** & TV

Limits on time children spend being sedentary

Staff training in **PA**

Communicating messages to families about **PA**

PA curriculum teaching & activities

Evaluating **PA** strategies

Physical activity promoting environments

Integrating PA learning experiences across KLA and program areas

Don't know

*****MULTIPLE CHOICE - CATI

VERSION*****

INFO 2 INFO11 2

NOLAB

MODULE SUBMODUL

Substr(PPA2,1,11) gt '00000000000' or

Substr(PPA2b,1,11) gt '00000000000' or PPA2a in (2,3,.R)

Next I would like to ask you some questions about any professional development relating to **PA** attended by your staff.

***** INFORMATION SCREEN ITEM

CHCE 1 3 ETPA1 3 _MAKE_

LABEL

MODULE SUBMODUL

INFO11=1

In the last 12 months have any staff at your service participated

in professional development or specific training relating to

PA provided by an agency external to your service?

```

1      Yes
2      No
3      Don't know
Staff trained in PA (past 12mths)
***** SINGLE CHOICE - CATI VERSION
*****
NUM    1      ETPA2    3      MM QINFORM      QFORMAT
LABEL
MODULE  SUBMODUL
ETPA1=1

```

How many staff attended training?

[Note: INTERVIEWERS, If don't know then enter 99]

```

1      90
0      100

```

Staff attended the training

```

***** NUMERIC OR DATE ENTRY - CATI VERSION
*****
CHCE   1 2      ETPA4    3      _MAKE_
LABEL
MODULE  SUBMODUL
ETPA2 gt . and AREA=0

```

Have any of your staff attended a training session on the Munch
and Move Program? This is a program focusing on **HE**, **PA** and **FMS**
development.

```

1      Yes
2      No
Staff attended Munch & Move training
***** SINGLE CHOICE - CATI VERSION
*****
NULL   1      NULL2    1
NOLAB
MODULE  SUBMODUL
ETPA4 gt . OR (ETPA2 gt . and AREA=1) or ETPA1 in (2,3)

```

```

Staff PA external training
*****NULL ITEM - DOES
NOTHING*****
CHCE   1 3      PAIT1    2      _MAKE_
LABEL
MODULE  SUBMODUL
NULL2=1

```

In the last 12 months has your service provided any professional
development or specific training related to **PA** for staff?

```

1      Yes
2      No
3      Don't know
Provided PA training for staff

```


***** SINGLE CHOICE - CATI VERSION

NUM 1 PAIT2 3 MM QINFORM QFORMAT
LABEL
MODULE SUBMODUL
PAIT1=1

How many staff members were included?

[Note: INTERVIEWERS, If don't know then enter 99]

1 90
0 100

Staff members attended

***** NUMERIC OR DATE ENTRY - CATI VERSION

INFO 1 INFO12 6

NOLAB

MODULE SUBMODUL

PAIT1 in (2,3) or PAIT2 gt .

We are aware that there is lots of information around about

children's **PA** levels, these questions are just asking you to tell

us **how much time you think** (in your opinion) young children should

spend in **PA** and **SSR** across the whole day.

Please refer to Definition of Terms.

***** INFORMATION SCREEN ITEM

NUM 1 PAS1 6 MM QINFORM QFORMAT

LABEL

MODULE SUBMODUL

INFO12=1

What do you think is the **MINIMUM** time that toddlers and preschoolers

(aged 1-5 yrs), should be physically active PER DAY? This means

accumulated time over the day rather than time spent in each session.

INTERVIEWERS: ENTER IN MINUTES (refer to conversion sheet)

If don't know enter 999

0 240 (reasonable limits)

0 999 (absolute limits)

Min time 1-5yrs **PA** recommendation/day

***** NUMERIC OR DATE ENTRY - CATI VERSION

NUM 1 PAS2 6 MM QINFORM QFORMAT

LABEL

MODULE SUBMODUL

PAS1 gt .

What do you think is the **MAXIMUM** amount of time children aged

between 2 and 5 yrs should spend sitting and watching television
and other electronic media PER DAY?

INTERVIEWERS: ENTER IN MINUTES (refer to conversion sheet)
If don't know enter 999

0 240 (reasonable limits)
0 999 (absolute limits)

Max time 2-5yrs spend in **SSR/day**

***** NUMERIC OR DATE ENTRY - CATI VERSION

NUM 1 PAS3 6 MM QINFORM QFORMAT
LABEL

MODULE SUBMODUL

PAS2 gt .

What do you think is the **MAXIMUM** amount of time children younger

than 2 yrs of age should spend sitting and watching television

and other electronic media PER DAY?

INTERVIEWERS: ENTER IN MINUTES (refer to conversion sheet)
If don't know enter 999

0 240 (reasonable limits)
0 999 (absolute limits)

Max time 1e 2 yrs spend in **SSR/day**

***** NUMERIC OR DATE ENTRY - CATI VERSION

INFO 1 INFO13 4
NOLAB

MODULE SUBMODUL

PAS3 gt .

The next question is about **Sedentary Behaviours (SB)**/activities
in general

Please refer to Definition of Terms.

***** INFORMATION SCREEN ITEM

NUM 1 PAS4 6 MM QINFORM QFORMAT
LABEL

MODULE SUBMODUL

INFO13=1

What do you think is the **MAXIMUM** amount of time children aged
between 2 and 5 yrs should be sedentary or kept inactive for
any one period of time, with the exception of sleeping?

INTERVIEWERS: ENTER IN MINUTES (refer to conversion sheet)
If don't know enter 999

0 240 (reasonable limits)
0 999 (absolute limits)

Max time 2-5yrs spend sedentary/day

***** NUMERIC OR DATE ENTRY - CATI VERSION

INFO 1 INFO16 7
NOLAB
MODULE SUBMODUL
PAS4 gt .

These questions are asking about primary contact staff practices related to **FMS** development and physically **AP** for young children in **CS**. For each practice we will ask whether your staff implement it as well as how many staff and how often.

Please answer the following questions about your service in relation to children aged 3-5 years only.

***** INFORMATION SCREEN ITEM

CHCE 1 3 SPA1 4 _MAKE_
LABEL
MODULE SUBMODUL
INFO16=1

On a usual day do primary contact staff join in and participate with children during child initiated free **AP**?

Please refer to Definition of Terms.

- 1 Yes
- 2 No
- 3 Don't know

Staff participate in **AP**

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 SPA2 4 _MAKE_
LABEL
MODULE SUBMODUL
SPA1=1

How many primary contact staff implement this practice?
(join in and participate in physically **AP** on usual day)

[Note: INTERVIEWERS, Prompted]

- 1 All staff
- 2 Most staff

3 Some staff

How many Staff join in **AP**

***** SINGLE CHOICE - CATI VERSION

CHCE 1 4 SPA3 4 _MAKE_

LABEL

MODULE SUBMODUL

SPA2 gt .

How often do primary contact staff usually implement this practice?

(join in and participate in physically **AP** on usual day)

[Note: INTERVIEWERS, Prompted]

1 All of the time

2 Most of the time

3 Some of the time

4 Other

Frequency of Staff join in AP

***** SINGLE CHOICE - CATI VERSION

OPEN 1 200 SPA4 3

LABEL

MODULE SUBMODUL

SPA3=4

Please specify Other?

[Note: INTERVIEWERS, Record the other frequency staff join in **AP**]

Other

***** OPEN ENDED ENTRY ITEM

CHCE 1 2 SPA5 4 _MAKE_

LABEL

MODULE SUBMODUL

SPA4 gt ' ' or SPA3 in (1 2 3) or SPA1 in (2,3)

On a usual day do primary contact staff provide verbal prompts to

encourage or extend children's activity during child initiated

free **AP** by saying things like 'run hard', 'good throw', or

'can you do it again'?

1 Yes

2 No

Staff provide verbal prompts

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 SPA6 4 _MAKE_

LABEL

MODULE SUBMODUL

SPA5=1

How many primary contact staff implement this practice?

(provide verbal prompts on a usual day)

[Note: INTERVIEWERS, Prompted]

1 All staff

2 Most staff

3 Some staff

How many staff provide verbal prompts

***** SINGLE CHOICE - CATI VERSION

CHCE 1 4 SPA7 4 _MAKE_

LABEL

MODULE SUBMODUL

SPA6 gt .

How often do primary contact staff implement this practice?

(provide verbal prompts on a usual day)

[Note: INTERVIEWERS, Prompted]

1 All of the time

2 Most of the time

3 Some of the time

4 Other

Frequency of verbal prompts

***** SINGLE CHOICE - CATI VERSION

OPEN 1 200 SPA8 3

LABEL

MODULE SUBMODUL

SPA7=4

Please specify Other?

[Note: INTERVIEWERS, Record the other frequency of verbal prompts]

Other

***** OPEN ENDED ENTRY ITEM

CHCE 1 3 SPA9 4 _MAKE_

LABEL

MODULE SUBMODUL

SPA8 gt ' ' or SPA7 in (1 2 3) or SPA5=2

This question is about learning experiences related to **PA** such as

Teaching activities about how **PA** helps children to be healthy.

In the past 12 months did primary contact staff conduct such learning experiences?

1 Yes

2 No

3 Don't know

Educate children about PA benefits

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 SPA10 4 _MAKE_

LABEL

MODULE SUBMODUL

SPA9=1

How many primary contact staff implemented this practice?

(conducted learning experiences in past 12 mth)

[Note: INTERVIEWERS, Prompted]

1 All staff

2 Most staff

3 Some staff

Educate children how PA helps with play

***** SINGLE CHOICE - CATI VERSION

CHCE 1 7 SPA11 2 _MAKE_

LABEL

MODULE SUBMODUL

SPA10 gt .

How often did primary contact staff implement this practice?

(conducted learning experiences in past 12 mths)

1 Daily

2 4 times per week

- 3 3 times per week
- 4 2 times per week
- 5 Once per week
- 6 Less than once per week
- 7 Don't know

PA makes them healthy

***** SINGLE CHOICE - CATI VERSION

CHCE 1 2 SPA13 6 _MAKE_

LABEL

MODULE SUBMODUL

SPA11 gt . or spa9 in (2,3)

This question is about encouraging **PA** through dramatic play
for example including props and resources that encourage **AP**.

Do staff arrange these kind of activities?

Please refer to Training Manual, page 9, for Examples

1 Yes

2 No

Staff arrange **PA** via **AP**

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 SPA14 4 _MAKE_

LABEL

MODULE SUBMODUL

SPA13=1

How many staff implement this practice?

(physically active dramatic play)

[Note: INTERVIEWERS, Prompted]

1 All staff

2 Most staff

3 Some staff

How many staff arrange PA via AP

***** SINGLE CHOICE - CATI VERSION

CHCE 1 7 SPA15 2 _MAKE_
 LABEL
 MODULE SUBMODUL
 SPA14 gt .

How often do staff implement this practice?

(physically active dramatic play)

- 1 Daily
- 2 4 times per week
- 3 3 times per week
- 4 2 times per week
- 5 Once per week
- 6 Less than once per week
- 7 Don't know

How often do staff arrange PA via AP

***** SINGLE CHOICE - CATI VERSION

CHCE 1 2 SPA16 5 _MAKE_
 LABEL
 MODULE SUBMODUL
 SPA15 gt . or SPA13=2

This question is about encouraging physical activity during transition activities e.g. asking children to mimic animal movements when moving on to another activity.

On a usual day do staff arrange such activities?

- 1 Yes
 - 2 No
- Encouraging PA during transitions

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 SPA17 4 _MAKE_
 LABEL
 MODULE SUBMODUL
 SPA16=1

How many staff implement this practice?

(physically active transition activities on a usual day)

[Note: INTERVIEWERS, Prompted]

- 1 All staff
- 2 Most staff
- 3 Some staff

How many staff implement this practice

***** SINGLE CHOICE - CATI VERSION

CHCE 1 2 SPA19 2 _MAKE_
LABEL
MODULE SUBMODUL
SPA17 gt . or SPA16=2

On a usual day do staff arrange activities where children are
physically active to music?

- 1 Yes
- 2 No

Staff arrange PA to music

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 SPA20 4 _MAKE_
LABEL
MODULE SUBMODUL
SPA19=1

How many staff implement this practice?

(physically active music activities on a usual day)

[Note: INTERVIEWERS, Prompted]

- 1 All staff
- 2 Most staff
- 3 Some staff

How many staff arrange PA to music

***** SINGLE CHOICE - CATI VERSION

```
CHCE 1 7          SPA21  2          _MAKE_
LABEL
MODULE  SUBMODUL
SPA20 gt .
```

How often do staff implement this practice?

(physically active music activities on a usual day)

- 1 Daily
- 2 4 times per week
- 3 3 times per week
- 4 2 times per week
- 5 Once per week
- 6 Less than once per week
- 7 Don't know

How often staff arrange PA to music

***** SINGLE CHOICE - CATI VERSION

```
CHCE 1 2          FMS1  4          _MAKE_
LABEL
MODULE  SUBMODUL
(SPA21 gt . or SPA19=2) and substr(GROUP,2,2) in ('01' '10' '11')
```

Does your service carry out planned, adult guided sessions to
facilitate children's exploration and development of **FMS**?

(Please refer to Definition of Terms)

```
1        Yes
2        No
Planned teacher FMS sessions
***** SINGLE CHOICE - CATI VERSION
*****
CHCE 1 9          FMS2  3          _MAKE_
LABEL
MODULE  SUBMODUL
FMS1=1
```

How often do the FMS sessions occur?

[Note: INTERVIEWERS, Prompted]

- 1 Once per day

2 4 times per week
 3 3 times per week
 4 2 times per week
 5 Once per week
 6 Less than once per week
 7 Sporadically
 8 Don't know
 .R Refused

How often/week do the sessions occur

***** SINGLE CHOICE - CATI VERSION

 NUM 1 FMS3 4 MM time24 HHMM5.0
 LABEL
 MODULE SUBMOD 4
 FMS2 gt .

What is the usual length of these sessions?

[Note: INTERVIEWERS enter time as HH:MM eg 1:30 for 1 hr and 30 min]
 (if don't know then enter 0:00)

0:00 06:00 (6 HRS)
 0:00 12:00 (12 HRS)

Usual length of **FMS**

***** NUMERIC OR DATE ENTRY - CATI VERSION

INFO 1 INFO18 6
 NOLAB
 MODULE SUBMODUL
 FMS3 gt .

I'm now going to ask you about the content of these FMS sessions.

Specifically, How often do they include each of the following
 components?

[Note: INTERVIEWERS, Responses are: Always, Very often, Sometimes,
 Rarely, Never]

***** INFORMATION SCREEN ITEM

CHCE 1 5 FMS4 1 _MAKE_
 LABEL
 MODULE SUBMODUL
 INFO18=1

Warm up & cool down activities?

- 1 Always
- 2 Very often
- 3 Sometimes
- 4 Rarely
- 5 Never

Warm up & cool down activities

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 FMS6 1 _MAKE_

LABEL

MODULE SUBMODUL

FMS4 gt .

Skill specific feedback e.g. error detection and correction?

- 1 Always
- 2 Very often
- 3 Sometimes
- 4 Rarely
- 5 Never

Skill specific feedback

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 FMS7 1 _MAKE_

LABEL

MODULE SUBMODUL

FMS6 gt .

Extension and challenge experiences?

- 1 Always
- 2 Very often
- 3 Sometimes
- 4 Rarely
- 5 Never

Extension & challenge experiences

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 FMS8 1 _MAKE_

LABEL

MODULE SUBMODUL

FMS7 gt .

Staff modelling and demonstration?

- 1 Always
- 2 Very often
- 3 Sometimes
- 4 Rarely
- 5 Never

Staff modelling and demonstration

***** SINGLE CHOICE - CATI VERSION

CHCE 2 4 FMS9 3 _MAKE_

LABEL

MODULE SUBMODUL

(FMS8 gt . or FMS1=2) or

((SPA21 gt . or SPA19=2) and GROUP='100')

On a usual day do staff initiate specific activities

separate to planned FMS activities where children
are physically active during group or circle time?

- 1 Yes
- 2 No
- 3 Don't now
- .R Refused

Staff initiate activities

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 FMS11 3 _MAKE_

LABEL

MODULE SUBMODUL

FMS9=1

How many staff implement this practice?

(children are physically active during group or circle time)

[Note: INTERVIEWERS, Prompted]

- 1 All staff
- 2 Most staff
- 3 Some staff
- 4 Don't now
- .R Refused

Staff implement separate activity

***** SINGLE CHOICE - CATI VERSION

CHCE 1 7 FMS12 2 _MAKE_

LABEL

MODULE SUBMODUL

FMS11 gt .

How often do staff implement this practice?

(children are physically active during group or circle time)

- 1 Daily
- 2 4 times per week
- 3 3 times per week
- 4 2 times per week
- 5 Once per week
- 6 Less than once per week
- 7 Don't know

Often staff implement activity

***** SINGLE CHOICE - CATI VERSION

CHCE 1 4 FMS13 1 _MAKE_

LABEL

MODULE SUBMODUL

FMS12 gt .

How many children would usually participate in this activity?

- 1 All Children
- 2 Most Children
- 3 Some children
- 4 Don't know

Children participate in activity

***** SINGLE CHOICE - CATI VERSION

INFO 1 INFOY 2

NOLAB

MODULE SUBMODUL

FMS13 gt . or FMS9 in (2,3,.R)

The next questions refer to the indoor and outdoor environments

of your service.

***** INFORMATION SCREEN ITEM

CHCE 1 4 PEI1 3 _MAKE_

LABEL

MODULE SUBMODUL

INFOY=1

Which best describes your indoor play area?

[Note: INTERVIEWERS, Prompted]

- 1 Quiet play only - no room for movement
- 2 Space for limited movement or some AP
- 3 Space easily expanded by equipment & furniture
- 4 Space for all activities with a big open room

Description of indoor play area

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 PEO4 5 _MAKE_

LABEL

MODULE SUBMODUL

PEI1 gt .

This question refers to the OP play environment.

Which best describes your OP play area?

[Note: INTERVIEWERS, Prompted]

- 1 Large space for running and physically AP
- 2 Large space but equipment limits individual running
- 3 Obstructed areas limiting physically AP

Description of OP

***** SINGLE CHOICE - CATI VERSION

```
INFO 1          INFOX 5
NOLAB
MODULE SUBMODUL
PEO4 gt .
Earlier it was confirmed that your service was open for
^CSD2^ hrs (and min)/day.
```

The next few questions ask how much of this time
in hours and minutes is spent in various activities.

```
***** INFORMATION SCREEN ITEM
*****
```

```
NUM 1          TMDF1 6      MM time24          HHMM5.0
LABEL
MODULE SUBMODUL
INFOX=1
```

How much of your daily operating time is spent in a form of
specific adult guided activity such as group music, dancing or
planned **FMS** sessions?

[Note: INTERVIEWERS, enter time as HH:MM e.g. 1:30 for 1 hr, 30 min]
(if don't know then enter 0:00)

```
0:00          06:00          ( 6 HRS)
0:00          12:00          (12 HRS)
```

Staff led music, dance or FMS

```
***** NUMERIC OR DATE ENTRY - CATI VERSION
*****
```

```
NUM 1          TOFAP1 5      MM time24          HHMM5.0
LABEL
MODULE SUBMODUL
TMDF1 gt .
```

How much of your daily operating time do children have available
to spend in child-initiated, outdoor, free physically **AP**?

[Note: INTERVIEWERS, enter time as HH:MM eg 1:30 for 1 hr, 30 min]
(if don't know then enter 0:00)

```
0:00          06:00          ( 6 HRS)
0:00          12:00          (12 HRS)
```

Total outdoor free AP

```
***** NUMERIC OR DATE ENTRY - CATI VERSION
*****
```

```
CHCE 1 8      LSB1 3          _MAKE_
LABEL
MODULE SUBMODUL
TOFAP1 gt .
```

On average, how often are children allowed to watch **SSR** (e.g.
television, videos or DVDs or have time to play computer games)
where they are sitting still?

- 1 Once per day
- 2 4 times per week
- 3 3 times per week
- 4 2 times per week

5 Once per week
 6 Less than once per week
 7 Never
 .R Refused

How often/week in **SSR** - Ed purposes
 ***** SINGLE CHOICE - CATI VERSION

 INFO 1 INFOL 2
 NOLAB
 MODULE SUBMODUL
 LSB1 gt .

I am now going to ask questions for specific age groups at your service

***** INFORMATION SCREEN ITEM

CHCE 1 9 TOFAP2 3 _MAKE_

LABEL

MODULE SUBMODUL

INFOL=1 and substr(GROUP,1,2) in ('01' '10' '11')

On average, how often do children aged 0-2 years engage in SSR (e.g.

television, videos or DVDs or play computer games) where they are sitting still?

1 More than once per day
 2 Once per day
 3 4 times per week
 4 3 times per week
 5 2 times per week
 6 Once per week
 7 Less than once per week
 8 Never
 .R Refused

Children participate SSR 0-2
 ***** SINGLE CHOICE - CATI VERSION

CHCE 1 9 TOFAP3 3 _MAKE_

LABEL

MODULE SUBMODUL

TOFAP2 gt . or (INFOL=1 and GROUP='001')

On average, how often do children aged between 2-5 years engage in SSR (e.g. television, videos or DVDs or play computer games) where

they are sitting still?

- 1 More than once per day
- 2 Once per day
- 3 4 times per week
- 4 3 times per week
- 5 2 times per week
- 6 Once per week
- 7 Less than once per week
- 8 Never
- .R Refused

Children participate SSR 2-5

***** SINGLE CHOICE - CATI VERSION

CHCE 1 8 LSB2 8 _MAKE_
LABEL
MODULE SUBMODUL
TOFAP3 gt .

This question is about occasions during the day where the MAJORITY of children are sitting still for more than 30 minutes at a time, for example times where staff put toys on a table and children are only allowed to sit at the table and play, or group activities with children seated on the floor.

On average, excluding meal and nap times, how many occasions during the day would this occur?

- 1 Never
- 2 Once per day
- 3 2 times per day
- 4 3 times per day
- 5 4 times per day
- 6 5 times per day
- 7 Don't know
- .R Refused

How often/week sitting >30mins

***** SINGLE CHOICE - CATI VERSION

CHCE 1 2 LSB3 3 _MAKE_
LABEL
MODULE SUBMODUL
LSB2 gt .

Do staff monitor or limit the time children spend participating
in activities where they are sitting still?

(not including meal and nap times)

1 Yes

2 No

Staff monitor sitting >30mins

***** SINGLE CHOICE - CATI VERSION

CHCE 1 4 LSB4 1 _MAKE_

LABEL

MODULE SUBMODUL

LSB3=1

How many staff?

1 All staff

2 Most staff

3 Some staff

4 Don't know

Number staff monitor sitting

***** SINGLE CHOICE - CATI VERSION

INFO 1 INFOF 1

NOLAB

MODULE SUBMODUL

(LSB4 gt . or LSB3=2) and (PPA1=1 or PPA2a=1)

The next few questions ask about involvement of families.

***** INFORMATION SCREEN ITEM

CHCE 1 4 FC1 5 _MAKE_

LABEL

MODULE SUBMODUL

INFOF=1

This question is about whether families were involved in the
development of your **PA** policy. For example; parents may have been
given the opportunity to comment on the policy before it was
adopted.

Did this happen at your service in the last year?

1 Yes

2 No

3 Don't know

.R Refused

Families involve in **PA** policy

***** SINGLE CHOICE - CATI VERSION

CHCE 1 2 FC2 3 _MAKE_
 LABEL
 MODULE SUBMODUL
 (LSB4 gt . or LSB3=2) and (PPA2a in (2,3,.R)) or FC1 gt .

In the last year were families involved in the development and
 implementation of any **PA** programs or activities with children at
 your service?

1 Yes
 2 No
 Families involved in **PA** programs
 ***** SINGLE CHOICE - CATI VERSION

MULT 1 8 FC3 5 7

MLTLB

MODULE SUBMODUL

FC2 gt .

In the last year have you provided information to families
 regarding any of the following?

[Note to interviewer: Please read out and get an answer to
 each item in the list]

- 1 Recommended time children to be **PA**
- 2 Importance of **PA** for children
- 3 Importance of developing **FMS**
- 4 Information to encourage **PA**
- 5 Recommended Limits on **SSR**
- 6 Information on how to limit **SSR** time
- 7 Other
- 8 None provided

Provided information to families

Recommended time children to be **PA**

Importance of **PA** for children

Importance of developing **FMS**

Information to encourage **PA**

Recommended Limits on **SSR**

Information on how to limit **SSR** time

Other

None provided

*****MULTIPLE CHOICE - CATI

VERSION*****

OPEN 1 200 FC4 3

LABEL

MODULE SUBMODUL

Substr(FC3,7,1)='1'

Please specify Other?

[Note: INTERVIEWERS, Record the other information provided to families]

Other

***** OPEN ENDED ENTRY ITEM

THE FOLLOWING QUESTIONS WERE

INCLUDED AT FOLLOW-UP FOR THE INTERVENTION SERVICES ONLY:

***** SINGLE CHOICE - CATI VERSION

INFO 1 INFO25 2

NOLAB

MODULE SUBMODUL

AREA=1 and STHEN1 gt .

Over the last few years you might have received printed copies of the Good for Kids Children's Services Newsletter in the post?

***** INFORMATION SCREEN ITEM

CHCE 1 4 GFK1 1

MAKE

LABEL

MODULE SUBMODUL

INFO25=1

Overall, do you find the GFK childrens services newsletters:

- 1 Very useful
- 2 Somewhat useful
- 3 Not at all useful
- 4 Do not recall receiving

Usefulness of newsletters

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK2 4 _MAKE_

LABEL

MODULE SUBMODUL

GFK1 gt .

You may have noticed that on all **G4Ks** resources, such as the

newsletter, the program's web address was advertised.

Have you logged on and visited the **CS** section of the website?

- 1 Yes
- 2 No
- 3 Don't know

Visited Children's Services on **G4Ks** www

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK3 3 _MAKE_

LABEL

MODULE SUBMODUL

GFK2=1

Overall, how useful do you find the **CS** section of the website?

[Responses are: Very useful, Somewhat useful, Not at all useful]

- 1 Very useful
- 2 Somewhat useful
- 3 Not at all useful

How useful **G4Ks** www site

***** SINGLE CHOICE - CATI VERSION

INFO 1 GFK4 6

NOLAB

MODULE SUBMODUL

GFK3 gt . or GFK2 in (2,3)

In the last year, Good for Kids has implemented their physical

activity Strategy, I Move We Move, with children's services.

This has included providing training workshops, resource kits and

follow-up support calls. The next few questions are about your

participation in this program and will help us to evaluate whether

the program has been beneficial or relevant for your service.

***** INFORMATION SCREEN ITEM

CHCE 1 3 GFK5 2 _MAKE_
LABEL
MODULE SUBMODUL
GFK4=1

Did you or any of your staff attend the **G4K I move We Move**
physical activity training workshop?

1 Yes
2 No
3 Don't know
Attend G4K workshop

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 GFK6 4 _MAKE_
LABEL
MODULE SUBMODUL
GFK5=1

Please indicate whether you strongly agree, agree, disagree or
strongly disagree with the following:

The training workshop was beneficial for staff to complete

1 Strongly agree
2 Agree
3 Disagree
4 Strongly disagree
5 Neutral

G4K workshop beneficial
***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 GFK7 1 _MAKE_
LABEL
MODULE SUBMODUL
GFK6 GT .

I would recommend the training to other services

1 Strongly agree
2 Agree
3 Disagree
4 Strongly disagree
5 Neutral

Recommend G4K training
***** SINGLE CHOICE - CATI VERSION

CHCE 1 6 GFK8 6 _MAKE_
LABEL
MODULE SUBMODUL
GFK7 GT . or GFK5 in (2,3)

You would have received a copy of the **G4Ks I move We Move Resource**

Package. It included a guide book, activity handbooks for different age groups, 2 dvds, laminated activity game cards and lanyards.

Overall, did you find the **G4K I move We Move Resource** Package?

(Read options)

- 1 Very useful
- 2 Somewhat useful
- 3 Not at all useful
- 4 Don't have a copy
- 5 Do not recall receiving
- 6 Don't know

Usefulness of G4K resource

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK10 2 _MAKE_

LABEL

MODULE SUBMODUL

GFK8 gt .

Did any of your staff complete the I move we move online professional development training?

- 1 Yes
- 2 No
- 3 Don't know

Any staff complete I MOVE online

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 GFK11 4 _MAKE_

LABEL

MODULE SUBMODUL

GFK10=1

Please indicate whether you strongly agree, agree disagree or strongly disagree with the following:

The online training was beneficial for staff to complete

- 1 Strongly agree
- 2 Agree
- 3 Disagree
- 4 Strongly disagree
- 5 Neutral

Online training was beneficial

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 GFK12 1 _MAKE_
LABEL
MODULE SUBMODUL
GFK11 GT .

Staff were able to find time to complete the online training

- 1 Strongly agree
- 2 Agree
- 3 Disagree
- 4 Strongly disagree
- 5 Neutral

Staff able complete online training

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 GFK13 1 _MAKE_
LABEL
MODULE SUBMODUL
GFK12 GT .

Staff were able to easily access the online training

- 1 Strongly agree
- 2 Agree
- 3 Disagree
- 4 Strongly disagree
- 5 Neutral

Staff easily accessed training

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 GFK14 2 _MAKE_
LABEL
MODULE SUBMODUL
GFK13 GT .

The prize incentives for individual staff (holiday voucher)

motivated staff to complete the online training

- 1 Strongly agree
- 2 Agree

3 Disagree

4 Strongly disagree

5 Neutral

Incentives motivated staff

***** SINGLE CHOICE - CATI VERSION

NULL 1 NULL6 1
NOLAB
MODULE SUBMODUL
GFK10 in (2,3) or GFK14 GT .

Splitting **G4Ks I move We Move Resource**

*****NULL ITEM - DOES

NOTHING*****

CHCE 1 3 GFK15 1 _MAKE_

LABEL

MODULE SUBMODUL
NULL6=1 and GFK8 in (1,2,3)

Did you use the G4K I move We Move Game Cards?

1 Yes

2 No

3 Don't know

Use G4K I move We Move Game Cards

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK16 1 _MAKE_

LABEL

MODULE SUBMODUL

GFK15=1

Overall, did you find the **G4K I move We Move Game Cards**: (Read out)

1 Very useful

2 Somewhat useful

3 Not at all useful

Usefulness of I MOVE Game Cards

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK17 2 _MAKE_

LABEL

MODULE SUBMODUL

GFK16 GT . or GFK15 in (2,3)

Did you use the DVDs included in the I Move we Move resource kit

(Fun Moves and Active Movement for Under 5s?)

1 Yes

2 No

3 Don't know

Use DVD's in kit

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK18 3 _MAKE_

LABEL

MODULE SUBMODUL

GFK17=1

Overall, did you find the **DVDs included in the I Move we Move**

resource kit: (Read out)

(Fun Moves and Active Movement for Under 5s?)

1 Very useful

2 Somewhat useful

3 Not at all useful

Usefulness of DVD's

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK19 1 _MAKE_

LABEL

MODULE SUBMODUL

GFK18 GT . or GFK17 in (2,3)

Did you use the G4K I move We Move FMS Lanyards

1 Yes

2 No

3 Don't know

Use lanyards

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK20 1 _MAKE_

LABEL

MODULE SUBMODUL

GFK19=1

Overall, did you find the **G4K I move We Move FMS Lanyards**: (Read out)

- 1 Very useful
- 2 Somewhat useful
- 3 Not at all useful

Usefulness of Lanyards

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK21 1 _MAKE_

LABEL

MODULE SUBMODUL

GFK20 GT . OR GFK19 IN (2,3)

Did you use the G4K I move We Move **Activity Handbooks**

- 1 Yes
- 2 No
- 3 Don't know

Use handbooks

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK22 1 _MAKE_

LABEL

MODULE SUBMODUL

GFK21=1

Overall, did you find the **G4K I move We Move Activity Handbooks**?

- 1 Very useful
- 2 Somewhat useful
- 3 Not at all useful

Usefulness of handbooks

***** SINGLE CHOICE - CATI VERSION

CHCE 1 2 GFK23 1 _MAKE_

LABEL

MODULE SUBMODUL

GFK22 GT . OR GFK21 in (2,3)

Did you use the G4K I move We Move Guide book?

- 1 Yes

2 No

Use guidebook

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK24 1 _MAKE_

LABEL

MODULE SUBMODUL

GFK23=1

Overall, did you find the **G4K I move We Move Guide book**?

1 Very useful

2 Somewhat useful

3 Not at all useful

Usefulness of guide book

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 GFK28 1 _MAKE_

LABEL

MODULE SUBMODUL

GFK24 gt .

Overall, how did you find the **G4K I move We Move policy template**?

1 Very useful

2 Somewhat useful

3 Not at all useful

4 Don't recall receiving it

5 Don't know

Usefulness of GFK policy template

***** SINGLE CHOICE - CATI VERSION

NULL 1 NULL5 1

NOLAB

MODULE SUBMODUL

(NULL6=1 and GFK8 in (4,5,6))or GFK28 GT . or GFK23 in (2,3)

End of GFK Resource Section

*****NULL ITEM - DOES

NOTHING*****

CHCE 1 5 GFK25 4 _MAKE_

LABEL

MODULE SUBMODUL

NULL5=1 and CSD7=1

This question is about whether you found our GFK resources

effective for Aboriginal children attending your service.

For Aboriginal children, did staff find the GFK I move we move resources:

- 1 Very useful
- 2 Somewhat useful
- 3 Not at all useful
- 4 Didn't use them
- 5 NOT APPLICABLE

Aboriginal find GFK resources

***** SINGLE CHOICE - CATI VERSION

CHCE 1 6 GFK26 8 _MAKE_
LABEL
MODULE SUBMODUL
GFK25 GT .

This question is to help us to evaluate the program in terms of supporting your service to engage with families about healthy eating and physical activity

Can you please tell us how engaged Aboriginal families have been with your services healthy eating and physical activity programs?

INTERVIEWER: If they ask, this does not have to be from the GFK program.

- 1 Very engaged
- 2 Mostly engaged
- 3 Somewhat engaged
- 4 Not engaged
- 5 Unable to say
- 6 HAVE NOT RUN ANY

Engaged of Aboriginal families

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 GFK27 2 _MAKE_

LABEL

MODULE SUBMODUL

GFK26 in (1,2,3,4,5)

Can you please tell us how engaged non-Aboriginal families have
been with your services activities and programs

- 1 Very engaged
- 2 Mostly engaged
- 3 Somewhat engaged
- 4 Not engaged
- 5 Unable to say

Engaged non Aboriginal families

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK29 2 _MAKE_

LABEL

MODULE SUBMODUL

(NULL5=1 and CSD7 in (2,3,.R)) or GFK27 GT . or GFK26=6

Did you participate in any support calls from the good for kid's team.
These took about 10 minutes.

- 1 Yes
- 2 No
- 3 Don't know

Receive support calls

***** SINGLE CHOICE - CATI VERSION

CHCE 1 3 GFK30 3 _MAKE_

LABEL

MODULE SUBMODUL

GFK29=1

Overall, how did you find the support calls from the good for kid's
team

in helping your service to implement best practice physical activity strategies at your service?

- 1 Very useful
- 2 Somewhat useful
- 3 Not at all useful

Usefulness of support calls

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 GFK31 5 _MAKE_

LABEL

MODULE SUBMODUL

GFK30 GT . or GFK29 in (2,3)

Please indicate your level of agreement with the following statements

I would recommend the GFK physical activity program, which includes the training, support calls and resources, to other children's services.

- 1 Strongly agree
- 2 Agree
- 3 Disagree
- 4 Strongly disagree
- 5 Neutral

Recommend GFK PA other services

***** SINGLE CHOICE - CATI VERSION

CHCE 1 5 GFK32 2 _MAKE_

LABEL

MODULE SUBMODUL

GFK31 GT .

The children attending our service have benefited from our involvement in the GFK physical activity program.

- 1 Strongly agree
- 2 Agree
- 3 Disagree
- 4 Strongly disagree
- 5 Neutral

Children benefit from GFK PA
 ***** SINGLE CHOICE - CATI VERSION

 NULL 1 NULL4 1
 NOLAB
 MODULE SUBMODUL
 GFK32 gt . or (AREA=0 and STHEN1 gt .)
 Bring all HNE and NSW back together
 *****NULL ITEM - DOES
 NOTHING*****
 INFO 1 INFO27 11
 NOLAB
 MODULE SUBMODUL
 NULL4=1 and NHE7=1
 Earlier in the survey you kindly agreed to send us a copy of
 your Menu. I can give you our contact addresses now:

EMAIL: Meghan.Finch@hnehealth.nsw.gov.au

FAX: ATT: Ms Meghan Finch

Fax: 02 4924 6215

POST: Ms Meghan Finch

HNEAHS Population Health

Locked Bag 10, WALLSEND NSW 2287

***** INFORMATION SCREEN ITEM

 CHCE 1 4 PO1 7 _MAKE_
 LABEL
 MODULE SUBMODUL
 INFO27=1 or (NULL4=1 and (NHE7 ne 1))
 So we can provide you with a written report from this survey,
 would you please confirm that we have the correct postal address
 for your service? According to our records your address is
 ^Address^
 ^Suburb^, ^State^ ^Postcode^.

Is this correct?

1 Yes
 2 No
 3 Don't know
 .R Refused

Confirm correct postal address

***** SINGLE CHOICE - CATI VERSION

OPEN 1 200 PO2 3

LABEL

MODULE SUBMODUL

PO1=2

What is the correct postal address?


```

[Note: INTERVIEWERS, Record the correct postal address]
Correct postal address
***** OPEN ENDED ENTRY ITEM
*****
INFO 1          INFO28  4
NOLAB
MODULE  SUBMODUL
AREA=1 and (PO2 gt ' ' or PO1 in (1,3,.R))
Thank you so much for your participation today. That concludes
our interview. Your responses will be very helpful in planning
how to further support services with healthy eating and physical
activity initiatives.
***** INFORMATION SCREEN ITEM
*****
INFO 1          INFO29  4
NOLAB
MODULE  SUBMODUL
AREA=0 and (PO2 gt ' ' or PO1 in (1,3,.R))
Thank you so much for your participation today. That concludes our
interview. Your responses will be very helpful in planning
how to further support services with healthy eating and physical
activity initiatives.
***** INFORMATION SCREEN ITEM
*****
NULL 1          NULL5c  1
NOLAB
MODULE  SUBMODUL
INFO28=1 or INFO29=1
Thank you for HNE and Non-HNE CS
*****NULL ITEM - DOES
NOTHING*****
INFO 1          INFO30  4
NOLAB
MODULE  SUBMODUL
NULL5c=1
Thanks again for taking the time to speak with us today and
throughout the project. I hope you have a great day.

Goodbye.

```

APPENDIX 7.4: SERVICE INFORMATION LETTER – FOLLOW-UP

Hunter New England Population Health

Direct Contact Details

Phone: (02) 4924 6477 Fax: (02) 4924 6490

Email: PHEnquiries@hnehealth.nsw.gov.au

HUNTER NEW ENGLAND
NSW HEALTH

10 August 2010

The Authorised Supervisor

«Service»

«Address1»

«Address2»

«Address3»

«Suburb» «State» «Postcode»

Dear Authorised Supervisor

CHILDCARE HEALTH SURVEY INFORMATION FOR AUTHORISED SUPERVISORS

Version 3, dated 03/1/03/2009

In 2006 and again in 2009, your service participated in the research project identified above which is being conducted by Dr John Wiggers from Hunter New England Population Health. The purpose of the project is to identify opportunities for childcare centres to promote physical activity and healthy eating in children. The purpose of this correspondence is to thank you for participating in the previous surveys, and to invite you to participate in an additional survey.

We understand that childcare centres already have a number of systems and practices in place that are conducive to children developing healthy lifestyles. However, we would like to identify if there are more ways in which we can enhance childcare centres' capacity to encourage children to consume healthy foods and drinks, and participate in physical activity.

We will be contacting you via telephone in two weeks time to invite you to participate in a similar survey to the one you participated in previously. The purpose of this additional survey is to identify the current policies and practices in the childcare sector relating to healthy eating and physical activity. Your number was previously obtained from the Department of Community Services. If you would like to participate, please indicate this to staff from Hunter New England Population Health when they contact you.

The survey will include brief questions to collect information about your childcare centre's current policies, facilities and equipment, sport, physical activity and nutrition programs, fundraising and childcare events, programming, teacher training and communication with parents. The telephone survey should take approximately 25 minutes to complete.

Any information provided by Authorised Supervisors will be treated as strictly confidential. Only the research team will have access to the completed surveys. The questionnaires will be stored in a secure facility and kept in the strictest confidence, as required by law. All information transferred electronically will be done in a file which is password protected. It will not be possible to identify individuals from any publication arising from the research.

Your participation in this research is voluntary. Whether or not you decide to participate, your decision will not disadvantage you or your centre in anyway. If you do participate, you may withdraw from the research at any time without giving a reason and you will have the option of withdrawing any information you have provided.

Hunter New England Area Health Service
Hunter New England Population Health
ABN 24 500 842 605

Locked Bag 10
Wallsend NSW 2287
Phone (02) 4924 6477 Fax (02) 4924 6490
Email PHEnquiries@hnehealth.nsw.gov.au

A summary report of the results of the Childcare Health Survey will be provided to your centre. The report will not identify any individuals or childcare centres. Results of the study may also be presented at scientific conferences and be published within scientific journals. No other childcare centre will be able to find out the results of your centre and no individuals will be able to be identified in any report or publication by the program.

If there is anything that you do not understand, or you would like more information, please contact Meghan Finch on (02) 49246 131.

Yours sincerely

Dr John Wiggers
Director
Hunter New England Population
Health

This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference: 06/07/26/4.04 and Department of Education and Training, Reference:

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrand, Professional Officer (Research Ethics), Hunter New England Human Research Ethics Committee, Hunter New England Health, Locked Bag 1, New Lambton NSW 2305, telephone (02) 49214950, email Nicole.Gerrand@hnehealth.nsw.gov.au

APPENDIX EIGHT:

APPENDIX 8.1: CHILDCARE COCHRANE REVIEW



Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services (Review)

Wolfenden L, Jones J, Williams CM, Finch M, Wyse RJ, Kingsland M, Tzelepis F, Wiggers J, Williams AJ, Seward K, Small T, Welch V, Booth D, Yoong SL

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[Intervention Review]

Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services

Luke Wolfenden^{1,2,3}, Jannah Jones^{1,2,3}, Christopher M Williams^{1,2,3,4}, Meghan Finch^{1,2,3}, Rebecca J Wyse^{1,2,3}, Melanie Kingsland¹, Flora Tzelepis¹, John Wiggers^{1,2,3}, Amanda J Williams^{1,2,3}, Kirsty Seward^{1,2,3}, Tameka Small^{1,2,3}, Vivian Welch⁵, Debbie Booth⁶, Sze Lin Yoong^{1,2,3}

¹School of Medicine and Public Health, University of Newcastle, Callaghan, Australia. ²Hunter Medical Research Institute, New Lambton, Australia. ³Hunter New England Population Health, Hunter New England Local Health District, Wallsend, Australia. ⁴Musculoskeletal Division, The George Institute for Global Health, Sydney, Australia. ⁵Brüyère Research Institute, University of Ottawa, Ottawa, Canada. ⁶University Library, University of Newcastle, Callaghan, Australia

Contact address: Luke Wolfenden, School of Medicine and Public Health, University of Newcastle, Callaghan, NSW, 2308, Australia. luke.wolfenden@hnehealth.nsw.gov.au.

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ABSTRACT

Background

Despite the existence of effective interventions and best-practice guideline recommendations for childcare services to implement policies, practices and programmes to promote child healthy eating, physical activity and prevent unhealthy weight gain, many services fail to do so.

Objectives

The primary aim of the review was to examine the effectiveness of strategies aimed at improving the implementation of policies, practices or programmes by childcare services that promote child healthy eating, physical activity and/or obesity prevention.

The secondary aims of the review were to:

1. describe the impact of such strategies on childcare service staff knowledge, skills or attitudes;
2. describe the cost or cost-effectiveness of such strategies;
3. describe any adverse effects of such strategies on childcare services, service staff or children;
4. examine the effect of such strategies on child diet, physical activity or weight status.

Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services (Review) |
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Search methods

We searched the following electronic databases on 3 August 2015: the Cochrane Central Register of Controlled trials (CENTRAL), MEDLINE, MEDLINE In Process, EMBASE, PsycINFO, ERIC, CINAHL and SCOPUS. We also searched reference lists of included trials, handsearched two international implementation science journals and searched the World Health Organization International Clinical Trials Registry Platform (www.who.int/ictpr/) and ClinicalTrials.gov (www.clinicaltrials.gov).

Selection criteria

We included any study (randomised or non-randomised) with a parallel control group that compared any strategy to improve the implementation of a healthy eating, physical activity or obesity prevention policy, practice or programme by staff of centre-based childcare services to no intervention, 'usual' practice or an alternative strategy.

Data collection and analysis

The review authors independently screened abstracts and titles, extracted trial data and assessed risk of bias in pairs; we resolved discrepancies via consensus. Heterogeneity across studies precluded pooling of data and undertaking quantitative assessment via meta-analysis. However, we narratively synthesised the trial findings by describing the effect size of the primary outcome measure for policy or practice implementation (or the median of such measures where a single primary outcome was not stated).

Main results

We identified 10 trials as eligible and included them in the review. The trials sought to improve the implementation of policies and practices targeting healthy eating (two trials), physical activity (two trials) or both healthy eating and physical activity (six trials). Collectively the implementation strategies tested in the 10 trials included educational materials, educational meetings, audit and feedback, opinion leaders, small incentives or grants, educational outreach visits or academic detailing. A total of 1053 childcare services participated across all trials. Of the 10 trials, eight examined implementation strategies versus a usual practice control and two compared alternative implementation strategies. There was considerable study heterogeneity. We judged all studies as having high risk of bias for at least one domain.

It is uncertain whether the strategies tested improved the implementation of policies, practices or programmes that promote child healthy eating, physical activity and/or obesity prevention. No intervention improved the implementation of all policies and practices targeted by the implementation strategies relative to a comparison group. Of the eight trials that compared an implementation strategy to usual practice or a no intervention control, however, seven reported improvements in the implementation of at least one of the targeted policies or practices relative to control. For these trials the effect on the primary implementation outcome was as follows: among the three trials that reported score-based measures of implementation the scores ranged from 1 to 5.1; across four trials reporting the proportion of staff or services implementing a specific policy or practice this ranged from 0% to 9.5%; and in three trials reporting the time (per day or week) staff or services spent implementing a policy or practice this ranged from 4.3 minutes to 7.7 minutes. The review findings also indicate that it is uncertain whether such interventions improve childcare service staff knowledge or attitudes (two trials), child physical activity (two trials), child weight status (two trials) or child diet (one trial). None of the included trials reported on the cost or cost-effectiveness of the intervention. One trial assessed the adverse effects of a physical activity intervention and found no difference in rates of child injury between groups. For all review outcomes, we rated the quality of the evidence as very low. The primary limitation of the review was the lack of conventional terminology in implementation science, which may have resulted in potentially relevant studies failing to be identified based on the search terms used in this review.

Authors' conclusions

Current research provides weak and inconsistent evidence of the effectiveness of such strategies in improving the implementation of policies and practices, childcare service staff knowledge or attitudes, or child diet, physical activity or weight status. Further research in the field is required.

PLAIN LANGUAGE SUMMARY**Improving the implementation of healthy eating, physical activity and/or obesity prevention policies, practices or programmes in childcare services****The review question**

Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services (Review) 2
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This review aimed to look at the effects of strategies to improve the implementation (or correct undertaking) of policies, practices or programmes by childcare services that promote children's healthy eating, physical activity and/or obesity prevention. We also looked at whether these strategies improved childcare service staff knowledge, skills or attitudes. We also wanted to determine the cost or cost-effectiveness of providing implementation support, whether support strategies were associated with any adverse effects and whether there was an impact on child nutrition, physical activity or weight status.

Background

A number of childcare service-based interventions have been found to be effective in improving child diet, increasing child physical activity and preventing excessive weight gain. Despite the existence of such evidence and best-practice guideline recommendations for childcare services to *implement* these policies and practices, many childcare services fail to do so. Without proper implementation, children will not benefit from these child health-directed policies and practices.

Study characteristics

The review identified 10 trials, eight of which examined implementation strategies versus usual practice, and two that compared different types of implementation strategies. The trials sought to improve the implementation of policies and practices targeting healthy eating (two trials), physical activity (two trials) or both healthy eating and physical activity (six trials). Collectively the implementation strategies tested in the 10 trials included educational materials, educational meetings, audit and feedback, opinion leaders, small incentives or grants, educational outreach visits or academic detailing. The strategies tested were only a small number of those that could be applied to improve implementation in this setting.

Search date

The evidence is current to August 2015.

Key results

None of the strategies identified in the review improved implementation of all the targeted policies or practices. However, most strategies reported improvement for at least one policy or practice. The findings provide weak and inconsistent evidence of the effects of these strategies on improving the implementation of policies, practices and programmes, childcare service staff knowledge or attitudes, or child diet, physical activity or weight status. The lack of consistent terminology in this area of research may have meant some relevant studies were not picked up in our search. Nonetheless, the few identified trials suggest that research to implement such policies and practices in childcare services is only in the early stages of development.

Quality of the evidence

We rated the evidence for all outcomes as very low quality and thus we cannot be overly confident in the findings.

SUMMARY OF FINDINGS FOR THE MAIN COMPARISON *[Explanation]*

Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services			
Patient or population: children up to the age of 6 years Settings: centre-based childcare services that cater for children prior to compulsory schooling Intervention: any strategy (including educational materials, educational meetings, audit and feedback, opinion leaders, small incentives or grants, educational outreach visits or academic detailing) with the primary intent of improving the implementation (by usual service staff) of policies, practices or programmes in centre-based childcare services to promote healthy eating, physical activity or prevent unhealthy weight gain Comparison: no intervention (8 studies) or alternate intervention (2 studies)			
Outcomes	Impact	No of participants (studies)	Quality of the evidence (GRADE)
Implementation of policies, practices or programmes that promote child healthy eating, physical activity and/or obesity prevention	We are uncertain whether strategies improve the implementation of policies, practices or programmes that promote child healthy eating, physical activity and/or obesity prevention	1053 participants (childcare services), 10 studies	⊕○○○ very low^a
Childcare service staff knowledge, skills or attitudes related to the implementation of policies, practices or programmes that promote child healthy eating, physical activity	We are uncertain whether strategies to improve the implementation of policies, practices or programmes that promote child healthy eating, physical activity and/or obesity prevention improve childcare service staff knowledge, skills or attitudes	457 participants (childcare service staff), 2 studies	⊕○○○ very low^a
Cost or cost-effectiveness of strategies to improve the implementation of policies, practices or programmes in childcare services	No studies were found that looked at the cost or cost-effectiveness of strategies to improve the implementation of policies, practices or programmes in childcare services	Nil	N/A
Adverse consequences of strategies to improve the implementation of policies, practices or programmes in childcare services	We are uncertain whether strategies to improve the implementation of policies, practices or programmes that promote child healthy eating, physical activity and/or obesity prevention impact on adverse consequences	20 participants (childcare services), 1 study	⊕○○○ very low^b

Measures of child diet, physical activity or weight status	We are uncertain whether strategies to improve the implementation of policies, practices or programmes that promote child healthy eating, physical activity and/or obesity prevention improve child diet, physical activity or weight status	2829 participants (children), ³ studies	⊕○○○ very low ^a
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GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

^aTriple downgraded due to limitations in the design, imprecision of evidence and unexplained heterogeneity.

^bTriple downgraded due to indirectness, inconsistency and imprecision of evidence.

BACKGROUND

Description of the condition

Internationally, the prevalence of being overweight and obesity has increased across every region of the world in recent decades (Finucane 2011). Currently over 1.5 billion adults and 170 million children are overweight or obese (Finucane 2011; Lobstein 2004). While obesity rates in high-income countries remain higher, prevalence rates in low- and middle-income countries are accelerating (Swinburn 2011). In Africa, for example, the prevalence of being overweight among children under five years is expected to increase from 4% in 1990 to 11% by 2025 (Black 2013). Excessive weight gain increases the risk of a variety of chronic health conditions. Between the years 2010 and 2030, up to 8.5 million cases of diabetes, 7.3 million cases of heart disease and stroke, and 669,000 cases of cancer attributable to obesity have been projected in the USA and UK alone (Wang 2011). In Australia, between the years 2011 and 2050, 1.75 million lives and over 10 million premature years of life will be lost due to excessive weight gain (Gray 2009).

Description of the intervention

Physical inactivity and poor diet are key drivers of excessive weight gain. As excessive weight gain in childhood tracks into adulthood, interventions targeting children's diet and physical activity have been recommended to mitigate the adverse health effects of obesity on the population (World Health Organization 2012). A recently published World Health Organization report into population-based approaches to childhood obesity prevention identified centre-based childcare services (including preschools, long daycare services and kindergartens that provide educational and developmental activities for children prior to formal compulsory schooling) as an important setting for public health action to reduce the risk of unhealthy weight gain in childhood. Such settings provide an opportunity to access large numbers of children for prolonged periods of time (World Health Organization 2012). Further, randomised and quasi-experimental trials have identified a number of interventions, delivered in childcare services, which have increased child physical activity and fundamental movement skill proficiency, improved child diet quality and prevented excessive weight gain (Adams 2009; De Silva-Sanigorski 2010; Hardy 2010; Trost 2008). As such, regulations and best practice guidelines for the childcare sector recommend implementation of a number of healthy eating and physical activity policies and practices, such as restricting sedentary screen time opportunities; ensuring meals provided by childcare services or foods packed by parents

for consumption in care are consistent with dietary guidelines; and the provision of programmes to promote physical activity and fundamental movement skill development (Commonwealth of Australia; McWilliams 2009; Tremblay 2012).

Despite the existence of evidenced-based best-practice guidelines for childcare services, implementation of obesity prevention policies and practices that are consistent with such guidelines is poor (McWilliams 2009; Story 2006). In the USA, research suggests that 75% of meat consumed in childcare is fried or high in fat, and that children consume less than 13% of dietary guideline recommendations for whole grains and 7% for dark vegetables (Ball 2008). Childcare service adherence to dietary guidelines in other countries has also been reported to be poor (Yoong 2014). Similarly, adherence to best-practice recommendations for physical activity is also suboptimal. For example, only 14% of USA childcare services provided 120 minutes of active play per day, 57% to 60% did not have a written physical activity policy (McWilliams 2009; Sisson 2012), and in 18% of childcare services, children were seated for more than 30 minutes at a time (McWilliams 2009). In Australia, it has been reported that just 48% to 50% of centre-based childcare services had a written physical activity policy, 46% to 60% had programmed time each day for fundamental movement skill development (Wolfenden 2010), and 60% of child lunch boxes contained more than one serving of high-fat, salt or sugar foods or drinks (Kelly 2010).

Without adequate implementation across the population of childcare services, the potential public health benefits of initiatives to improve child diet or physical activity, or prevent obesity, will not be fully realised. 'Implementation' is described as the use of strategies to adopt and integrate evidence-based health interventions and to change practice patterns within specific settings (Glasgow 2012). Implementation research, specifically, is the study of strategies designed to integrate health policies, practices or programmes within specific settings (for example, primary care, community centres or childcare services) (Schillinger 2010). The National Institutes of Health recognises implementation research as a fundamental component of the third stage of the research translation process ('T3') and that it is a necessary pre-requisite for research to yield public health improvements (Glasgow 2012). While staff of centre-based childcare services are responsible for providing educational experiences and an environment supportive of healthy growth and development, including initiatives designed to reduce the risk of excessive weight gain, it may be the childcare services themselves, government or other agencies (such as for licensing and accreditation requirements) that undertake strategies aimed at enhancing the implementation of such initiatives.

There are a range of potential strategies that can improve the likelihood of implementation of healthy eating, physical activity and obesity prevention policies and practices in childcare services. The Cochrane Effective Practice and Organisation of Care (EPOC) taxonomy is a framework for characterising educational, behavioural, financial, regulatory and organisational interventions

(EPOC 2015); it includes three categories with 22 subcategories within the topic of 'implementation strategies'. Examples of such subcategories include continuous quality improvement, educational materials, performance monitoring, local consensus processes and educational outreach visits (EPOC 2015).

How the intervention might work

The determinants of policy and practice implementation are complex and the mechanisms by which support strategies facilitate implementation are not well understood. Implementation frameworks have identified a large number of factors operating at multiple macro and micro levels that can influence the success of implementation (Damschroder 2009). However, few studies have been conducted in the childcare setting to identify key determinants of implementation in this setting. A study by Wolfenden and colleagues of over 200 childcare services in Australia examined associations between the existence of healthy eating and physical activity policies and practices and 13 factors suggested by Damschroder's Consolidated Framework for Implementation Research to impede or promote implementation (Wolfenden 2015a). The study reported that implementation policy and practice implementation was more likely when service managers, management committee and parents were supportive, and where external resources to support implementation were accessible. Applied implementation frameworks, such as the Theoretical Domains Framework (Michie 2008), suggest that strategies to facilitate implementation may be most likely to be effective with a thorough understanding of implementation context and barriers, and when theoretical frameworks are applied to select implementation support strategies to address key determinants of implementation. For example, knowledge barriers to implementation may be best overcome with education meetings or materials, while activity reminders, such as decision support systems, may be particularly important in instances where staff forgetfulness is identified as a local implementation barrier.

Why it is important to do this review

A number of large systematic reviews have been undertaken to assess the effectiveness of such implementation strategies in improving the professional practice of clinicians. For example Ivers and colleagues reviewed the effectiveness of audit and feedback on the behaviour of health professionals and the health of their patients and found it generally resulted in small but important improvements in professional practice (Ivers 2012). Giguère and colleagues reviewed the effectiveness of printed education materials on the practice of healthcare professionals and patient health outcomes and found a small beneficial effect on professional practice outcomes (Giguère 2012). Additional systematic reviews have assessed the effectiveness of additional implementation strategies

including reminders (Arditi 2012), education meetings and workshops (Forsetlund 2009; O'Brien 2007), and incentives (Scott 2011). Despite the existence of such reviews, implementation research in non-clinical community settings remains limited (Buller 2010). While several implementation strategies have been used to improve the implementation of healthy eating, physical activity and obesity prevention policies and practices in childcare services (Finch 2012; Ward 2008), a systematic synthesis of the effects reported in such trials has not been undertaken in this setting. To our knowledge, just one systematic review of implementation interventions in non-clinical settings (for example, schools) has been published to date (Rabin 2010). The review, which was an update of an earlier Agency for Healthcare Research and Quality report (Agency for Healthcare Research and Quality 2003), investigated the effectiveness of strategies in any community setting to implement policies or practices to reduce behavioural risks for cancer, including healthy eating, physical activity, smoking and sun protection. The review included studies published between 1980 and 2008 and did not identify any implementation trials targeting healthy eating or physical activity in childcare services. An up-to-date, comprehensive review of such literature is therefore warranted.

OBJECTIVES

The primary aim of the review was to examine the effectiveness of strategies aimed at improving the implementation of policies, practices or programmes by childcare services that promote child healthy eating, physical activity and/or obesity prevention.

The secondary aims of the review were to:

1. describe the impact of such strategies on childcare service staff knowledge, skills or attitudes;
2. describe the cost or cost-effectiveness of such strategies;
3. describe any adverse effects of such strategies on childcare services, service staff or children;
4. examine the effect of such strategies on child diet, physical activity or weight status.

METHODS

Criteria for considering studies for this review

Types of studies

Any study (randomised, including cluster-randomised, or non-randomised trials) with a parallel control group that compared:

1. a strategy to improve the implementation of any healthy eating, physical activity or obesity prevention policy, practice or programme in centre-based childcare services compared with no intervention or 'usual' practice;
2. two or more alternative strategies to improve the implementation of any healthy eating, physical activity or obesity prevention policy, practice or programme in centre-based childcare services.

We excluded studies that did not include implementation of policy, practices or programmes as a specific aim (primary or secondary), as well as studies that did not report baseline measures of the primary outcome. There was no restriction on the length of the study follow-up period, language of publication or country of origin.

Types of participants

Centre-based childcare services such as preschools, nurseries, long daycare services and kindergartens that cater for children prior to compulsory schooling (typically up to the age of five to six years). We excluded studies of childcare services provided in the home.

Types of interventions

Any strategy with the primary intent of improving the implementation of policies, practices or programmes in centre-based childcare services to promote healthy eating, physical activity or prevent unhealthy weight gain was eligible. To be eligible strategies must have sought to improve the implementation of policies, practices or programmes by usual childcare service staff. Strategies could have included quality improvement initiatives, education and training, performance feedback, prompts and reminders, implementation resources, financial incentives, penalties, communication and social marketing strategies, professional networking, the use of opinion leaders or implementation consensus processes. Interventions may have been singular or multi-component.

Types of outcome measures

Primary outcomes

We included any measure of either the completeness or the quality of the implementation of childcare service policies, practices or programmes (for example, the percentage of childcare services implementing a food service consistent with dietary guidelines or the mean number of physical activity practices implemented). To assess the review outcomes, data may have been collected from a variety of sources including teachers, managers, cooks or other staff of centre-based childcare services; or administrators, officials

or other health, education, government or non-government personnel responsible for encouraging or enforcing the implementation of health-promoting initiatives in childcare services. Such data may have been obtained from audits of service records, questionnaires or surveys of staff, service managers, other personnel or parents; direct observation or recordings; examination of routine information collected from government departments (such as compliance with food standards or breaches of childcare service regulations) or other sources. Additionally, children, parents or childcare service staff may have provided information regarding child diet, physical activity or child weight status.

Secondary outcomes

1. Any measure of childcare service staff knowledge, skills or attitudes related to the implementation of policies, practices or programmes that promote child healthy eating, physical activity and/or obesity prevention.
2. Estimates of absolute costs or any assessment of the cost-effectiveness of strategies to improve the implementation of policies, practices or programmes in childcare services.
3. Any reported adverse consequences of a strategy to improve the implementation of policies, practices or programmes in childcare services. This could include impacts on child health (for example, an increase in child injury following the implementation of physical activity-promoting practices) or development, service operation or staff attitudes (for example, impacts on staff motivation or cohesion) or the displacement of other key programmes, curricula or practices.
4. Any measure of child diet, physical activity (including sedentary behaviours) or weight status. Such measures could be derived from any data source including direct observation, questionnaire, or anthropometric or biochemical assessments. We excluded studies focusing on malnutrition/malnourishment.

Search methods for identification of studies

We conducted searches for peer-reviewed articles in electronic databases. We also undertook handsearching of relevant journals and the reference lists of included trials.

Electronic searches

We searched the following electronic databases: the Cochrane Central Register of Controlled trials (CENTRAL) (2015, Issue 7), MEDLINE (1950 to 2015), MEDLINE In Process (up to 2015), EMBASE (1947 to 2015), PsycINFO (1950 to 2015), ERIC (up to 2015), CINAHL (up to 2015) and SCOPUS (up to 2015). We adapted the MEDLINE search strategy for the other databases and we included filters used in other systematic reviews for population (childcare services) (Zoritch 2000), physical activity (Dobbins 2013), healthy eating (Jaime 2009), and obesity (Waters 2011).

A search filter for intervention type (implementation interventions) was based on previous reviews (Rabin 2010), and a glossary of terms in implementation and dissemination research (Rabin 2008). See Appendix 1 for the detailed search strategy.

An experienced librarian (DB) searched the electronic databases.

Searching other resources

We searched the reference lists of all included trials for citation of other potentially relevant trials. We conducted handsearches of all publications for the past five years in the journal *Implementation Science* and the *Journal of Translational Behavioural Medicine* as they are the leading implementation journals in the field. We also performed handsearches of the reference lists of included trials. Furthermore, we conducted searches of the World Health Organization International Clinical Trials Registry Platform (www.who.int/ictpr/) and ClinicalTrials.gov (www.clinicaltrials.gov). We included studies identified in such searches, which have not yet been published, in the 'Characteristics of ongoing studies' table. We also made contact with the authors of included trials, experts in the field of implementation science and key organisations to identify any relevant ongoing or unpublished trials or grey literature publications.

Data collection and analysis

Selection of studies

Two review authors (from pool of six authors: JJ, LW, CMW, AJW, KS and SLX) independently screened abstracts and titles. Review authors were not blind to the author or journal information. We conducted the screening of studies using a standardised screening tool developed based on the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011), which we piloted before use. We obtained the full texts of manuscripts for all potentially eligible trials for further examination. For all manuscripts, we recorded information regarding the primary reason for exclusion and documented this in the 'Characteristics of excluded studies' table. We included the remaining eligible trials in the review. We resolved discrepancies between review authors regarding study eligibility by consensus. In instances where the study eligibility could not be resolved via consensus, a third review author made a decision.

Data extraction and management

Two review authors (from pool of five authors: JJ, MF, RW, FT, TS), unblinded to author or journal information, independently extracted information from the included trials. We recorded the information extracted from the included trials in a data extraction form that we developed based on the recommendations of the Cochrane Public Health Group Guide for Developing a Cochrane

Protocol (Cochrane Public Health Group 2011). We piloted the data extraction form before the initiation of the review. We resolved discrepancies between review authors regarding data extraction by consensus and, where required, via a third review author.

We extracted the following information:

1. Study eligibility as well as the study design, date of publication, childcare service type, country, participant/service demographic/socioeconomic characteristics and number of experimental conditions, as well as information to allow assessment of study risk of bias.
2. Characteristics of the implementation strategy, including the duration, number of contacts and approaches to implementation, the theoretical underpinning of the strategy (if noted in the study), information to allow classification against the EPOC taxonomy, and to enable an assessment of the overall quality of evidence using the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) approach, as well as data describing consistency of the execution of the intervention with a planned delivery protocol.
3. Trial primary and secondary outcomes, including the data collection method, validity of measures used, effect size and measures of outcome variability.
4. Source(s) of research funding and potential conflicts of interest.

Assessment of risk of bias in included studies

Overall risk of bias

Two review authors (MK and FT) assessed risk of bias independently using the 'Risk of bias' tool described in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011). We provided an overall risk of bias ('high', 'low' or 'unclear') for each included study based on consideration of study methodological characteristics (sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective outcome reporting and 'other' potential sources of bias). Where required, a third review author adjudicated discrepancies regarding the risk of bias that could not be resolved via consensus. We included an additional criterion 'potential confounding' for the assessment of the risk of bias in non-randomised trial designs (Higgins 2011). We also included additional criteria for cluster-randomised controlled trials including 'recruitment to cluster', 'baseline imbalance', 'loss of clusters', 'incorrect analysis' and 'compatibility with individually randomised controlled trials' (Higgins 2011). We documented the risk of bias of the included studies in 'Risk of bias' tables.

Measures of treatment effect

Differences in measures and the primary and secondary outcomes reported in the included studies precluded the use of summary

statistics to describe treatment effects. As such, the methods and outcomes of the included trials are comprehensively described in narrative form according to broad implementation strategy characteristics.

Unit of analysis issues

Clustered studies

We examined clustered trials for unit of analysis errors. We identified trials with unit of analysis errors in the 'Risk of bias' tables.

Dealing with missing data

We contacted the authors of included trials to provide additional information if any outcome data were unclear or missing. All information we received was included in the results of the review. We noted any instances of potential selective or incomplete reporting of outcome data in the 'Risk of bias' tables.

Assessment of heterogeneity

We were unable to perform an assessment of heterogeneity due to considerable variability in terms of study interventions, outcomes, measures and comparators. Therefore we were unable to explore heterogeneity via box plots, forest plots and/or the I^2 statistic (Higgins 2011). Instead the potential implications of trial heterogeneity are outlined in the *Discussion*.

Assessment of reporting biases

The comprehensive search strategy for this review helped to reduce the risk of reporting bias. We also conducted comparisons between published reports and trial protocols, and trial registers where such reports were available. Instances of potential reporting bias are documented in the 'Risk of bias' tables.

Data synthesis

We narratively synthesised trial findings according to the implementation strategies employed and the outcome measures reported. We used the EPOC taxonomy to classify implementation strategies (EPOC 2015). As the trial heterogeneity precluded meta-analysis we described the effects of interventions by reporting the absolute effect size of the primary outcome measure for policy or practice implementation for each study. We calculated the effect size by subtracting the change from baseline on the primary implementation outcome for the control or comparison group from the change from baseline in the experimental or intervention group. If data to enable calculation of the change from baseline were unavailable, we used the differences between groups

post-intervention. Where there were two or more primary implementation outcome measures, we used the median effect size of the primary outcomes. Where the primary outcome measure was not explicitly identified by the study authors in the published manuscripts we used the implementation outcome on which the trial sample size calculation was based or, in its absence, we took the median effect size of all measures of policy or practice outcomes reported in the manuscript. Such an approach was previously used in the Cochrane Review of the effects of audit and feedback on professional practices published by the Cochrane EPOC Group (Ivers 2012). In instances where a number of subscales of an overall implementation score were reported in addition to a total scale score, we used the total score as the primary outcome to provide a more comprehensive measure of implementation. We reverse scored implementation measures that did not represent an improvement (for example, the proportion of services without a nutrition policy). We present the effects of interventions according to the implementation strategies (classified using the EPOC taxonomy) employed by included studies and, within such grouping, based on the outcome data (continuous or dichotomous) reported.

We included a 'Summary of findings' table to present the key findings of the review ([Summary of findings for the main comparison](#)). We generated the table based on the recommendations of the *Cochrane Handbook for Systematic Reviews of Interventions* and the EPOC Group and included i) a list of all primary and secondary outcomes in the review; ii) a description of intervention effect, iii) the number of participants and studies addressing each outcome, and iv) a grade for the overall quality of the body of evidence for each outcome. In particular, the table provides key information concerning the quality of evidence, the magnitude of effect of the interventions examined and the sum of available data on the main outcomes.

Two review authors (LW and JJ) rated the overall quality of evidence for each outcome using the GRADE system (Guyatt 2010), with any disagreements resolved via consensus or, where required, by a third review author. The GRADE system defines the quality of the body of evidence for each review outcome regarding the extent to which one can be confident in the review findings. The GRADE system required an assessment of methodological quality, directness of evidence, heterogeneity, precision of effect estimates and risk of publication bias. We used the GRADE quality ratings (from 'very low' to 'high') to describe the quality of the body of evidence for each review outcome and we included these

in '[Summary of findings for the main comparison](#)'.

Subgroup analysis and investigation of heterogeneity

Data were insufficient to conduct subgroup analysis or enable quantitative exploration of heterogeneity. Nonetheless clinical and methodological heterogeneity of included studies is described narratively. To describe the impact of implementation strategies delivered 'at scale' (defined as involving 50 or more childcare services) we performed subgroup analyses narratively for the primary implementation outcomes. Specifically we performed subgroup analyses where included studies sought to improve implementation of policies, practices or programmes across 50 or more services.

Sensitivity analysis

We did not perform sensitivity analysis by removing studies with a high risk of bias or by removing outliers contributing to statistical heterogeneity as marked heterogeneity precluded pooled analysis.

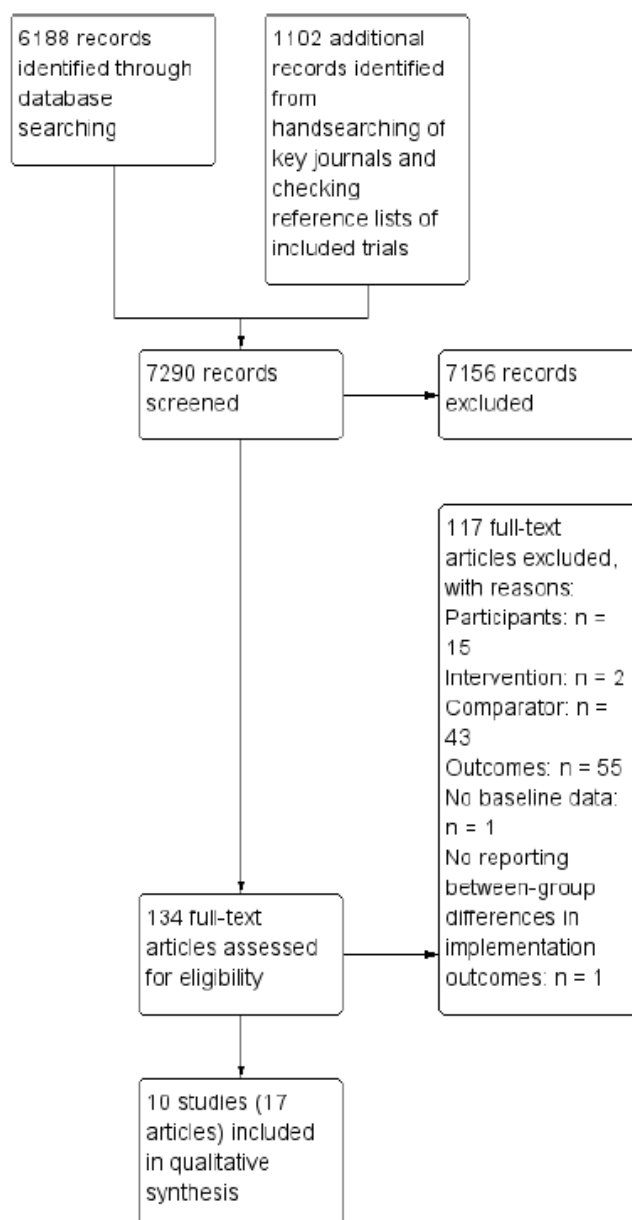
RESULTS

Description of studies

See [Characteristics of included studies](#); [Characteristics of excluded studies](#); [Characteristics of ongoing studies](#)

Results of the search

The electronic search, conducted on 3 August 2015, yielded 6188 citations ([Figure 1](#)). We identified an additional 1102 records from handsearching key journals and checking reference lists of included trials. We identified no additional records through our contact with the authors of included trials, experts in the field of implementation science and key organisations. Following screening of titles and abstracts, we obtained the full texts of 134 manuscripts for further review, of which we included 17 manuscripts describing 10 individual trials. We contacted the authors of five included trials to provide additional information where any outcome data were unclear or missing. All authors responded and the information we received was included in the results of the review. We identified four studies as ongoing studies that have not yet been published through searches of clinical trial registration databases.

Figure 1. Study flow diagram.

Included studies

Types of studies

The trials were predominantly conducted in the USA ($n = 5$) (Alkon 2014; Benjamin 2007; Gosliner 2010; Ward 2008; Williams 2002), and Australia ($n = 4$) (Bell 2014; Finch 2012; Finch 2014; Hardy 2010), but also included a study from Ireland ($n = 1$) (Johnston Molloy 2013). Studies were conducted between 1995 and 2012, although two studies did not report the years of data collection (Benjamin 2007; Gosliner 2010). There was considerable heterogeneity in the participants, interventions and outcomes (clinical heterogeneity), and the study design characteristics (methodological) of included studies.

Participants

Of the 10 included trials, seven recruited childcare services located in disadvantaged areas or specifically serving disadvantaged low-income or minority children (Alkon 2014; Bell 2014; Finch 2012; Finch 2014; Gosliner 2010; Johnston Molloy 2013; Williams 2002). The socio-economic characteristics of the service locality or the children attending was not described in the remaining three trials. There was considerable variability in the number of participating childcare services in the included studies. The largest trial recruited 583 preschools (Bell 2014). However, most trials recruited 20 or fewer childcare services (Alkon 2014; Benjamin 2007; Finch 2014; Gosliner 2010; Williams 2002), with the smallest trial recruiting just nine services. Three trials sought to improve implementation of policies, practices or programmes in 50 or more services (Bell 2014; Finch 2012; Ward 2008). Six of the 10 included trials were conducted by two research groups in the USA and Australia and all were conducted in high-income countries (Alkon 2014; Bell 2014; Benjamin 2007; Finch 2012; Finch 2014; Ward 2008).

Interventions

Two trials targeted the implementation of healthy eating policies or practices only (Bell 2014; Williams 2002), two targeted the implementation of physical activity policies and practices only (Finch 2012; Finch 2014), and six targeted both healthy eating and physical activity policies and practices (Alkon 2014; Benjamin 2007; Gosliner 2010; Hardy 2010; Johnston Molloy 2013; Ward 2008). All trials used multiple implementation strategies. The strategies tested examined only a small number of those described in the EPOC taxonomy that could be applied to improve implementation in the setting. The definitions of each of the EPOC subcategories used to classify implementation strategies employed by stud-

ies included in the review are provided in Table 1. Using the EPOC taxonomy descriptors, all trials included educational meetings and educational materials (Alkon 2014; Bell 2014; Benjamin 2007; Finch 2012; Finch 2014; Gosliner 2010; Hardy 2010; Johnston Molloy 2013; Ward 2008; Williams 2002). One trial utilised these strategies with the addition of audit and feedback (Johnston Molloy 2013). Three trials combined educational meetings and educational materials with educational outreach visits or academic detailing (Alkon 2014; Benjamin 2007; Ward 2008), and three trials utilised these strategies with the addition of small incentives of financial grants not otherwise specified (Gosliner 2010; Hardy 2010; Williams 2002). Two studies tested an intervention consisting of educational meetings and educational materials with audit and feedback, the use of opinion leaders and small incentives (Bell 2014; Finch 2012), and one study tested the impact of an implementation strategy comprising educational meetings and educational materials, academic detailing, audit and feedback, opinion leaders and small incentives (Finch 2014). Four studies reported that strategies to support implementation were theoretically based (Bell 2014; Benjamin 2007; Finch 2014; Ward 2008), and the theories adopted included components of social cognitive theory against a social-ecologic framework (Benjamin 2007; Ward 2008), practice change and capacity building theoretical frameworks (Bell 2014), and social-ecological models of health behaviour change (Finch 2014).

Outcomes

Implementation was primarily assessed using telephone interview, surveys/questionnaires completed by childcare service staff or audits of service documents conducted by researchers (Bell 2014; Benjamin 2007; Finch 2012; Gosliner 2010; Hardy 2010; Williams 2002), or by direct observation (Alkon 2014; Finch 2014; Johnston Molloy 2013; Ward 2008). The validity of four of the five trials utilising a survey/questionnaire to assess implementation was not reported (Bell 2014; Finch 2012; Gosliner 2010; Hardy 2010). In one trial outcome assessments were conducted immediately post-intervention, and one and four months post-intervention (Benjamin 2007), while the remaining studies included follow-up ranging from up to five to six months (Hardy 2010), 22 months (Bell 2014), or four years after initiation of the intervention (Johnston Molloy 2013). Three trials reported outcomes of both implementation and a measure of child healthy eating, physical activity or weight status (Alkon 2014; Finch 2014; Williams 2002), two trials included measures of childcare service staff knowledge, skills or attitudes (Finch 2012; Hardy 2010), one trial included a measure of potential adverse effects (Finch 2014), and none reported costs or cost-effectiveness analyses.

Study design characteristics

Seven of the included studies were randomised trials (or cluster-randomised trials) (Alkon 2014; Benjamin 2007; Finch 2014; Gosliner 2010; Hardy 2010; Johnston Molloy 2013; Ward 2008), and three were non-randomised trials with a parallel control group (Bell 2014; Finch 2012; Williams 2002).

Eight trials compared an implementation strategy to usual practice or a no intervention control (Alkon 2014; Bell 2014; Benjamin 2007; Finch 2012; Finch 2014; Hardy 2010; Ward 2008; Williams 2002). Two trials directly compared two different implementation strategies (Gosliner 2010; Johnston Molloy 2013). Four studies utilised a convenience sample of childcare services (Alkon 2014; Benjamin 2007; Johnston Molloy 2013; Ward 2008). Four trials attempted to recruit all eligible services in the study region (Bell 2014; Finch 2012; Hardy 2010), or randomly approached services within a study region to participate (Finch 2014), the service level participation rate of such studies ranging from 48% (Hardy 2010) to 91% (Bell 2014). The sampling procedures of two trials were unclear (Gosliner 2010; Williams 2002).

We judged implementation to be the primary outcome in seven trials (Alkon 2014; Bell 2014; Benjamin 2007; Finch 2012; Gosliner 2010; Johnston Molloy 2013; Ward 2008), and a secondary outcome in the remaining three trials (Finch 2014; Hardy 2010; Williams 2002), based on the stated aims of the trial. A variety of outcome measures were employed by the included studies. Seven trials included continuous measures of implementation outcomes including policy or environment scores (Alkon 2014; Benjamin 2007; Johnston Molloy 2013; Ward 2008), minutes of policy or programme implementation (Finch 2012; Finch 2014; Hardy 2010), frequency of policy or programme implementation (Finch 2014; Hardy 2010), or quantity of food or beverages or macronutrients provided to children (Bell 2014; Williams 2002). Six trials reported a dichotomous measure of implementation, including the percentage of staff or childcare services that implemented

a policy, practice or programme (Alkon 2014; Bell 2014; Finch 2012; Finch 2014; Gosliner 2010; Hardy 2010). Assessment of implementation included observation of childcare environments (Alkon 2014; Finch 2014; Johnston Molloy 2013; Ward 2008), audits of menus (Bell 2014; Williams 2002), or telephone interviews or surveys/questionnaires completed by staff of childcare services (Bell 2014; Benjamin 2007; Finch 2012; Gosliner 2010; Hardy 2010) (see Table 2).

Excluded studies

Following screening of titles and abstracts, we obtained the full texts of 134 manuscripts for further review for study eligibility (Figure 1). Of these, we considered 115 studies ineligible following the trial screening process (reasons for exclusion included: participants $n = 15$; intervention $n = 2$; comparator $n = 43$; outcomes $n = 55$). We excluded a study based on 'inappropriate outcomes' if it did not report implementation outcomes, if it did not report implementation outcomes for both intervention and control groups and if it did not report between-group differences in implementation outcomes. We excluded an additional study following the commencement of data extraction as it did not report between-group differences in implementation outcomes (Korwanich 2008). A further two studies did not collect baseline data (De Silva-Sanigorski 2012; Gosliner 2010). We retained one of these studies as it was a randomised trial and therefore the examination of post-intervention differences between groups was considered to be valid (Gosliner 2010).

Risk of bias in included studies

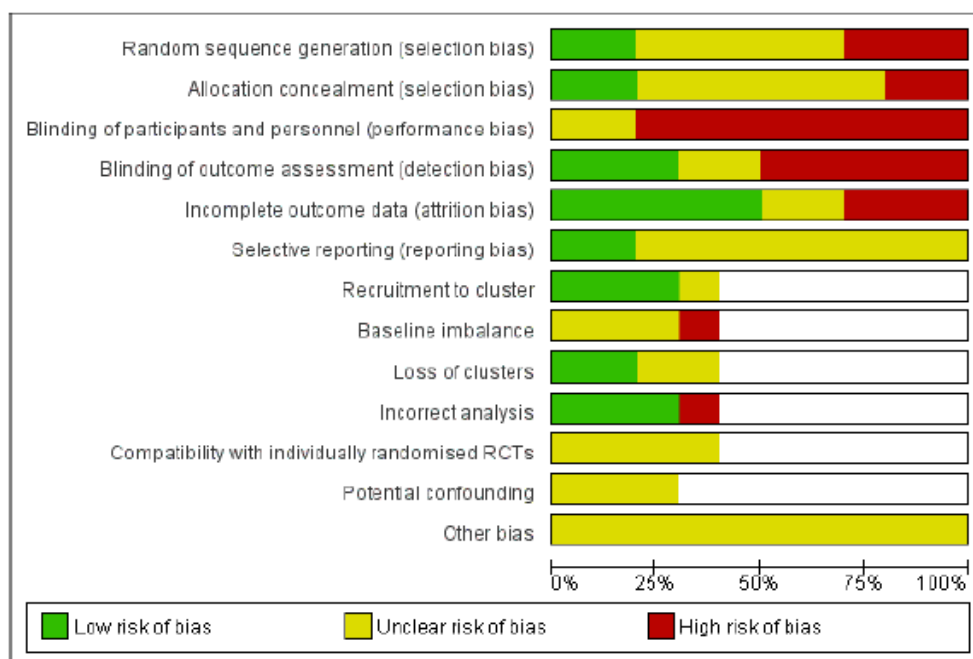
See Characteristics of included studies.

The level of risk of bias is presented separately for each study in Figure 2 and as a combined study assessment of risk of bias in Figure 3.

Figure 2. 'Risk of bias' summary: review authors' judgements about each risk of bias item for each included study.

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Recruitment to cluster	Baseline imbalance	Loss of clusters	Incorrect analysis	Compatibility with individually randomised RCTs	Potential confounding	Other bias
Alkon 2014	?	?	-	+	+	?	+	?	?	+	?		?
Bell 2014	-	-	-	-	-	?						?	?
Benjamin 2007	?	?	-	-	?	?	?	?	?	-	?		?
Finch 2012	-	-	?	-	?	?						?	?
Finch 2014	+	+	-	+	+	+	+	-	+	+	?		?
Gosliner 2010	?	?	-	-	-	?							?
Hardy 2010	?	?	-	-	+	?	+	?	+	+	?		?
Johnston Molloy 2013	+	+	?	?	-	?							?
Ward 2008	?	?	-	+	+	?							?
Williams 2002	-	?	-	?	+	+						?	?

Figure 3. 'Risk of bias graph': review authors' judgements about each risk of bias item presented as percentages across all included studies.



Allocation

Risk of selection bias differed across studies. Only two of the studies were low risk as computerised random number functions and tables were used to generate random sequences and allocation was undertaken automatically in a single batch, preventing allocation from being pre-empted (Finch 2014; Johnston Molloy 2013). For the three studies with quasi-experimental, non-randomised designs, the risk of selection bias was high (Bell 2014; Finch 2012; Williams 2002). For the remaining five studies, such bias was unclear as these studies did not report on random sequence generation or concealment of allocation.

Blinding

For the majority of studies ($n = 8$), the risk of performance bias was high due to participants and research personnel not being blind to group allocation. For the remaining two studies the risk of performance bias was unclear as in both studies the control group also

received some form of intervention (Finch 2012; Johnston Molloy 2013). Detection bias differed across studies based on whether outcome measures were objective (e.g. body mass index (BMI)) (low risk) or self-reported (high risk), and whether research personnel were blind to group allocation when conducting outcome assessment (low risk). For three studies, the risk of detection bias was low for all outcomes included in this review (Alkon 2014; Finch 2014; Ward 2008). For the remainder of the studies ($n = 7$), the risk of detection bias was high, low or unclear across one or more outcome measures.

Incomplete outcome data

For half the studies ($n = 5$), the risk of attrition bias was low as either all or most participating services were followed up and/or sensitivity analysis was conducted to assess the impact of missing data. For two studies the risk of such bias was high due to a large

difference in the proportion of participating services lost to follow-up between groups (Bell 2014; Johnston Molloy 2013). Risk of attrition bias was also high for the study conducted by Gosliner and colleagues (Gosliner 2010), as participants who did not complete the intervention were excluded from the analysis. For the remaining studies the risk of attrition bias was unclear as it was unclear whether incomplete outcome data had been addressed adequately.

Selective reporting

For the majority of the studies ($n = 8$) a published protocol paper or trial registration record was not identified and therefore it was unclear whether reporting bias had occurred. For the remaining two studies the risk of reporting bias was low as protocol papers were available and all *a priori* determined outcomes were reported (Finch 2014; Williams 2002).

Other potential sources of bias

For the four studies that were cluster-randomised controlled trials, we assessed the potential risk of additional biases (Alkon 2014; Benjamin 2007; Finch 2014; Hardy 2010).

For the potential risk of recruitment (to cluster) bias, three of these studies were low risk as either a random, quasi-random or census approach was used for recruitment (Alkon 2014; Finch 2014; Hardy 2010).

Regarding risk of bias due to baseline imbalances, three studies were at unclear risk (Alkon 2014; Benjamin 2007; Hardy 2010), while one study was at high risk due to baseline imbalances in service characteristics, with no mention of adjustments within the analysis (Finch 2014).

Two studies were low risk for loss of clusters as either all children were followed up or there was no loss of clusters (Finch 2014; Hardy 2010).

For incorrect analysis, three studies were low risk (Alkon 2014; Finch 2014; Hardy 2010), while the remaining study was high risk as no statistical analysis was undertaken due to the small sample size (Benjamin 2007).

All four cluster-randomised controlled trials were at unclear risk for compatibility with individually randomised controlled trials as we were unable to determine whether a herd effect existed (Alkon 2014; Benjamin 2007; Finch 2014; Hardy 2010).

For the three studies with quasi-experimental, non-randomised designs (Bell 2014; Finch 2012; Williams 2002), we also considered the potential risk of bias due to confounding factors. For all three studies it was unclear whether confounders were adequately adjusted for.

Effects of interventions

See: [Summary of findings for the main comparison](#)

See [Summary of findings for the main comparison](#); Table 2.

Most studies reported improvement in at least one of the policies or practices targeted by the implementation support strategy. Of the eight trials that compared an implementation strategy to usual practice or a no intervention control, seven reported statistically significant improvements in the implementation of at least one of the targeted policies or practices relative to control (Alkon 2014; Bell 2014; Finch 2012; Finch 2014; Hardy 2010; Ward 2008; Williams 2002). For trials comparing implementation strategies against a non-intervention or usual practice control, the absolute effect of the primary implementation outcome was as follows: among the three trials that reported score-based measures of implementation the scores ranged from 1 to 5.1 (Alkon 2014; Benjamin 2007; Ward 2008); across four trials reporting the proportion of staff or services implementing a specific policy or practice this ranged from 0% to 9.5% (Alkon 2014; Bell 2014; Finch 2012; Finch 2014; Hardy 2010); and in three trials reporting the time (per day or week) staff or services spent implementing a policy or practice this was 4.3 minutes to 7.7 minutes (Table 2). Two trials reported comparing two different implementation strategies: the first reported no significant improvement on any measure of implementation (Johnston Molloy 2013), while the second reported significant improvements in two of the eight implementation outcomes reported (Gosliner 2010).

The effects of interventions are presented according to the implementation strategies (classified using the Cochrane Effective Practice and Organisation of Care (EPoC) Group taxonomy) employed by included studies and, within such grouping, based on the outcome data (continuous or dichotomous) reported.

Primary outcome

1. Education materials, manager and staff educational meetings, and audit and feedback versus educational materials, manager educational meetings, and audit and feedback

Continuous outcomes

Johnston Molloy and colleagues conducted a randomised, parallel-group trial testing two training-based interventions to improve implementation of nutrition and health-related activity practices in Irish full daycare services (preschools) (Johnston Molloy 2013). Services were randomised to a 'manager and staff trained' group ($n = 31$) or a 'manager trained' only group ($n = 30$). Eighteen services in the 'manager and staff training' group and 24 in the 'manager trained' group provided follow-up data and were included in the main analysis. There was no single primary implementation outcome reported in the trial, however the total Preschool Health Promotion Activity Scored Evaluation score did not differ significantly between groups (absolute difference in median scores between 'manager and staff trained' versus 'manager trained' only

group = -2), with median total scores improving from 15 to 34 in the 'manager and staff trained group' and 13 to 34 in the 'manager trained' only group ($P = 0.84$). Similarly, there were no significant between-group differences on any of the four subscale measures of nutrition environment, food service, meals or snacks.

2. Educational materials, educational meetings and educational outreach visits or academic detailing versus usual practice control

Continuous outcomes

Three trials assessed the impact of implementation strategies using self-assessment or observational assessment scores of the childcare environment, or childcare policies and practices (Alkon 2014; Benjamin 2007; Ward 2008). All trials assessed the effects of implementation strategies consisting of educational materials, education meetings and educational outreach visits or academic detailing (Alkon 2014; Benjamin 2007; Ward 2008). The absolute effect size for the primary implementation outcome (based on a total scale score where provided, or the median absolute effect size where multiple implementation outcomes are reported) ranged from 1 for the implementation strategies tested by Ward and colleagues and assessed via researcher observation of childcare environment (Ward 2008), to a 5.09 point improvement in Nutrition and Physical Activity Self-Assessment for Child Care (NAPSACC) self-assessment score among services receiving implementation support in a trial by Benjamin and colleagues (Benjamin 2007).

All three studies, Alkon 2014, Benjamin 2007 and Ward 2008, assessed the effectiveness of implementation of the NAPSACC programme (Ammerman 2007). The first was a randomised pilot study to assess the feasibility, acceptability and impact of the programme, which targeted implementation of 15 key service nutrition and physical activity policies and practices (Benjamin 2007). A convenience sample of eight counties in North Carolina, USA were randomised to an intervention group or control (six intervention counties and two control). Between two and five childcare services were approached per county and 15 services in the intervention and four in the control region participated. Implementation support was delivered by childcare health consultants (typically registered nurses) who were provided a NAPSACC tool kit and resources. Changes in policy and practice implementation were re-assessed using the NAPSACC self-assessment survey completed by service managers immediately following the six-month intervention. At follow-up, two intervention services had withdrawn and one had closed. The trial found no significant change in the NAPSACC self-assessment survey score completed by service managers in the intervention relative to the control group between baseline and immediately post-intervention (mean difference (MD) 5.10, 95% confidence interval (CI) -2.80 to 13.00, $P = 0.21$) (Benjamin 2007).

The second evaluation of the NAPSACC programme utilised a randomised controlled trial design (Ward 2008). A convenience sample of 30 childcare health consultants in North Carolina were randomised to an intervention ($n = 20$) or delayed intervention control group ($n = 10$). A convenience sample of 84 licensed childcare services associated with participating health consultants were then recruited. The primary trial outcome (change in nutrition and physical activity environment score) data were collected at baseline and immediately following the six-month intervention using the Environment and Policy Assessment and Observation (EPAO) tool. There were significant improvements in total EPAO score among services receiving implementation support (MD 1.01, 95% CI 0.18 to 1.84, $P = 0.02$). There were no significant differences between groups at follow-up for either the nutrition (MD 0.90, 95% CI 0.19 to 1.61, $P = 0.06$) or physical activity (MD 1.15, 95% CI -0.21 to 2.51, $P = 0.19$) environment subscales.

In the third study, Alkon and colleagues reported the findings of a randomised controlled trial of the NAPSACC programme conducted in 17 childcare services serving predominantly low-income families (Alkon 2014). Nutrition and physical activity policies were evaluated by a research assistant using the California Childcare Health Program Health and Safety Policy Checklist (CCH-SPHSPC), while a modified version of the EPAO tool was completed by a research assistant to assess nutrition and physical activity practices during a one-day observation. The trial found a significant increase in the mean policy scores, reflecting improvements in quantity and quality of nutrition and physical activity policies among intervention services at follow-up. The mean nutrition policy score increased from 0.89 at baseline to 5.17 at follow-up, with no change (0.0) in the mean score within the control group. The mean physical activity policy score increased from 0 at baseline to 2.82 at follow-up, with no change in the mean score within the control group (0.0). There were no significant differences in unadjusted nutrition (MD 0.07, 95% CI -0.16 to 0.30, $P = 0.55$) or physical activity (MD 0.00, 95% CI -0.29 to 0.29, $P = 1.00$) EPAO scores between groups at follow-up. Total EPAO score was not reported.

Dichotomous outcomes

The trial by Alkon and colleagues also assessed the impact of such an implementation strategy on the types and portions of all foods and beverages served to children in care. Assessments were conducted by direct observations conducted by researchers using the Diet Observation in Child Care (DOCC) tool, a validated instrument (Alkon 2014). At follow-up there were no significant differences between groups on 10 measures of the types and portions of foods and beverages offered to children. Non-significant improvements favouring intervention services were observed in the offering of: healthy foods (intervention +8%, control +1%); low- or non-fat milk (intervention +10%, control +2%); and low-fat meats and beans (intervention +17%, control -8%) (no other data

reported).

3. Educational materials, educational meetings, educational outreach visits or academic detailing with small incentives or grants versus usual practice control

Continuous outcomes

Two trials assessed the effectiveness of implementation strategies consisting of educational materials, educational meetings, educational outreach visits or academic detailing and incentives, and utilised continuous measures of implementation (Hardy 2010; Williams 2002). However, the measures used in each trial differed. Hardy and colleagues utilised a number of implementation measures including the duration (in minutes) (three measures) or frequency (three measures) of staff or service implementation of practices or programmes (Hardy 2010). Williams and colleagues reported changes in the macronutrients of foods served to children (Williams 2002). The primary outcome for the trial conducted by Williams was the fat content of childcare meals. The effect size of the primary implementation outcome for both trials can be seen in Table 2.

Hardy and colleagues conducted a cluster-randomised controlled trial to evaluate the 'Munch and Move' programme in one state of Australia (New South Wales) (Hardy 2010). All 61 government services (preschools) in the study region were invited to participate in the trial and 29 consented and were randomised. To assess policy and practice implementation, interviews with all service managers occurred at baseline and immediately following the five-month intervention. The frequency of service provided in fundamental movement skill activities for children increased from 1.3 sessions per week to 3.2 sessions per week in the intervention group whilst remaining unchanged among control services, a difference that was statistically significant (difference at follow-up of 1.5, 95% CI 0.01 to 2.9, $P = 0.05$). There were no significant differences between groups in the frequency of structured play sessions per week (adjusted difference 0.02, 95% CI -1.5 to 1.5), or unstructured play sessions per week (adjusted difference not reported). There were significant differences for the three measures assessing minutes per session of structured play (adjusted difference 0.09, 95% CI -11.6 to 11.8), unstructured play (adjusted difference 7.7, 95% CI -15.6 to 31.0) or fundamental movement skill sessions (adjusted difference 3.4, 95% CI -9.7 to 16.5). There were no significant differences between groups on any of the four measures of nutrition policy or practice implementation including food-based activities, rules around food and food policies (effect sizes not reported).

Williams and colleagues conducted a quasi-experimental trial of a preschool education and food service intervention conducted in Head Start Centers in upstate New York (Bollella 1999; D'Agostino 1999; Spark 1998; Williams 1998; Williams 2002;

Williams 2004). The primary aim was to reduce the saturated fat content of service meals and to reduce consumption of saturated fat by children. Six services received either a food service intervention with nutrition classroom education curricula or an identical food service intervention with a classroom safety component. Both of these groups received implementation support to improve food service. Three other childcare services with food operations not amenable to modification served as a control and received safety education curricula. Implementation of menus with nutrient content consistent with guideline recommendations was assessed by obtaining menu recipes and food labels over a five-day period. The trial found statistically significant within-group reductions in grams of saturated fat of food listed on menus, the primary implementation outcome, reducing from 11.3 grams (standard deviation (SD) ± 1.9) to 7.6 grams (SD ± 1.7) at the 18-month follow-up. Significant within-group changes were also identified for percentage of energy (kcal) from fat, reducing from 31.0 (SD ± 2.6) to 27.6 (SD ± 2.8) at six months ($P < 0.05$) and to 25.0 (SD ± 2.6) at 18 months ($P < 0.01$). Similarly, the percentage of energy (kcal) from saturated fat reduced from 12.5 (SD ± 1.4) to 10.3 (SD ± 1.4) at six months (not significant) and to 8.0 (SD ± 1.2) at the 18-month follow-up ($P < 0.05$) within the intervention group. There were no significant changes in these measures within the control group. Statistical comparisons between groups were not conducted. No other statistically significant changes were reported within either group for the 15 other nutrients measured at 18-month follow-up.

Dichotomous outcomes

Hardy and colleagues also reported trial outcomes using dichotomous measures (Hardy 2010). There were no significant differences between groups on any measures of nutrition policy or practice implementation including the conduct of food-based activities, development of new rules around food and drinks bought from home, and the provision of health information to families, with the effect sizes relative to control ranging from -7% to 31% ($P > 0.05$).

4. Educational materials, educational meetings, educational outreach visits or academic detailing with small incentives or grants with staff wellness programme versus educational materials, educational meetings, educational outreach visits or academic detailing

Dichotomous outcomes

Gosliner and colleagues conducted a randomised trial with staff from childcare services in California, USA to assess the impact of an intervention on the nutrition and physical activity environment of childcare services (Gosliner 2010). Childcare services that were participating in a health education and policy development

project (Child Health and Nutrition Center Enhancement) were matched on city of location and randomised to an intervention or control group. All services received multi-strategic implementation support. In addition, staff of intervention services received a wellness programme consisting of individual health assessments (conducted by the research team); monthly newsletters and information with pay-checks promoting healthy eating and nutrition; a group walking programme where staff received collective incentive rewards as they reached milestones; and staff follow-up support visits. At 10-month follow-up there were significant improvements in two of the eight implementation measures. Specifically, staff at intervention services were significantly more likely to report providing fruit 'more often' to children in children's meals or snacks during the past year (74% of staff) compared to staff at control services (41% of staff) ($P = 0.004$). Similarly, staff at intervention services were significantly more likely to report providing vegetables 'more often' to children in children's meals or snacks during the past year (64% of staff) compared to staff at control services (38% of staff) ($P = 0.03$). There were no significant differences between groups in the provision of sweetened beverages (intervention 7%, control 8%) and sweetened foods (intervention and control 5%) (P values not reported). At children's celebrations during the past year, staff at intervention services were significantly more likely to report providing fresh fruit (39% of staff) compared to staff at control services (24% of staff) ($P = 0.05$). Further, intervention staff reported providing fewer sweetened beverages (7% of staff) compared to control (27% of staff) ($P = 0.05$) and fewer sweetened foods (intervention 15%, control 34%) ($P = 0.025$). There were no differences between groups in the provision of vegetables at children's celebrations (intervention 32%, control 24%) (P value not reported).

5. Educational materials, educational meetings, audit and feedback, opinion leaders and small incentives versus usual practice control

Two trials assessed the effectiveness of implementation strategies consisting of educational materials, educational meetings, audit and feedback, opinion leaders and small incentives (Bell 2014; Finch 2012). Bell and colleagues reported the impact of the implementation strategy on four continuous measures of the quantity (number of food items or food served) of food served to children (Bell 2014). The absolute effect size of the primary implementation outcome for this measure (calculated as the median effect across the four measures) was 0.5 serves/items (range 0.4 to 0.8). Finch and colleagues reported a single continuous measure assessing the impact of an implementation strategy on the time spent in structured physical activities (Finch 2012). Both trials also report dichotomous measures of the proportion of services implementing a policy or practice. The absolute effect size of the primary implementation outcome for these measures was 1% (range -4% to 41%) in the trial by Finch and colleagues (calculated as the

median across 10 measures) and 9.5% (range 2% to 36%) in the trial by Bell and colleagues (calculated as the median across 10 measures).

Continuous outcomes

Finch and colleagues conducted a quasi-experimental trial of a strategy to increase implementation of physical activity-promoting policies and practices in centre-based childcare services (Finch 2012). All services located within the Hunter New England geographic area of New South Wales, Australia ($n = 338$) were invited to participate in the intervention and received support to implement a number of policies and practices to promote child physical activity in care. A 10% sample of services in the rest of the state ($n = 268$) were randomly selected to serve as a comparison group. Services in the comparison region had the opportunity to receive government support to implement 'Munch and Move' (described above), a programme targeting similar policies and practices but utilising a less intensive series of implementation support (Hardy 2010). Implementation of physical activity practices was assessed at baseline and between eight and 12 months post-intervention via a telephone interview administered to service managers. At follow-up there was no significant difference between groups in time spent in structured physical activities (intervention +0.2 hours, control +0.1 hours, $P = 0.65$).

In Australia, Bell and colleagues conducted a quasi-experimental trial to determine the impact of an implementation intervention to improve healthy eating policies and practices in centre-based childcare services (Bell 2014). All services in one geographic region of the state of New South Wales, Australia (Hunter New England) were offered the intervention ($n = 287$) and provided implementation support. A random sample of 10% of childcare services located in all other regions of New South Wales were invited to participate in the evaluation and served as a control group ($n = 296$). The trial was conducted in the context of the 'Good for Kids. Good for Life' programme but occurred over a different period to the trial by Finch and colleagues (Finch 2012). Services allocated to the control group received usual care that may have included exposure to a government childcare programme to support healthy eating and physical activity offered to services. Baseline measures were collected between December 2006 and May 2007, while the follow-up assessment occurred between March and August 2009. An audit of menus revealed that, relative to control services, intervention services were significantly more likely to have fewer high-fat, salt or sugar processed meal items (intervention -0.9 items, control -0.2 items, $P = 0.001$), fewer sweetened drinks (intervention -0.4 items, control -0.1 items, $P < 0.001$), fewer servings of fruit (intervention -0.5 serves, control -0.1 serves, $P = 0.05$) and more servings of vegetables (intervention +1.0 serves, control +0.2 serves, $P < 0.001$).

Dichotomous outcomes

In the trial by Finch and colleagues (Finch 2012), data collected via telephone interview revealed service managers in the intervention region were significantly more likely to report a physical activity policy (intervention +28%, control +4%, $P < 0.01$) with a physical activity policy that referred to limits on small screen recreation (intervention +37%, control +5%, $P < 0.01$) and with staff trained in physical activity (intervention +47%, control +6%, $P < 0.01$). There were no significant differences between intervention and control services at follow-up in the proportion that conducted daily fundamental movement sessions with recommended components (intervention +8%, control -1%, $P = 0.08$); with a policy that referred to physical activity training for staff (intervention +23%, control +8%, $P = 0.07$), where all staff usually participate in free active play (intervention +7%, control +8%), where all staff usually provide verbal prompts for physical activity (intervention +2%, control +3%), where children watch small screen recreation less than once per week (intervention -1%, control -2%), and where children participate in seated activities for no longer than 30 minutes at a time (intervention +1%, control +3%) ($P = 0.65$ to 0.95).

A number of improvements in implementation assessed using dichotomous measures were reported in the trial by Bell and colleagues (Bell 2014). Relative to the services in the control group, data from interviews with service managers found a significant increase in the proportion of services providing only water and plain milk to children (non-sweetened drinks). Within the intervention group this increased from 68% at baseline to 95% at follow-up, compared with changes from 58% to 82% in control services ($P = 0.02$). The proportion of services where parents participate in nutrition programmes or policy development significantly increased from 65% at baseline to 77% at follow-up for intervention services compared with a change from 65% to 59% in the control group ($P < 0.01$). There were no significant differences between groups in three other policies or practices examined and assessed via telephone interview with service managers. Furthermore, consistent with dietary guidelines, intervention services were significantly more likely than control services to have no sweetened drinks listed on their menu (intervention +46%, control +10%, $P < 0.001$) and the appropriate servings of fruit (intervention +34%, control +4%, $P = < 0.001$) and vegetables (intervention +20%, control +4%, $P = 0.01$) listed on the menu. There were no significant differences between groups in service guideline adherence to recommendations regarding provision of high-fat, salt and sugar processed foods or water (intervention effect sizes +9% to +10%, $P = 0.11$ to 1.00).

6. Educational materials, educational meetings, audit and feedback, opinion leaders and small incentives versus usual practice control

Continuous outcomes

Finch and colleagues conducted a randomised controlled trial with 20 centre-based childcare services in the Hunter region of the state of New South Wales, Australia (Finch 2014; Finch 2010). The intervention primarily sought to determine the effectiveness of a physical activity intervention, implemented by childcare service staff on the physical activity levels of children attending childcare. Secondary outcomes included assessment of the effectiveness of implementation strategies and the impact of the intervention on rates of child injury. The trial found that time spent by intervention services in structured physical activities increased from 23.67 (SD ± 6.03) minutes at baseline to 52.40 (SD ± 45.29) minutes at follow-up, whereas control services decreased from 37.80 (SD ± 13.33) at baseline to 27.00 (SD ± 1.41) at follow-up. This difference was significant ($P < 0.02$). There were no significant differences between groups in the number of occasions of fundamental movement skill development activity sessions (intervention +0.8 sessions, control +0.2 sessions), the number of times staff participated in active play (intervention +1.4 times, control -1.6 times); or the number of times staff provided positive statements about physical activity (intervention +1.7 times, control -10.4 times) ($P = 0.07$ to 0.08). There was little difference between groups in nine other measures of policy and practice implementation including: total minutes of fundamental movement skill development activity sessions, number of times staff prompted physical activity, total minutes of television viewing, total minutes of seated time, or the number of physical activity-promoting resources or equipment.

Dichotomous outcomes

The trial by Finch included two measures assessing the proportion of services implementing a policy or practice (Finch 2014; Finch 2010). At follow-up there was no difference between groups in the proportion of services that had a physical activity policy or that had children seated for a period exceeding 30 minutes.

Subgroup analyses of strategies to improve implementation 'at scale'

Three trials sought to implement policies or practices 'at scale', defined as more than 50 services (Bell 2014; Finch 2012; Ward 2008). The randomised trial of multiple strategies to implement the NAPSACC programme by Ward and colleagues was conducted in 56 intervention services and reported significant improvements in total EPAO score among services receiving implementation support (MD 1.01, 95% CI 0.18 to 1.84) (Ward 2008). A quasi-experimental trial of implementation support provided to more than 200 childcare services reported significant improvement, favouring the intervention group, in the proportion of intervention services with a physical activity policy (percentage change in telephone interview measure: intervention +28%, control +4%, $P < 0.01$) with a physical activity policy that referred to limits on small screen recreation (percentage change in telephone interview

measure: intervention +37%, control +5%, $P < 0.01$) and with staff trained in physical activity (percentage change in telephone interview measure: intervention +47%, control +6%, $P < 0.01$), but not eight other measures (Finch 2012). Across all 11 practices the median improvement of intervention relative to control was 2.5% (range -4% to 41%). Similarly, Bell and colleagues found, relative to the services in the control group, significant increase among services receiving implementation support in the proportion of services providing only water and plain milk to children (non-sweetened drinks) and a number of measures of the proportion of service menus with foods consistent with dietary guidelines (Bell 2014). Across 10 such measures, however, the median effect was 9.5% (range 2% to 36%). An audit of menus revealed that intervention services had fewer high-fat, salt or sugar processed meal items (intervention -0.9 items, control -0.2 items, $P = 0.001$), fewer sweetened drinks (intervention -0.4 items, control -0.1 items, $P < 0.001$), and more servings of vegetables (intervention +1.0 serves, control +0.2 serves, $P < 0.001$).

Secondary outcomes

Impact on childcare service staff knowledge, skills or attitudes

Two studies reported changes, relative to a comparator, in attitudes or knowledge of childcare service staff following multi-component interventions. First, surveys of service managers participating in the intervention trialled by Hardy and colleagues found no differences between groups in any of the seven items assessing staff attitudes regarding encouraging healthy eating or physical activity in children at care ($P = 0.07$ to 0.39), or three items assessing staff knowledge of recommendations regarding child intake of fruit, vegetables or recreational screen time (Hardy 2010) ($P = 0.22$ to 0.79). Second, a telephone interview of managers of services receiving the intervention in the study conducted by Finch and colleagues found a greater increase in the proportion of managers at intervention services knowing the recommendations for child participation in physical activity (from 14% at baseline to 21% at follow-up), compared to managers at control services (magnitude of increase not reported) ($P < 0.01$), but not in knowledge of the recommendations for maximum time preschool-aged children should spend in small screen recreation or being sedentary (effect sizes not reported) ($P > 0.05$) (Finch 2012).

Estimates of absolute costs or assessments of cost-effectiveness

None of the included studies reported on the costs or reported any cost analyses for the interventions.

Reported adverse consequences

One study explicitly assessed whether the intervention had unintended adverse effects. The study, by Finch and colleagues, compared the number of child injuries in the month prior assessment among intervention and comparison childcare services as reported by childcare managers at baseline and follow-up (Finch 2014). The rate of injury per month at intervention services at baseline was 0.18 (95% CI 0.09 to 0.27) and 0.17 (95% CI 0.08 to 0.27) at follow-up, and at control services was 0.12 (95% CI 0.04 to 0.20) at baseline and 0.11 (95% CI 0.03 to 0.19) at follow-up. This difference was not statistically significant ($P = 0.85$).

Effects on child diet, physical activity or weight status

Diet

In the quasi-experimental trial comparing child education curricula and a one-day food service modification training for cooks with a child curricula only control, Williams and colleagues assessed child dietary intake via direct observation during meal and snack periods (Williams 2002). The intervention was primarily focused on reducing fat, saturated fat and energy. The trial found that children attending intervention services consumed significantly less energy (-81.33 kcal), fat (-3.6 grams), saturated fat (-1.86 grams), as well as less fat as a percentage of energy (-4.48), and saturated fat as a percentage of energy (-2.87) relative to the control at the six-month follow-up during attendance at care (all $P < 0.001$). At the 18-month follow-up, the saturated fat (-2.56 grams) and fat as a percentage of energy (-10.92), and saturated fat as a percentage of energy (-5.15), remained significantly lower relative to the control group ($P < 0.001$ to 0.01). The trial also assessed changes in 13 other nutrients. Of these, intake of iron and magnesium were found to be higher among children in intervention compared with control services at the 18-month follow-up.

Physical activity

In a randomised trial of a multi-component intervention to facilitate implementation of the NAPSACC programme, Alkon and colleagues found no significant changes in the intensity or type of physical activity of children in care as assessed by the Observation System for Recording Activity in Preschools (OSRAP) tool (effect sizes and P value not reported) (Alkon 2014). There was, however, a non-significant decrease in the intervention group in the proportion of sedentary/quiet time, from 60% at baseline to 56% at follow-up, and a non-significant increase in the control group from 53% at baseline to 58% at follow-up (P value not reported). In the randomised trial of a multi-component intervention of 20 childcare services by Finch and colleagues, there was no significant difference between groups at follow-up in the step counts per minute as assessed by pedometer (Finch 2014). Mean child step

counts in the intervention group were 17.20 (95% CI 15.94 to 18.46) at baseline and 16.12 (95% CI 14.86 to 17.30) at follow-up, and in the control group were 13.78 (95% CI 12.76 to 14.80) at baseline and 13.87 (95% CI 12.57 to 15.17) at follow-up.

Weight status

Analyses of the impact of the intervention on centre-level child adiposity revealed a significant reduction in body mass index (BMI) z-score relative to the control group (coefficient -0.26, standard error (SE) 0.1, $P = 0.02$) in the trial by Alkon and colleagues (Alkon 2014). The analyses were conducted in children who provided both baseline and follow-up data ($n = 209$) and excluded extreme outliers. There were no significant changes within the intervention or control group in the proportion of children in the underweight, healthy weight, overweight or obese categories ($P = 0.22$ to 1.00). Between-group comparisons for this measure were not reported (Alkon 2014). An intervention focused on improving childcare menus by Williams and colleagues assessed change in child weight to height ratio at six-month follow-up. The trial found no significant intervention effect (F -value 1.18, P value not reported) (Williams 2002).

DISCUSSION

Summary of main results

This review sought to assess the impact of strategies to support the implementation of policies, practices or programmes to promote physical activity, healthy eating or prevent excessive weight gain among children in centre-based childcare services. The review identified just 10 trials, most of which were randomised controlled trials testing multi-component implementation support strategies. Collectively, the findings suggest that the impact of trialled strategies to facilitate implementation is equivocal. None of the included trials improved, relative to a comparison group, implementation of all of the targeted policies and practices. However, most trials reported a significant benefit of implementation support for at least one measure of policy or practice implementation (Alkon 2014; Bell 2014; Finch 2012; Finch 2014; Gosliner 2010; Hardy 2010; Williams 2002). The impact of such interventions on the knowledge or attitudes of childcare service staff, or on the diet, physical activity or weight status of children was also equivocal in the few trials that reported such outcomes.

There were a number of challenges in conducting and synthesising the findings of included studies. There was considerable heterogeneity in the policies and practices targeted, interventions tested, measures used and outcomes reported among included trials. Such heterogeneity precluded meta-analysis and quantitative exploration of heterogeneity and potential effect modifiers. The

degree of clinical and methodological heterogeneity also presented challenges for the narrative synthesis. The 10 included trials reported the effects of six types of implementation strategy, often targeting different nutrition, physical activity or obesity prevention policies and practices, and using different measures of implementation. Classification of implementation strategies was also difficult. The Cochrane Effective Practice and Organisation of Care (EPOC) Group taxonomy has been developed to describe strategies to improve implementation or professional practice of health services or practitioners, which were often not relevant for the childcare setting (EPOC 2015). Other strategies employed by included trials to facilitate implementation, including small incentives such as lotteries or wellness initiatives, did not fit with the current EPOC taxonomy descriptors. To address such issues we included full descriptions of trials, study context and implementation strategies, and reported median and range of effects of included studies. A revision of the EPOC taxonomy and descriptors to align more with the implementation strategies used in non-clinical settings may improve EPOC strategy coverage and facilitate classification for studies undertaken in childcare and other community settings. Interpretation of the findings therefore represents a considerable challenge.

Among studies aiming to target childcare healthy eating or nutrition policies and practices, improvements were often reported on measures of food provision by childcare service staff. For example, relative to control services, implementation of the majority of practices pertaining to the types of foods served to children were reported in the multi-component intervention conducted by Bell and colleagues (Bell 2014), and the staff wellness programme conducted by Gosliner and colleagues (Gosliner 2010). Significant effects were also reported for measures of food energy and fat (the primary macronutrients targeted by the intervention) following a one-day workshop for cooks and ongoing support from a registered dietitian in the study by Williams and colleagues (Williams 2002). Similarly, within-group improvements were reported on all measures of food provision among both implementation training support strategies trialled by Johnston Molloy and colleagues (Johnston Molloy 2013). Childcare services may be particularly amenable to making changes to improve food provision given that in most jurisdictions providing food consistent with nutrition guidelines is required under service licensing and accreditation standards, as food provision is typically the primary responsibility of a single staff member (Froehlich Chow 2011) (i.e. the service cook), and given strong interest among staff to provide healthy foods to children (Derscheid 2010; Pagnini 2007). Furthermore, barriers to provision of healthy foods by services typically pertain to limited knowledge and skills of cooks (Froehlich Chow 2011; Moore 2005; Pollard 1999), with it being suggested such barriers be overcome through training (Michie 2008). The findings of this review suggest that the multi-component interventions targeting food service provision, many of which included implementation support focusing on professional development and training

of cooks, may have successfully overcome such reported barriers. In contrast, improvements were not consistently reported on other measures of healthy eating or physical activity policy or practice implementation. Support from childcare executive committees, the service manager or parents (Wolfenden 2015a), as well as staff members' own healthy eating or physical activity behaviours, self-efficacy in facilitating healthy eating or physical activity, and negative staff attitudes (Cashmore 2008; Copeland 2011; Froehlich Chow 2011), have all been identified as impediments to implementing healthy eating or physical activity-promoting policies and practices. Furthermore, for the implementation of physical activity policies, practices and programmes in particular, structural barriers, such as a preference for child-directed rather than teacher-led structured physical activity by childcare service staff, a lack of space, inclement weather or lack of broader policy framework (Cashmore 2008; Copeland 2011), have been noted as implementation barriers. Such a complex range of potential determinants to implementation in this setting may require carefully considered and targeted support strategies in order for them to be overcome. Only three of the included studies examined the impact of interventions on measures of child nutrition, physical activity or adiposity and effects were mixed. Improvements in both the implementation of nutrition practices regarding food service and in child diet were reported following the multi-component intervention conducted by Williams and colleagues (Williams 2002). However, the multi-component support provided in the trial by Finch and colleagues did not improve child physical activity while in care (Finch 2014), nor did intensive implementation support strategies to facilitate implementation of the Nutrition and Physical Activity Self-Assessment for Child Care (NAPSACC) programme (Alkon 2014). Such findings are likely to reflect limited improvements in implementation of physical activity practices for both trials. Providing intensive implementation support did, however, reduce child body mass index (BMI) z-score in the evaluation of the NAPSACC programme conducted by Alkon and colleagues (Alkon 2014). Such a finding was surprising given that improvements in healthy eating and physical activity policies, but not practices, were reported. Potentially, the implementation support may have facilitated the implementation of other obesity prevention practices by staff of intervention childcare services, or in the home. Further research is warranted to assess such effects in future trials.

Overall completeness and applicability of evidence

Six of the 10 included trials were conducted by two research groups in the USA and Australia (Alkon 2014; Bell 2014; Benjamin 2007; Finch 2012; Finch 2014; Ward 2008). Furthermore, all of the included studies were conducted in high-income countries. The applicability of study findings to lower and middle-income countries, where the operational, philosophical and cultural contexts may differ substantially, is unknown (Rosemburg 2003). Future

research, conducted by a greater range of research groups in different research contexts, would strengthen the applicability of the evidence base.

Quality of the evidence

The overall rating of the quality of the body of evidence reported in this review across all GRADE domains was very low, suggesting that the effects of interventions reported in the review may differ from the true effects. 'Risk of bias' assessments identified a number of limitations of the existing trials, particularly among the non-randomised designs. Risk of performance bias (due to lack of blinding of participants or personnel), detection bias (due to use of self-assessment measures in some studies) and reporting bias (due to a lack of prospective registration or published trial protocols) were particularly prevalent among included studies. The comparison groups used limited the directness of the assembled evidence. A number of studies included comparison groups that included some active implementation support (Johnston Molloy 2013), or 'usual' implementation support (Bell 2014; Finch 2012), which may not have been well defined. Finally, there were concerns regarding the precision of the estimates of included studies for the primary outcomes of this review. Most studies included samples of fewer than 15 per trial arm, which is likely to be insufficient to detect small but meaningful effects. Similarly, seven of the 10 trials included a measure of implementation as the primary trial outcome (Alkon 2014; Bell 2014; Benjamin 2007; Finch 2012; Gosliner 2010; Johnston Molloy 2013; Ward 2008), and only one of these performed a sample size calculation to justify the included sample (Finch 2012). As trial data could not be pooled in meta-analysis, under-powering of individual studies in this review may mask important effects.

Potential biases in the review process

The review included a comprehensive search strategy for peer-reviewed and grey literature and examined over 6000 citations. We also sought relevant studies from screening of citations of included studies, and from contact with experts in the field. While the search strategy was rigorous, as a field in which terminology for implementation constructs are developing, it is possible that not all studies that report implementation outcomes were identified. For example, it has been estimated that 15% of studies use implementation strategies that cannot be classified using implementation taxonomies (Mazza 2013). Potentially relevant studies may have been missed based on the implementation strategy search terms used in this review. However, a previous review conducted by the Agency for Healthcare Research and Quality failed to identify any studies of implementation strategies targeting healthy eating and physical activity in the childcare setting (Rabin 2010), and contact with other experts in the field did not yield any additional

studies to those identified in the primary search. Such findings provide some evidence to suggest that the search strategy may have provided reasonable coverage of the relevant literature. Nonetheless, we will assess the appropriateness of search terms in future updates of the review to ensure that the search terms are inclusive of relevant implementation terminology and newly released taxonomies. The method for describing effects across studies may have also introduced bias. In instances where a primary implementation outcome was not identified in included trials we utilised a median effect size across implementation outcomes. Such analyses are inconsiderate of the robustness of individual measures, and may mask important effects on single implementation outcomes. Consideration of the narrative description of each trial included in the review is therefore important when interpreting trial findings.

Agreements and disagreements with other studies or reviews

Contextualising the findings of the review with those conducted previously is difficult given that few reviews have examined the effectiveness of implementation strategies in community settings. A comprehensive review conducted in 2008 identified just one study in the childcare setting, which targeted implementation of policies and practices to reduce the risk of skin cancer (Rabin 2010). The review found mixed evidence of the effectiveness of strategies to support implementation of health promotion policies and practices in other settings, such as schools and sporting clubs: findings that are similar to the conclusions of this review (Rabin 2010). In healthcare settings, systematic reviews have found that multi-component implementation strategies may not be more effective than single component strategies (Squires 2014). However, small positive improvements in implementation or professional practice have been found in large systematic review of strategies including audit and feedback (Ivers 2012), training (Forsetlund 2009), and academic detailing (O'Brien 2007). More trials are required in the childcare setting to determine if such strategies are similarly effective in this setting.

AUTHORS' CONCLUSIONS

Implications for practice

The review highlights how little guidance is available for policy makers and practitioners interested in supporting the implementation of healthy eating, physical activity or obesity prevention policies, practices and programmes in centre-based childcare services. Collectively the findings suggest that implementation strategies can have a positive impact, albeit limited, on the implementation of healthy eating, physical activity and obesity prevention policies, practices and programmes in this setting. With a small number of

trials to date and in the absence of high-quality evidence, formative work to achieve a comprehensive understanding of the setting, context and barriers to implementation, and careful selection of support strategies to address these, may be particularly important for practitioners to maximise the potential for successful implementation (French 2012).

Implications for research

The findings of this review suggest that there is considerable scope to improve the evidence base to guide future efforts to support implementation of healthy eating, physical activity and obesity prevention programmes in centre-based childcare services. The limited number of trials is surprising given the large numbers of trials testing interventions in to improve healthy eating, physical activity or obesity prevention interventions in recent systematic reviews in this setting (Finch 2016; Mikkelsen 2014; Sisson 2016). The findings confirm bibliographic studies that indicate that trials examining the effects of strategies to implement evidence-based programmes or policies represent a fraction of public health research trials (Wolfenden 2016a; Wolfenden 2016; Yoong 2015). Greater investment in research, and research infrastructure to support trials to improve dissemination and implementation of effective childcare-based interventions, is therefore warranted (Wolfenden 2016b). Additionally, the review identified a number of ongoing studies in the area, which will further contribute to the evidence base (see *Characteristics of ongoing studies*).

In many instances the trials included in the review had small samples (Alkon 2014; Benjamin 2007; Finch 2014; Gosliner 2010; Hardy 2010; Williams 2002), which may be unable to detect important improvements in policy or practice, or they used self-reported measures of implementation. The cost of practice improvements was not assessed in any included trials and few trials assessed the impact of interventions on child health behaviours or weight status (Alkon 2014; Finch 2014; Williams 2002). Comprehensive evaluations of future efforts to improve the implementation of health-promoting initiatives targeting excessive weight gain or its determinants in this setting are required to address the limitations identified within the existing evidence base. The use of hybrid designs in future trials, in which implementation outcomes as well as impacts on health behaviours or weight status have been recommended, is one means of achieving this (Cohen 2015).

With a few exceptions, most included studies developed implementation support strategies without the aid of relevant theory or theoretical frameworks (Alkon 2014; Finch 2012; Gosliner 2010; Hardy 2010; Johnston Molloy 2013; Williams 2002). Perhaps unsurprisingly, the use of the range of potential strategies, as described in the EPOC taxonomy, was relatively limited by the included studies, and focused often on one-off training or resource provision. The factors that influence policy or practice implementation are typically complex. Improvements in implementation may require ongoing changes to systems and processes rather than fixed

discrete support. However, none of the trials included strategies to address other fiscal, political, regulatory or governance factors that could potentially influence the success of implementation efforts. The use of comprehensive theoretical frameworks could assist in considering a broad range of implementation barriers and designing appropriate support strategies to address these (Cane 2012; Damschroder 2009).

Further, given that the impact of current implementation support strategies appears equivocal, future theoretically informed research to identify the mechanism by which support strategies may facilitate implementation would be of particular value to guide future strategy design. The Theoretical Domains Framework is supported by documented processes to identify impediments to implementation, selection of support strategies to overcome such barriers, and validated instruments to assess implementation constructs (French 2012; Michie 2008). The framework has been successfully applied in clinical settings to improve professional prac-

tice (Cane 2012; Phillips 2015). Application of implementation-specific frameworks such as the Theoretical Domains Framework in the childcare setting seems warranted to examine whether this improves the impact of implementation interventions in this setting. Furthermore, adaptation and revalidation of tools to assess implementation constructs in future trials in the setting would provide valuable insights into mechanisms of effect to progress the field.

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Strategies to Improve the Implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services (Review)

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

Alkon 2014

Methods	<p>Study design: cluster-randomised controlled trial</p> <p>Intervention duration: 7 months</p> <p>Length of follow-up from baseline: 7 months</p> <p>Differences in baseline characteristics: reported</p> <p>Unit of allocation: childcare service</p> <p>Unit of analysis: childcare service (child behaviour and weight status were assessed at the level of the individual)</p>
Participants	<p>Service type: childcare centres</p> <p>Region: California, Connecticut and North Carolina, USA</p> <p>Demographic/socioeconomic characteristics: children between the ages of 3 and 5 years of age from racial/ethnically diverse backgrounds and primarily of low-income families</p> <p>Inclusion/exclusion criteria: inclusion criteria: English-speaking service manager, on-site kitchen, racial/ethnic diversity among the children, participation by at least 60% of families, and a population of children in care primarily comprised of low-income children between the ages of 3 and 5 years of age</p> <p>Number of services randomised: 18 (9 intervention, 9 control)</p> <p>Numbers by trial group:</p> <p>n (controls baseline) = 9</p> <p>n (controls follow-up) = 9 (2 small services under same ownership analysed as 1 service)</p> <p>n (interventions baseline) = 9</p> <p>n (interventions follow-up) = 9</p> <p>Recruitment:</p> <p>Service: 42 childcare services were recruited, of which 24 services did not meet the inclusion criteria. Childcare health consultants from California and North Carolina recruited the convenience sample of services for their respective states while Connecticut services were recruited by the Connecticut principal investigator.</p> <p>Child:</p> <p>Physical activity: 8 children at each service, randomly selected by a statistician</p> <p>BMI: the research assistants selected children at the pre-intervention period for height and weight measurements from service-specific randomly ordered lists of enrolled children. Those with pre-intervention measurements (268) were prioritised for measurement post-intervention (336); 209 children had useable data at both time points.</p> <p>Recruitment rate: 43%</p>
Interventions	<p>Number of experimental conditions: 2 (intervention, control)</p> <p>Policies, practices or programmes targeted by the intervention:</p> <p>Nutrition and Physical Activity Self-Assessment for Child Care (NAPSACC) programme including:</p> <ul style="list-style-type: none"> - Childhood obesity - Healthy eating for young children - Physical activity for young children - Personal health and wellness

Alkon 2014 (Continued)

	<p>- Working with families to promote healthy behaviours</p> <p>Implementation strategies:</p> <p>- Workshop: the childcare health consultants facilitated 5 x 1-hour NAPSACC workshops for child care providers and other staff (e.g. cooks, administrators) at each of the intervention services on i) childhood obesity; ii) healthy eating for young children; iii) physical activity for young children; iv) personal health and wellness; and iv) working with families to promote healthy behaviours</p> <p>- Consultation: childcare health consultants provided at least monthly on-site consultations and additional phone or email consultations and materials and resources (posters and information sheets on nutrition and physical activities). The childcare health consultants conducted a mean of 11 on-site visits and 8 off-site consultations per service over the 7-month intervention, in addition to the provider and parent workshops.</p> <p>- Policy support: childcare health consultants worked with the service managers to write or update the service nutrition and physical activity policies</p> <p>- Parent workshop: 7 of the intervention services also received the parent workshop "Raising Healthy Kids"</p> <p>Who delivered the intervention: previously trained nurse childcare health consultants</p> <p>Theoretical underpinning: not reported</p> <p>Description of control: delayed NAPSACC intervention in year 2 of the study</p>
Outcomes	<p>Outcome relating to the implementation of childcare service policies, practices or programmes:</p> <p>Service nutrition and physical activity policies:</p> <p><i>Data collection method:</i> Californian Childcare Health Programme Health and Safety Checklist (CHPHSPC) completed by blinded research assistants and used to determine if the service's written policies adhered to national guidelines</p> <p><i>Validity of measures used:</i> unclear - this policy measurement technique was used in another study and was shown to be a valid measure of the effect of childcare health consultant interventions on childcare service environments</p> <p>Provider nutrition and physical activity practices:</p> <p><i>Data collection method:</i> modified version of the Environment and Policy Assessment and Observation (EPAO) was completed by a research assistant. Mean scores for the nutrition and physical activity scales were calculated for each service then aggregated by intervention and control services</p> <p><i>Validity of measures used:</i> although these items were modified from a reliable instrument, they were not previously validated in the format included in this study</p> <p>Outcome relating to staff knowledge, skills or attitudes: not applicable</p> <p>Outcome relating to cost: not applicable</p> <p>Outcome relating to adverse consequences: not applicable</p> <p>Outcome relating to child diet, physical activity or weight status:</p> <p>Child physical activity:</p> <p><i>Data collection method:</i> the Observation System for Recording Activity in Preschools (OSRAP) - Data collection was completed by a trained research assistant. Children were observed in 15-second intervals for a total of 12 to 16 minutes per child; the observations were conducted over an 8-hour day. Data were aggregated as the mean percentage of physical activity intensity (1 = stationary to 5 = fast)</p> <p><i>Validity of measures used:</i> the OSRAP has been validated and has been compared favourably with accelerometer data</p> <p>Child weight status:</p>

Alkon 2014 (Continued)

	<i>Data collection method:</i> BMI z-score - the research assistants used a portable foldable stadiometer to measure height and a digital scale to measure weight. Pre/post BMI z-score and % underweight, healthy weight, overweight and obese children <i>Validity of measures used:</i> unclear - appears to be an objective measure	
Notes	-	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Authors indicate that the services were randomly assigned to treatment groups, but the sequence generation procedure was not described One control group service that was not able to adequately complete baseline data collection was replaced by a matched service (unclear if this was randomly chosen)
Allocation concealment (selection bias)	Unclear risk	Method of concealment not described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	We assumed that due to the nature of the intervention childcare service staff and study personnel delivering the intervention were not blind to the study allocation and therefore there is a potential high risk of performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment was undertaken by blinded research personnel and therefore the risk of detection bias is considered to be low
Incomplete outcome data (attrition bias) All outcomes	Low risk	Complete data collected for all services (8 control and 9 intervention), with no services excluded from the analysis - therefore risk of attrition bias is considered to be low
Selective reporting (reporting bias)	Unclear risk	No prospective trial protocol or trial registration so it is unclear whether there was selective outcome reporting
Recruitment to cluster	Low risk	Selection of participants from each service for measurement of child diet, physical activity and BMI outcomes was random, so risk of bias through selection to cluster is considered to be low

Alkon 2014 (Continued)

Baseline imbalance	Unclear risk	There is baseline imbalance in parent and child care provider characteristics but they adjust for some of these in the analysis
Loss of clusters	Unclear risk	In the control group replaced 1 cluster with a matched cluster and then merged 2 clusters (services that came under same management) for analysis
Incorrect analysis	Low risk	Hierarchical linear models conducted to assess child-level BMI z-score outcomes (accounting for clustering within the service)
Compatibility with individually randomised RCTs	Unclear risk	Unable to determine if a herd effect exists.
Other bias	Unclear risk	-

Bell 2014

Methods	<p>Study design: quasi-experimental trial</p> <p>Intervention duration: average of 22 months between initiation of intervention and collection of follow-up data</p> <p>Length of follow-up from baseline: average 22 months (between initiation of intervention and collection of follow-up data)</p> <p>Differences in baseline characteristics: reported</p> <p>Unit of allocation: childcare service</p> <p>Unit of analysis: childcare service</p>
Participants	<p>Service type: preschools and long daycare services</p> <p>Region: Intervention: Hunter New England region, New South Wales, Australia; Control: New South Wales, Australia</p> <p>Demographic/socioeconomic characteristics: Intervention: the Hunter New England region - a geographically large area (130,000 km²) with a demographically diverse population including metropolitan urban and suburban areas, regional services, and rural and isolated remote communities. The region included pockets of wealth and poverty, and an overall socioeconomic status lower than the New South Wales state average. Control: not reported</p> <p>Inclusion/exclusion criteria: all services located within the intervention region were invited to participate. Services were excluded that catered for children with special needs such as intellectual or physical disabilities.</p> <p>Number of services randomised: 583 (287 intervention, 296 control)</p> <p>Numbers by trial group:</p> <p>n (control baseline) = 251</p> <p>n (control follow-up) = 191</p> <p>n (intervention baseline) = 261</p> <p>n (intervention follow-up) = 240</p> <p>Recruitment: Intervention: all services (n = 287) located within the intervention region</p>

Bell 2014 (Continued)

	<p>were invited to participate. Control: a simple random sample of eligible centre-based childcare services in all other regions of the state of New South Wales were invited to participate in the study as the comparison group (n = 296)</p> <p>Recruitment rate: Intervention: 91%; Control: 85%</p>
Interventions	<p>Number of experimental conditions: 2 (intervention, control)</p> <p>Policies, practices or programmes targeted by the intervention: Healthy eating policies and practices of childcare services including:</p> <ul style="list-style-type: none"> - Staff training in nutrition - Policy guiding the content of food and drinks provided to children by the service - Policy guiding the content of food and drinks packed for children by parents - Provision of non-sweetened drinks (milk and water) only to children during care - Parent participation in nutrition policy or programmes - Provision of foods to children consistent with dietary guidelines (for services that provide meals to children) and accreditation requirements <p>Implementation strategies:</p> <ul style="list-style-type: none"> - Identifying leaders and obtaining their support and endorsement of the programme and targeted policy and practices - Provision of professional development for staff (2 x 6-hour workshops (1 for staff and service managers, 1 for cooks and service managers) - Small incentives - Resource provision - Performance monitoring and feedback - Follow-up support (20-minute phone call once, 5 newsletters) <p>Who delivered the intervention: the intervention was delivered by health service staff who worked with regional representatives of the Department of Community Services and childcare service staff to implement the intervention strategies</p> <p>Theoretical underpinning: the intervention was based on practice change and capacity-building theoretical frameworks</p> <p>Description of control: from July 2008 onwards, preschool services (not including long daycare services) in New South Wales were able to access implementation support via a government-supported programme that aimed to promote physical activity and healthy eating for children</p>
Outcomes	<p>Outcome relating to the implementation of childcare service policies, practices or programmes:</p> <p>Service healthy eating policies and practices:</p> <ul style="list-style-type: none"> - Staff with nutrition training - Services with a policy guiding the content of food and drinks provided to children by the service - Services with a policy guiding the content of food and drinks packed for children by parents - Services providing only water or plain milk to children - Parent participation in nutrition policy or programmes <p><i>Data collection method:</i> computer-assisted telephone interview with service managers</p> <p><i>Validity of measures used:</i> not reported</p> <p>Nutritional quality of lunch menus:</p> <ul style="list-style-type: none"> - Number of times processed foods high in fat, salt and/or sugar were listed on the menu each day

Bell 2014 (Continued)

	<ul style="list-style-type: none">- Number of times sweetened drinks were listed on the menu each day- Number of times water was listed on the menu each day- Number of 'child size' servings of fruit listed on the menu each day- Number of 'child size' servings of vegetables listed on the menu each day <p>Classification into the following categories:</p> <ul style="list-style-type: none">- No high-fat, -salt and/or -sugar processed food menu items- No sweetened drink menu items- Water with every eating occasion- 1 child-size serving of fruit listed on the menu each day- The number of child-size servings of vegetables listed on the menu each day <p><i>Data collection method:</i> all services were invited to submit a copy of their current 2-week menu</p> <p><i>Validity of measures used:</i> not reported</p> <p>Outcome relating to staff knowledge, skills or attitudes: not applicable</p> <p>Outcome relating to cost: not applicable</p> <p>Outcome relating to adverse consequences: not applicable</p> <p>Outcome relating to child diet, physical activity or weight status: not applicable</p>	
Notes	-	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quasi-experimental design. High risk of selection bias as intervention services were recruited from a selected area. Control services were randomly selected from a comparison region. There were no details provided regarding the sequence generation procedure used to randomise control services for selection
Allocation concealment (selection bias)	High risk	Quasi-experimental design. Intervention services were recruited from a selected area, therefore high risk of bias as no concealment of allocation
Blinding of participants and personnel (performance bias) All outcomes	High risk	We assumed that due to the nature of the intervention childcare service staff and study personnel delivering the intervention were not blind to the study allocation and therefore there is a potential high risk of performance bias
Blinding of outcome assessment (detection bias) All outcomes	High risk	Self-reported policies and practices. There was no blinding of research personnel or participants (service managers) and due to the self-report of this outcome, risk of bias

Bell 2014 (Continued)

		is considered to be high
Incomplete outcome data (attrition bias) All outcomes	High risk	There was a large difference in the proportion of services followed up amongst intervention and control groups and the proportion that provided a menu for assessment: Intervention group: 91% of services surveyed at baseline were followed up and 61% provided a menu Control group: 76% of services from the control area (NSW) were followed up and 49% provided a menu Due to the magnitude of difference in the proportions of participants followed up between groups, the risk of bias is assessed as high
Selective reporting (reporting bias)	Unclear risk	No prospective trial protocol or trial registration so it is unclear whether there was selective outcome reporting
Potential confounding	Unclear risk	Authors state that "Characteristics of services were not adjusted for in the logistic regression model as we were looking at change within services and the baseline score of the services effectively controlled for potential differences in baseline characteristics between the two regions." It is unknown whether this was adequate to reduce bias due to known confounders
Other bias	Unclear risk	-

Benjamin 2007

Methods	<p>Study design: cluster-randomised controlled trial (counties randomly allocated into either the intervention (n = 6) or comparison (n = 2) group; all eligible services were approached and services enrolled on a first-come first-served basis)</p> <p>Intervention duration: 6 months</p> <p>Length of follow-up from baseline: approximately 10 months (assessments occurred 4 months after the 6-month intervention)</p> <p>Differences in baseline characteristics: not reported</p> <p>Unit of allocation: county</p> <p>Unit of analysis: childcare service</p>
Participants	<p>Service type: childcare centres</p> <p>Region: North Carolina, USA</p> <p>Demographic/socioeconomic characteristics: not reported</p> <p>Inclusion/exclusion criteria: inclusion criteria: size of the childcare service (between 20</p>

Benjamin 2007 (Continued)

	<p>and 150 children); participation in the Child and Adult Care Food Program; rating of 3, 4 or 5 stars on the NC1-5 Star Rating System for quality child care. Exclusion criteria: open case of child abuse or neglect; service provided services to a special population of children only; Head Start service; classified as a family child care home</p> <p>Number of services randomised: 19 (15 intervention, 4 control)</p> <p>Numbers by trial group:</p> <p>n (control baseline) = 4</p> <p>n (control follow-up) = 4</p> <p>n (intervention baseline) = 15 (2 intervention services withdrew because their manager had left their position)</p> <p>n (intervention follow-up) = 13</p> <p>Recruitment: convenience sampling - the North Carolina childcare regulatory agency provided a list of eligible childcare services for each intervention and comparison county. 2 services were selected per county, except for 1 large county where 5 services participated.</p> <p>Recruitment rate: not reported</p>
Interventions	<p>Number of experimental conditions: 2 (intervention, control)</p> <p>Policies, practices or programmes targeted by the intervention:</p> <p>NAPSACC programme. The programme focused on 15 nutrition and physical activity areas. Nutrition areas of focus included: fruits and vegetables; fried food and high-fat meats; beverages; menus and variety; meals and snacks; food items outside of regular meals and snacks; supporting healthful eating; nutrition education for children, parents and staff; and nutrition policy. Key physical activity areas of focus included: active play and inactive time; TV use and TV viewing; play environment; supporting physical activity; physical activity education for children, parents and staff; and physical activity policy.</p> <p>Implementation strategies:</p> <ul style="list-style-type: none"> - Self-assessment: childcare service managers, with assistance from key service staff, completed the self-assessment instrument to identify current service nutrition and physical activity policies and practices - Action plan: NAPSACC trained childcare health consultants worked with the services to develop an action plan to improve at least 3 areas identified from the self-assessment instrument. Childcare service managers were asked to select their priority areas for improvement in order to facilitate the most fitting and lasting environmental changes at the service. - Workshops: the trained childcare health consultants delivered 3 x 30-minute workshops on being overweight, healthful eating and physical activity - Provision of technical assistance: ongoing technical assistance (visits and calls) were provided by the childcare health consultants to service managers to support policy and practice changes <p>Who delivered the intervention: NAPSACC trained childcare health consultants</p> <p>Theoretical underpinning: NAPSACC is a theory-based programme that employs components of social cognitive theory against a backdrop of the socio-ecological framework. The inherent relationship between environment and behaviour has proven useful in intervention research. Social cognitive theory identifies several factors that influence behaviour change, including expectancies, observational learning, self-efficacy, behavioural capability, reinforcement and reciprocal determinism, which were all principles used to guide the NAPSACC intervention.</p> <p>Description of control: the comparison services did not receive any training or technical</p>

Benjamin 2007 (Continued)

	assistance from a childcare health consultant but completed only the pre- and post-self-assessment instrument	
Outcomes	Outcome relating to the implementation of childcare service policies, practices or programmes: Total nutrition and physical activity score assessed using the self-assessment instrument, which included 29 nutrition and 15 physical activity questions with either a demonstrated or a perceived relationship to childhood overweight. Each question had 3 response categories, assigned 1, 2 or 3 points (1 = minimum standard, 2 = good, 3 = best practice) <i>Data collection method:</i> self-assessment instrument <i>Validity of measures used:</i> not established at time of study - additional work tests the reliability and validity of the NAPSACC self-assessment instrument in a sample of childcare services Outcome relating to staff knowledge, skills or attitudes: not applicable Outcome relating to cost: not applicable Outcome relating to adverse consequences: not applicable Outcome relating to child diet, physical activity or weight status: not applicable	
Notes	Given the small sample size (n = 4) in the comparison group, no between-group comparisons were made	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Counties were matched and randomly allocated to control or intervention groups. The sequence generation procedure is not described
Allocation concealment (selection bias)	Unclear risk	Unclear as to whether concealment of allocation occurred.
Blinding of participants and personnel (performance bias) All outcomes	High risk	We assumed that due to the nature of the intervention childcare service staff and study personnel delivering the intervention were not blind to the study allocation and therefore there is a potential high risk of performance bias
Blinding of outcome assessment (detection bias) All outcomes	High risk	Self-assessment conducted by childcare service staff for nutrition and physical activity policies and practices No blinding of research personnel or participants (service managers) and due to the self-report of this outcome the risk of bias is considered high

Benjamin 2007 (Continued)

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	17 of the 19 intervention group services had full data available and 4 of 4 control services. No information is provided on the characteristics of the services that dropped out, nor sensitivity analysis undertaken to test assumptions regarding missing data
Selective reporting (reporting bias)	Unclear risk	No prospective trial protocol or trial registration so it is unclear whether there was selective outcome reporting
Recruitment to cluster	Unclear risk	All services within the county invited to participate and chosen to participate on first-come basis - 2 per county, but 1 county was given permission to have 5 services participate
Baseline imbalance	Unclear risk	A convenience sample of 6 intervention and 2 comparison counties, matched on urban/rural status randomly allocated to intervention or comparison group. Unclear if baseline characteristic imbalances are present as this was not reported. Outcome measures at baseline were similar
Loss of clusters	Unclear risk	Unclear whether the 2 lost services were from the same county
Incorrect analysis	High risk	No statistical analysis completed due to small sample size.
Compatibility with individually randomised RCTs	Unclear risk	Unable to determine if a herd effect exists.
Other bias	Unclear risk	-

Finch 2012

Methods	<p>Study design: quasi-experimental study</p> <p>Intervention duration: 3 months (staggered)</p> <p>Length of follow-up from baseline: 18 months (follow-up was conducted approximately 12 months after the initiation of the intervention with wave 1 services, and approximately 6 months after the initiation of the intervention for wave 2 services)</p> <p>Differences in baseline characteristics: reported</p> <p>Unit of allocation: childcare service</p> <p>Unit of analysis: childcare service</p>
Participants	<p>Service type: long daycare services and preschools</p> <p>Region: Intervention: Hunter New England region, New South Wales, Australia; Control: New South Wales, Australia</p> <p>Demographic/socioeconomic characteristics: Intervention: the intervention region included a large non-metropolitan area (more than 130,000 km²) encompassing urban and rural communities with a population of 60,970 children aged 0 to 5 years. Control: the comparison region of New South Wales had an area of 801,305 km² and included major cities, inner regional services, outer regional services, remote and very remote areas. New South Wales has a population of 506,095 children aged 0 to 5 years</p> <p>Inclusion/exclusion criteria: inclusion criteria: long daycare services and preschools in the Hunter New England area (intervention group) or the remainder of New South Wales (comparison group) as recorded by the licensing agency for such services. Exclusion criteria: services catering solely for children with special needs such as intellectual or physical disabilities</p> <p>Number of services randomised: 484 services participated in baseline measures. Intervention: 275 (not randomised, those services approached who agreed to participate and completed baseline data collection). Control: 209 (of those randomly approached and who took part in baseline evaluation).</p> <p>Numbers by trial group: n (control baseline) = 209 n (control follow-up) = 164 n (intervention baseline) = 275 n (intervention follow-up) = 228</p> <p>Recruitment: Intervention: all services (n = 338) located within the intervention region were invited to participate. Control: a simple random sample of eligible centre-based childcare services in all other regions of the state of New South Wales were invited to participate in the study as the comparison group (n = 298).</p> <p>Recruitment rate: Intervention: 81%; Control: 83%</p>
Interventions	<p>Number of experimental conditions: 2 (intervention, control)</p> <p>Policies, practices or programmes targeted by the intervention:</p> <ul style="list-style-type: none"> - Physical activity policy - Conducting daily fundamental movement sessions with recommended components - Time spent on structured physical activities - All staff usually participate in free active play - All staff usually provide verbal prompts for physical activity - Children are allowed to watch small screen recreation less than once per week - Children participate in seated activities for no longer than 30 minutes at a time - Staff trained in physical activity <p>Implementation strategies:</p> <ul style="list-style-type: none"> - Offer of staff training (1 x 6-hour workshop)

Finch 2012 (Continued)

	<ul style="list-style-type: none"> - Offer of information programme resources and instructional materials: - Offer of follow-up support (2 x 15-minute support calls, 2 support emails/faxes, 6 project newsletters) - Provision of performance monitoring and feedback regarding policy and practice adoption - Offer of incentives <p>Who delivered the intervention: the staff training was delivered by external experts and follow-up support and performance monitoring and feedback (telephone) was delivered by health service staff</p> <p>Theoretical underpinning: not reported</p> <p>Description of control:</p> <ul style="list-style-type: none"> - Childcare service staff were invited to attend a full day workshop provided by a non-government organisation - Provision of a printed resource folder - Provision of a small financial grant to support staff attendance at training or the purchase of equipment - Opportunity for additional support strategies to be provided by local health services at their discretion
Outcomes	<p>Outcome relating to the implementation of childcare service policies, practices or programmes:</p> <ul style="list-style-type: none"> - Services with a physical activity policy that referred to: - Child fundamental movement skills development - Limits on small screen recreation and TV - Physical activity training for staff - Services conducting daily fundamental movement sessions with recommended components - Time spent on structured physical activities - Services where all staff usually participate in free active play (role modelling) - Services where all staff usually provide verbal prompts for physical activity - Services where children are allowed to watch small screen recreation less than once per week - Services where children participate in seated activities for no longer than 30 minutes at a time - Services with staff trained in physical activity <p><i>Data collection method:</i> service manager self-report via computer-assisted telephone interview</p> <p><i>Validity of measures used:</i> unclear (developed following review of existing validated tools and pre-tested prior to use)</p> <p>Outcome relating to staff knowledge, skills or attitudes:</p> <p>Service manager knowledge of:</p> <ul style="list-style-type: none"> - The recommended time children should be sedentary - Child physical activity recommendations - The recommended maximum time children should watch television <p><i>Data collection method:</i> service manager self-report via computer-assisted telephone interview</p> <p><i>Validity of measures used:</i> unclear</p> <p>Outcome relating to cost: not applicable</p> <p>Outcome relating to adverse consequences: not applicable</p>

Finch 2012 (Continued)

	Outcome relating to child diet, physical activity or weight status: not applicable	
Notes	The study had multiple outcomes but did not appear to adjust the P value for multiple comparisons	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quasi-experimental design. High risk of selection bias as the intervention services were recruited from a selected area. Control services were randomly selected from a comparison region. No detail is provided regarding the sequence generation procedure used to randomise control services for selection. Table 2 shows that services within the intervention and comparison sites differed significantly in terms of socio-economic areas, geographic locality and services with children of an Aboriginal background
Allocation concealment (selection bias)	High risk	Quasi-experimental design. Intervention services were recruited from a selected area, therefore high risk of bias as there was no concealment of allocation
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	We assumed that due to the nature of the intervention childcare service staff and study personnel delivering the intervention were not blind to the study allocation, however, as the control group may have also received some form of intervention, systematic bias between groups in terms of performance bias is unknown
Blinding of outcome assessment (detection bias) All outcomes	High risk	Self-reported physical activity policies and practices. No blinding of research personnel or participants (service managers) and due to the self-report of this outcome, the risk of bias is considered to be high
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	83% of intervention group services included in final post-test data analysis; 78% of comparison group services included in final post-test data analysis. While these proportions are similar, it is unclear whether the services lost to follow-up differed between groups. No sensitivity analysis re-

Finch 2012 (Continued)

		ported to test assumptions regarding missing data
Selective reporting (reporting bias)	Unclear risk	No prospective trial protocol or trial registration so it is unclear whether there was selective outcome reporting
Potential confounding	Unclear risk	Authors state that "Characteristics of services were not adjusted for in the logistic regression model as we were looking at change within services and the baseline score of the services effectively controlled for potential differences in baseline characteristics between the two regions." It is unknown whether this was adequate to reduce bias due to known confounders
Other bias	Unclear risk	-

Finch 2014

Methods	Study design: cluster-randomised controlled trial Intervention duration: 7 months Length of follow-up from baseline: 8 months Differences in baseline characteristics: reported Unit of allocation: childcare service Unit of analysis: childcare service (child physical activity was assessed at the level of the individual)
Participants	Service type: centre-based long daycare services Region: Hunter region, New South Wales Demographic/socioeconomic characteristics: the Hunter region encompasses non-metropolitan 'major cities' and 'inner regional' areas with 14,061 children aged 3 to 5 years residing in the area. 5% of residents speak languages other than English and 2% of residents are of Aboriginal or Torres Strait Islander origin. The Hunter region has lower indices of socioeconomic status than the New South Wales state average. Inclusion/exclusion criteria: inclusion criteria: centre-based long daycare services (providing care for a minimum of 8 hours a day). Services were required to have at least 25 enrolled children aged between 3 to 5 years. Children aged 3 to 5 years attending participating services were eligible for the study if they attended on the day of the week nominated by the service manager for baseline data collection. Number of services randomised: 20 services (10 intervention (242 children), 10 control (215 children)) Numbers by trial group: n (controls baseline) = 10 services n (controls follow-up) = 10 services n (interventions baseline) = 10 services n (interventions follow-up) = 10 services Recruitment: a total of 70 childcare services in the study region served as the sampling

Finch 2014 (Continued)

	<p>frame</p> <p>Recruitment rate: 54%</p>
Interventions	<p>Number of experimental conditions: 2 (intervention, control)</p> <p>Policies, practices or programmes targeted by the intervention:</p> <ul style="list-style-type: none"> - Fundamental movement skill development activity sessions - Staff delivery of structured physical activity - Staff role modelling of active play and delivery of verbal prompts - Limiting small screen recreation and sedentary time - Providing children with a physical activity-promoting indoor and outdoor physical environment - Physical activity policy <p>Implementation strategies:</p> <ul style="list-style-type: none"> - Staff training (6-hour workshop for childcare service staff) - Provision of resources - Follow-up support (2 telephone support calls and a 2-hour service visit) - Performance feedback via project newsletter on 2 occasions - Incentives - Opinion leaders <p>Who delivered the intervention: workshop and follow-up component delivered by experts</p> <p>Theoretical underpinning: the multi-level intervention was designed using the social ecological models of health behaviour change</p> <p>Description of control: wait list control group that did not receive the intervention or any intervention support or materials during the study period and were offered the intervention after collection of all follow-up data</p>
Outcomes	<p>Outcome relating to the implementation of childcare service policies, practices or programmes:</p> <ul style="list-style-type: none"> - Fundamental movement skill development activity sessions - Staff delivery of structured physical activity - Staff role modelling of active play and delivery of verbal prompts - Limiting small screen recreation and sedentary time - Physical activity-promoting resources and materials - Portable equipment - Physical activity policy <p><i>Data collection method:</i> observational audit - EPAO was conducted by 2 trained research staff</p> <p><i>Validity of measures used:</i> unclear - EPAO has reported high inter-observer agreement but other psychometric properties of this tool are not reported</p> <p>Outcome relating to staff knowledge, skills or attitudes: not applicable</p> <p>Outcome relating to cost: not applicable</p> <p>Outcome relating to adverse consequences:</p> <p>The number of child injuries recorded at the service in the month of data collection at baseline and follow-up</p> <p><i>Data collection method:</i> service manager self-report via interview</p> <p><i>Validity of measures used:</i> unclear</p> <p>Outcome relating to child diet, physical activity or weight status:</p> <p><i>Child step count:</i></p>

Finch 2014 (Continued)

	<i>Data collection method:</i> pedometer worn for 1 day during attendance at the childcare service <i>Validity of measures used:</i> a valid measure of physical activity in preschool age children	
Notes	The trial had multiple outcomes but did not appear to adjust the P value for multiple comparisons	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computerised random number function in Microsoft Excel was used to generate random number sequence
Allocation concealment (selection bias)	Low risk	Statistician not involved in the project allocated the services to groups using a computerised program
Blinding of participants and personnel (performance bias) All outcomes	High risk	We assumed that due to the nature of the intervention childcare service staff and study personnel delivering the intervention were not blind to the study allocation and therefore there is a potential high risk of performance bias
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Implementation of policies and practices measured using observational audit - research staff undertaking audits were blind to group allocation
Incomplete outcome data (attrition bias) All outcomes	Low risk	Implementation of policies and practices - no loss to follow-up (10 intervention services; 10 control services)
Selective reporting (reporting bias)	Low risk	There are no unreported outcomes according to those planned in the published protocol
Recruitment to cluster	Low risk	For the child physical activity measure, children were recruited by service managers at the service selecting a day of the week for measurement to occur. Allocation was not revealed to services until after baseline data collection
Baseline imbalance	High risk	Baseline imbalance in services in areas of higher socio-economic status (intervention 90%, control 60%) and average years of

Finch 2014 (Continued)

		operation (intervention 8 years, control 20 years) and no mention of adjustment within analysis
Loss of clusters	Low risk	100% followed up.
Incorrect analysis	Low risk	Generalised linear mixed model accounting for children nested within services
Compatibility with individually randomised RCTs	Unclear risk	Unable to determine if a herd effect exists.
Other bias	Unclear risk	-

Gosliner 2010

Methods	Study design: randomised trial Intervention duration: not reported Length of follow-up from baseline: 10 months Differences in baseline characteristics: not reported by group Unit of allocation: childcare service Unit of analysis: childcare service staff
Participants	Service type: childcare centres Region: California, USA Demographic/socioeconomic characteristics: childcare services were located in low-income neighbourhoods in Northern California Inclusion/exclusion criteria: inclusion criteria: services that were already participating in a health education and policy development project (Child Health and Nutrition Service Enhancement) with the Contra Costa Child Care Council Number of services randomised: 18 (9 intervention, 9 control) Numbers by trial group: n (controls baseline) = 7 n (controls follow-up) = 7 n (interventions baseline) = 6 n (interventions follow-up) = 6 Recruitment: 9 pairs of eligible services were matched on city of location and programme size and were randomised to either the intervention or control group Recruitment rate: 84% entered the study
Interventions	Number of experimental conditions: 2 (intervention, control) Policies, practices or programmes targeted by the intervention: Nutrition and physical activity policies, children's food and physical activity environment Implementation strategies: <ul style="list-style-type: none"> - Training and technical assistance regarding children's health and nutrition - Received a set of nutrition and physical activity policies - Staff wellness programme consisting of: <ul style="list-style-type: none"> - Kick-off wellness training with individual health consultations including education, individual health assessments

Gosliner 2010 (Continued)

	<ul style="list-style-type: none">- Monthly newsletters and information with pay-checks promoting healthy eating and physical activity- Group walking programme with awards for reaching milestones- Staff follow-up support visits <p>Theoretical underpinning: not reported</p> <p>Description of control: control services received training and technical assistance regarding children's health and nutrition and received a set of nutrition and physical activity policies</p>	
Outcomes	<p>Outcome relating to the implementation of childcare service policies, practices or programmes:</p> <ul style="list-style-type: none">- Staff providing fresh fruits in children's meals and snacks more often during the past year- Staff providing fresh vegetables in children's meals and snacks more often during the past year- Staff providing sweetened beverages in children's meals and snacks more often during the past year- Staff providing sweetened foods in children's meals and snacks more often during the past year- Staff providing fresh fruits in children's celebrations more often during the past year- Staff providing fresh vegetables in children's celebrations more often during the past year- Staff providing sweetened beverages in children's celebrations more often during the past year- Staff providing sweetened foods in children's celebrations more often during the past year <p><i>Data collection method:</i> childcare service staff self-report via questionnaire</p> <p><i>Validity of measures used:</i> unclear</p> <p>Outcome relating to staff knowledge, skills or attitudes: not applicable</p> <p>Outcome relating to cost: not applicable</p> <p>Outcome relating to adverse consequences: not applicable</p> <p>Outcome relating to child diet, physical activity or weight status: not applicable</p>	
Notes	The study did not report baseline values for the implementation outcomes	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Services were matched on city of location and programme size and were randomised to intervention or control group. The sequence generation procedure was not reported
Allocation concealment (selection bias)	Unclear risk	Whether pending allocation was concealed is unclear as no information was provided on concealment

Gosliner 2010 (Continued)

Blinding of participants and personnel (performance bias) All outcomes	High risk	We assumed that due to the nature of the intervention childcare service staff and study personnel delivering the intervention were not blind to the study allocation and therefore there is a potential high risk of performance bias
Blinding of outcome assessment (detection bias) All outcomes	High risk	Self-reported by service managers, therefore high risk of bias due to managers being aware of allocation
Incomplete outcome data (attrition bias) All outcomes	High risk	Data were available for 50 (56%) participants in the intervention group and 39 (44%) in the control group. Of those not returning at endpoint, most had changed employment (80%) or were on leave or vacation (14%). 7 intervention staff who reported participating in less than half of the intervention activities were considered inadequately exposed and were excluded from the analysis, leaving 43 staff in the intervention group. Therefore the intention-to-treat principle was not applied
Selective reporting (reporting bias)	Unclear risk	No prospective trial protocol or trial registration so it is unclear whether there was selective outcome reporting
Other bias	Unclear risk	-

Hardy 2010

Methods	Study design: cluster-randomised controlled trial Intervention duration: 5 months Length of follow-up from baseline: 5 months Differences in baseline characteristics: reported Unit of allocation: childcare service Unit of analysis: childcare service (staff knowledge and attitudes were assessed at the level of the individual)
Participants	Service type: preschools Region: Sydney, New South Wales, Australia Demographic/socioeconomic characteristics: not described Inclusion/exclusion criteria: inclusion criteria: preschools operating under the auspices of the New South Wales Department of Education and Training located in the Sydney, Western Sydney and South Western Sydney education regions of New South Wales Number of services randomised: 29 (15 intervention, 14 control)

Hardy 2010 (Continued)

	<p>Numbers by trial group: n (controls baseline) = 14 n (controls follow-up) = 14 n (interventions baseline) = 15 n (interventions follow-up) = 15 Recruitment: all eligible preschools were invited to participate in the study (n = 61) Recruitment rate: 48%</p>
Interventions	<p>Number of experimental conditions: 2 (intervention, control) Policies, practices or programmes targeted by the intervention: 'Munch and Move' programme: - Healthy eating and ways of incorporating food-based activities into the education programme - Physical activity and ways of incorporating fun, games-based skills activities into the programme - Strategies to encourage children to limit their recreational screen time - Providing opportunities for children to engage in unstructured physically active play - Developing and implementing healthy nutrition and physical activity fundraising policies Implementation strategies: - 1-day professional development workshop for up to 2 staff, delivered by a specialised early childhood training organisation - Resources for preschools that included a manual and a small grant to support staff to attend training or purchase physical activity equipment for the service - Contact with health promotion professionals from the local health service, to provide additional advice to preschools to support the delivery of the programme including 2 visits post-workshop Who delivered the intervention: experts and health service staff Theoretical underpinning: not reported Description of control: control preschools received health information on unrelated topics (road safety and sun safety) during the intervention period</p>
Outcomes	<p>Outcome relating to the implementation of childcare service policies, practices or programmes: - Structured play time (minutes per session) - Frequency of structured play (sessions per week) - Unstructured play time (minutes per session) - Frequency of unstructured play (sessions per week) - Fundamental movement skill activities (minutes per session) - Frequency of fundamental movement skill activities (sessions per week) - Conduct of food-based activities - Rules concerning food and drink brought in from home - Food policies - Communicating food rules and policies to parents <i>Data collection method:</i> interview with the service manager <i>Validity of measures used:</i> unclear Outcome relating to staff knowledge, skills or attitudes: Knowledge of recommended guidelines for children: - Daily serves of fruit</p>

Hardy 2010 (Continued)

	<ul style="list-style-type: none">- Daily serves of vegetables- Recreational screen time (TV/DVDs) (hours per day) <p>Attitudes (agreement with statement):</p> <ul style="list-style-type: none">- Teachers do not need to act as role models for being active- It is not the role of the teacher to teach movement skills- It is not important that children participate in structured active play- Safety concerns limit active play opportunities in the preschool setting- It is not the role of the teacher to teach about healthy eating- Parents should be able to send any type of food to school with their child- It is alright to sell chocolates and sweets for fundraising <p><i>Data collection method:</i> childcare service staff self-report via questionnaire</p> <p><i>Validity of measures used:</i> unclear</p> <p>Outcome relating to cost: not applicable</p> <p>Outcome relating to adverse consequences: not applicable</p> <p>Outcome relating to child diet, physical activity or weight status: not applicable</p>	
Notes	-	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	The procedure for random sequence generation was not described
Allocation concealment (selection bias)	Unclear risk	Whether pending allocation was concealed is unclear as no information is provided on concealment
Blinding of participants and personnel (performance bias) All outcomes	High risk	We assumed that due to the nature of the intervention childcare service staff and study personnel delivering the intervention were not blind to the study allocation and therefore there is a potential high risk of performance bias
Blinding of outcome assessment (detection bias) All outcomes	High risk	Policies and practices - self-reported by service managers in interviews with research staff, therefore high risk of bias due to managers being aware of allocation
Incomplete outcome data (attrition bias) All outcomes	Low risk	All service managers followed up in both groups - therefore low risk of bias for outcome regarding implementation of policies and practices
Selective reporting (reporting bias)	Unclear risk	No prospective trial protocol or trial registration so it is unclear whether there was selective outcome reporting

Hardy 2010 (Continued)

Recruitment to cluster	Low risk	All parents of participating services were invited to allow their children to participate
Baseline imbalance	Unclear risk	Unclear response rate of children in each group - imbalance in numbers of students (intervention 263, control 167); some imbalances in baseline characteristics (mean years teaching experience: intervention 4.5 years, control 6 years; teacher's aide: intervention 11.1 years, control 8.9 years; children attending 2 days per week: intervention 22%, control 11%; children attending 3 days per week: intervention 21%, control 42%; English speaking: intervention 58%, control 41%) - unknown if any were significant. Adjustment of some characteristics in analysis
Loss of clusters	Low risk	No loss of clusters.
Incorrect analysis	Low risk	CSPlan procedure used to allow for clustering within service class
Compatibility with individually randomised RCTs	Unclear risk	Unable to determine if a herd effect exists.
Other bias	Unclear risk	-

Johnston Molloy 2013

Methods	Study design: randomised parallel-group trial Intervention duration: not specified Length of follow-up from baseline: not specified Differences in baseline characteristics: not reported Unit of allocation: childcare service Unit of analysis: childcare service
Participants	Service type: preschools Region: Republic of Ireland Demographic/socioeconomic characteristics: preschools were situated in towns, villages and the countryside across 4 midland counties in a geographical area defined as disadvantaged Inclusion/exclusion criteria: inclusion criteria: preschools providing a "full day care service" (i.e. for more than 5 hours per day). Exclusion criteria: preschools that provided only sessional (less than 3.5 hours per session) or part-time care for children; preschools designated as ineligible by the Preschool Inspection Team due to insufficient standard in other pre-defined areas of inspection; preschools that had not been inspected by the Preschool Inspection Team in the previous 12-month period.

Johnston Molloy 2013 (Continued)

	<p>Number of services randomised: 61 (30 intervention group 'manager trained', 31 intervention group 'manager and staff trained')</p> <p>Numbers by trial group:</p> <p>n (intervention group 'manager trained' baseline) = 30</p> <p>n (intervention group 'manager trained' follow-up) = 24</p> <p>n (intervention group 'manager and staff trained' baseline) = 31</p> <p>n (intervention group 'manager and staff trained' follow-up) = 18</p> <p>Recruitment: convenience sampling was undertaken. An up-to-date list of preschools (n = 100) providing a 'full daycare service' was obtained and these preschools were invited to participate</p> <p>Recruitment rate: 61%</p>
Interventions	<p>Number of experimental conditions: 2 (intervention group 'manager trained', intervention group 'manager and staff trained')</p> <p>Policies, practices or programmes targeted by the intervention:</p> <ul style="list-style-type: none"> - Adequate meal and snack composition - Healthy foods and fluids - Appropriate serving size provision - Family-style food service - Healthy preschool policy development <p>Implementation strategies:</p> <p>Intervention 'manager trained':</p> <ul style="list-style-type: none"> - 1-hour manager training session with a research dietitian - Provision of resources (Preschool Nutrition and Health Education Resource) and best practice criterion (Preschool Health Promotion Activity Scored Evaluation Form) - Provision of individualised 'written feedback record' from a pre-intervention observation visit, suggested strategies for improvement discussed with the manager <p><i>Who delivered the intervention:</i> dietitians</p> <p><i>Theoretical underpinning:</i> not reported</p> <p>Implementation strategies:</p> <p>Intervention 'manager and staff trained':</p> <ul style="list-style-type: none"> - 1-hour manager training session with a research dietitian - 1.5-hour structured staff education session with a research dietitian including presentation, group work exercises and discussion - Provision of resources (Preschool Nutrition and Health Education Resource) and best practice criterion (Preschool Health Promotion Activity Scored Evaluation Form) - Provision of individualised 'written feedback record' from a pre-intervention observation visit and suggested strategies for improvement discussed with the manager and staff <p><i>Who delivered the intervention:</i> dietitians</p> <p><i>Theoretical underpinning:</i> adult learning methodologies</p>
Outcomes	<p>Outcome relating to the implementation of childcare service policies, practices or programmes:</p> <ul style="list-style-type: none"> - Environment - Food service - Meals - Snacks - Overall score <p><i>Data collection methods:</i> 1 day observation, preschool manager self-report</p>

Johnston Molloy 2013 (Continued)

	<i>Validity of measures used:</i> used the validated Preschool Health Promotion Activity Scored Evaluation Form Outcome relating to staff knowledge, skills or attitudes: not applicable Outcome relating to cost: not applicable Outcome relating to adverse consequences: not applicable Outcome relating to child diet, physical activity or weight status: not applicable	
Notes	-	
<i>Risk of bias</i>		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	A random-number table was used to allocate services to treatment groups
Allocation concealment (selection bias)	Low risk	We assumed that allocation was conducted in a single, automated process via the random-number table and therefore allocation could not be pre-empted
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Due to nature of the intervention (training), childcare service staff and study personnel delivering the intervention were not blind to study allocation, however as both groups received some form of intervention it is unknown if there is a systematic difference in the potential for performance enhancement and therefore bias
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information provided on whether the individuals conducting the outcome assessment (audits) were blind to group allocation
Incomplete outcome data (attrition bias) All outcomes	High risk	Of 31 services allocated to the 'manager and staff training' intervention, only 18 received the intervention and had follow-up data collected. Of the 30 services allocated to the 'manager training' group, 27 received the intervention and 24 had follow-up data collected. Although data are provided to demonstrate no significant difference between those who participated and did not, this analysis is conducted for all services, not by group. Rated as high risk of bias due to the magnitude of differences in participants lost to follow-up between groups

Johnston Molloy 2013 (Continued)

Selective reporting (reporting bias)	Unclear risk	No prospective trial protocol or trial registration so it is unclear whether there was selective outcome reporting
Other bias	Unclear risk	-

Ward 2008

Methods	Study design: randomised controlled trial Intervention duration: 6 months Length of follow-up from baseline: 6 months Differences in baseline characteristics: reported Unit of allocation: childcare service Unit of analysis: childcare service
Participants	Service type: childcare centres Region: North Carolina, USA Demographic/socioeconomic characteristics: not described Inclusion/exclusion criteria: inclusion criteria: current enrolment of 15 to 150 children. Exclusion criteria: services with an open case of abuse or neglect or served only a special population. Number of services randomised: 84 (56 intervention, 26 control, 2 excluded following randomisation) Numbers by trial group: n (controls baseline) = 26 n (controls follow-up) = 26 n (interventions baseline) = 56 n (interventions follow-up) = 56 Recruitment: all childcare health consultants working in North Carolina were invited to participate. A convenience sample was selected by recruiting the first 30 childcare health consultants (only 1 per county) who indicated an interest in participation, worked with at least 3 childcare services meeting eligibility requirements, and had not participated in the previous pilot project. Recruitment rate: not reported
Interventions	Number of experimental conditions: 2 (intervention, control) Policies, practices or programmes targeted by the intervention: NAPSACC programme. Best practices for the promotion of proper nutrition and regular physical activity at childcare. The programme focused on 15 nutrition and physical activity areas. Nutrition areas of focus included: fruits and vegetables; fried food and high-fat meats; beverages; menus and variety; meals and snacks; food items outside of regular meals and snacks; supporting healthful eating; nutrition education for children, parents and staff; and nutrition policy. Key physical activity areas of focus included: active play and inactive time; TV use and TV viewing; play environment; supporting physical activity; physical activity education for children, parents and staff; and physical activity policy Implementation strategies: - Provision of educational materials

Ward 2008 (Continued)

	<ul style="list-style-type: none">- Self-assessment instrument completed by service managers- Action planning to improve at least 3 target areas identified from the self-assessment- Education workshops on child being overweight, healthy eating and physical activity for children delivered by childcare health consultants- Provision of technical assistance to service staff via in-person visits and telephone contact- Re-assessment using the self-assessment tool <p>Who delivered the intervention: trained childcare health consultants</p> <p>Theoretical underpinning: social cognitive theory against a social-ecologic framework</p> <p>Description of control: delayed intervention control group</p>	
Outcomes	<p>Outcome relating to the implementation of childcare service policies, practices or programmes:</p> <ul style="list-style-type: none">- Total nutrition score- Total physical activity score <p><i>Data collection method:</i> EPAO tool including 1-day observation and a review of pertinent service documents conducted by trained observers. 75 items were selected to evaluate the impact of the intervention. All 75-item responses were converted to a 3-point scale (0, 1 and 2), averaged within a given subscale, and multiplied by10, with the average of all subscale scores representing total nutrition and physical activity scores.</p> <p><i>Validity of measures used:</i> not established at time of study - additional work tests the reliability and validity of the NAPSACC self-assessment instrument in a sample of childcare services</p> <p>Outcome relating to staff knowledge, skills or attitudes: not applicable</p> <p>Outcome relating to cost: not applicable</p> <p>Outcome relating to adverse consequences: not applicable</p> <p>Outcome relating to child diet, physical activity or weight status: not applicable</p>	
Notes	-	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information provided on the method for generating random sequence for allocation of childcare health consultants to treatment groups
Allocation concealment (selection bias)	Unclear risk	No information provided on concealment of allocation of childcare health consultants to groups
Blinding of participants and personnel (performance bias) All outcomes	High risk	We assumed that due to the nature of the intervention childcare service staff and study personnel delivering the intervention were not blind to the study allocation and therefore there is a potential high risk of performance bias

Ward 2008 (Continued)

Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessors were blind to group allocation of services and the tool used was observational
Incomplete outcome data (attrition bias) All outcomes	Low risk	82 of 84 services recruited were followed up - 2 services were lost to follow-up due to closure
Selective reporting (reporting bias)	Unclear risk	Authors state that the outcome measures were determined a priori but unknown if these are listed in a study protocol or trial registry
Other bias	Unclear risk	-

Williams 2002

Methods	Study design: quasi-experimental trial Intervention duration: 3 years Length of follow-up from baseline: 6 months, 18 months Differences in baseline characteristics: not reported Unit of allocation: childcare service Unit of analysis: childcare service (child diet and weight status was assessed at the level of the individual)
Participants	Service type: Head Start Services - preschools Region: Upstate New York, USA Demographic/socioeconomic characteristics: low-income, predominantly minority preschool children Inclusion/exclusion criteria: not reported Number of services randomised: 9 (3 intervention: food service modification plus classroom education with nutrition modules, 3 intervention: food service modification plus classroom safety education, 3 control) Numbers by trial group: n (controls baseline) = 3 n (controls follow-up) = 3 n (interventions: food service modification plus classroom education baseline) = 3 n (interventions: food service modification plus classroom education follow-up) = 3 n (interventions: food service modification plus classroom safety education baseline) = 3 n (interventions: food service modification plus classroom safety education follow-up) = 3 Recruitment: not reported Recruitment rate: not reported
Interventions	Number of experimental conditions: 3 (intervention: food service modification plus classroom education with nutrition modules, intervention: food service modification plus classroom safety education, control) Policies, practices or programmes targeted by the intervention:

Williams 2002 (Continued)

	<p>Food service modification:</p> <ul style="list-style-type: none"> - Achieving a 5 day a week meal/snack plan that provided no more than 30% energy from total fat and no more than 10% energy from saturated fat - Increased offering of fruit, vegetables, breads and grains in meals, decreased total and saturated fat content of foods purchased for the service and decreased total and saturated fat due to alterations in food preparation techniques <p>Implementation strategies:</p> <p>Intervention: food service modification plus classroom education with nutrition modules:</p> <ul style="list-style-type: none"> - Healthy Start Comprehensive Preschool Health Education Curriculum - core curriculum plus nutrition-related units - 1-day training programme for cooks, which covered the major food service intervention areas: menu planning, recipe development, food purchasing and food preparation - A list of objectives was developed together with the cooks - Ongoing support from registered dietitian - Manual, newsletters and incentives <p>Intervention: food service modification plus classroom safety education:</p> <ul style="list-style-type: none"> - Healthy Start Comprehensive Preschool Health Education Curriculum - core curriculum plus safety-related unit - 1-day training programme for cooks, which covered the major food service intervention areas: menu planning, recipe development, food purchasing and food preparation - A list of objectives was developed together with the cooks - Ongoing support from registered dietitian - Manual, newsletters and incentives <p>Who delivered the intervention: registered dietitians</p> <p>Theoretical underpinning: not reported</p> <p>Description of control: Healthy Start Comprehensive Preschool Health Education Curriculum - core curriculum plus safety-related units</p>
Outcomes	<p>Outcome relating to the implementation of childcare service policies, practices or programmes:</p> <p>Change in service menu:</p> <ul style="list-style-type: none"> - kcal - Total fat - Saturated fat - % kcal from total fat - % kcal from saturated fat <p><i>Data collection method:</i> service menus were analysed for nutrient content by obtaining menus, recipes and food labels for 5 days at each data collection time point</p> <p><i>Validity of measures used:</i> unclear</p> <p>Outcome relating to staff knowledge, skills or attitudes: not applicable</p> <p>Outcome relating to cost: not applicable</p> <p>Outcome relating to adverse consequences: not applicable</p> <p>Outcome relating to child diet, physical activity or weight status:</p> <p>Change in child school meal dietary intake:</p> <ul style="list-style-type: none"> - Energy (kcal) - Total fat - Saturated fat - % kcal from total fat

Williams 2002 (Continued)

	<p>- % kcal from saturated fat</p> <p><i>Data collection method:</i> direct observation of children during attendance at the service with plate waste measurement to determine amounts of foods and beverages consumed</p> <p><i>Validity of measures used:</i> the complete dietary intake assessment protocol was adapted from existing protocols proven to be reliable and valid</p> <p>Child weight status:</p> <p><i>Data collection method:</i> measurements of child weight (using digital scale) and height (using telescopic measuring rod) obtained by trained staff. Weight to height ratio calculated at baseline and at 6 months</p> <p><i>Validity of measures used:</i> unclear - appears to be an objective measure</p>	
Notes	For the analysis, all services assigned to the food service intervention arm of the study were grouped together, as were the services assigned to the control condition	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	No random allocation to control and intervention conditions (random allocation to 1 of 2 intervention conditions)
Allocation concealment (selection bias)	Unclear risk	Unclear as to whether concealment of allocation occurred.
Blinding of participants and personnel (performance bias) All outcomes	High risk	We assumed that due to the nature of the intervention childcare service staff and study personnel delivering the intervention were not blind to the study allocation and therefore there is a potential high risk of performance bias
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information is provided on whether research personnel undertaking menu assessment and other data collection were blind to group allocation
Incomplete outcome data (attrition bias) All outcomes	Low risk	Implementation data collected on all intervention (n = 6) and control services (n = 3) pre- and post-intervention
Selective reporting (reporting bias)	Low risk	Methodology paper also lists physiological measures - these have been published elsewhere
Potential confounding	Unclear risk	No information provided.
Other bias	Unclear risk	-

BMI: body mass index

EPAO: Environment and Policy Assessment and Observation

NAPSACC: Nutrition and Physical Activity Self-Assessment for Child Care

OSRAP: Observation System for Recording Activity in Preschools

RCT: randomised controlled trial

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Adamo 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Adams 2012	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Agrawal 2012	Non-controlled study
Alhassan 2013	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Alhassan 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Androutsos 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Antoine 2012	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Bammann 2007	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Battista 2014	Non-controlled study
Bellows 2007	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Bellows 2013	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Benjamin 2008	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Bisceglie 2010	Non-controlled study

(Continued)

Bonis 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Bryars 2012	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Buscemi 2014	Inappropriate participants
Carpenter 2010	Non-controlled study
Crowley 2009	Non-controlled study
Céspedes 2013	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
D'agostino 1999	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Davis 2013	Non-controlled study
De Bock 2013	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
De Craemer 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
De Silva-Sanigorski 2010	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
De Silva-Sanigorski 2011	Inappropriate participants
De Silva-Sanigorski 2012	No baseline data
Duncan 2011	Non-controlled study
Endres 2003	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Falbe 2013	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Farfan-Ramirez 2011	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Ferrer 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme

(Continued)

Fitzgerald 2014	Non-controlled study
Fitzgibbon 2002	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Fitzgibbon 2005	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Fitzgibbon 2006	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Fitzgibbon 2011	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Foltz 2012	Non-controlled study
Foulkes 2014	Non-controlled study
Fritz 2007	Non-controlled study
Gallois 2011	Non-controlled study
Gannon 2013	Non-controlled study
Gannon 2014	Non-controlled study
Girardet 2009	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Goldberg 2010	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Goldfield 2012	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Goldfield 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Golley 2011	Non-controlled study
Graham 2008	Inappropriate participants
Hammons 2013	Non-controlled study
Hanna 2012	Inappropriate intervention
Harvey 2008	Non-controlled study

(Continued)

Helland 2013	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Herbert 2013	Non-controlled study
Herman 2012	Non-controlled study
Isbell 2013	Non-controlled study
Jones 2010	Inappropriate participants
Jouret 2009	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Kain 2012	Inappropriate participants
Korwanich 2008	No reporting of between-group differences in implementation outcomes
Lent 2012	Inappropriate participants
Lerner-Geva 2015	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Manios 2012	Non-controlled study
Manios 2013	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Mazzeo 2012	Non-controlled study
Metcalf 2012	Non-controlled study
Mier 2005	Non-controlled study
Mo-suwan 1998	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Najjar 2013	Non-controlled study
NAPNAP 2006	Non-controlled study
Natale 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Nemet 2011	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme

(Continued)

Nemet 2013	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Niederer 2009	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Niederer 2013	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Organizational Research Services 2003	Non-controlled study
Page 2011	Non-controlled study
Partington 2012	Non-controlled study
Passchl 2004	Non-controlled study
Patel 2010	Non-controlled study
Peregrin 2001	Non-controlled study
Phillips 2004	Non-controlled study
Prosper 2009	Inappropriate participants
Ramsay 2013	Inappropriate intervention
Requena 2010	Non-controlled study
Roth 2011	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Roths 2002	Non-controlled study
Rudolf 2010	Non-controlled study
Sanigorski 2008	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Santos-Beneit 2013	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Savage 2006	Inappropriate participants
Schindler 2013	Non-controlled study
Schwarz 2013	Non-controlled study

(Continued)

Sekhobo 2012	Inappropriate participants
Skouteris 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Small 2007	Inappropriate participants
Smiciklas-Wright 1978	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Stock 2007	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Stolley 2003	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Story 2012	Inappropriate participants
Strauß 2011	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Summerbell 2012	Non-controlled study
Thibault 2010	Non-controlled study
Thomas 2012	Inappropriate participants
Trost 2008	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Trost 2012	Inappropriate participants
Van Stan 2013	Non-controlled study
Vanderwall 2012	Inappropriate participants
Vasquez 2008	Non-controlled study
Verbestel 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Watt 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Whaley 2010	Inappropriate participants
Wilken 2013	Inappropriate participants

(Continued)

Williams 2009	Non-controlled study
Witt 2012	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Yin 2012	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Zask 2012	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme
Zhou 2014	Inappropriate outcomes - does not aim to improve implementation of a policy, practice or programme

Characteristics of ongoing studies [ordered by study ID]**Baby NAPSACC Intervention Study**

Trial name or title	Baby NAPSACC Intervention Study
Methods	Study design: randomised trial
Participants	Service type: childcare centres Region: North Carolina, USA Number of services participating: not specified
Interventions	Number of experimental conditions: 2 (intervention, control) Policies, practices or programmes targeted by the intervention: not specified Implementation strategies: - Service and family self-assessment - Targeted technical assistance provided by Baby NAPSACC consultant for providers and parents - Training workshops for child care providers - Parent outreach and support
Outcomes	Outcome relating to the implementation of childcare service policies, practices or programmes: change in childcare service policies and practices
Starting date	2013
Contact information	Sara Benjamin Neelon, sara.benjamin@dm.duke.edu
Notes	ClinicalTrials.gov Identifier: NCT01890681

Finch 2015

Trial name or title	A pragmatic randomised controlled trial of an implementation intervention to increase healthy eating and physical activity-promoting policies, and practices in centre-based childcare services
Methods	Study design: randomised controlled trial
Participants	Service type: childcare services (preschools and long daycare services) Region: Hunter New England region, New South Wales, Australia Number of services participating: 165
Interventions	Number of experimental conditions: 2 (intervention, control) Policies, practices or programmes targeted by the intervention: <ul style="list-style-type: none"> - Having a service policy (nutrition, physical activity and small screen recreation) - Service providing information to families (healthy eating, physical activity, small screen time and breast feeding, where relevant) - Service providing structured and specific learning experiences about healthy eating at least 2 times per week - Service supplying age-appropriate drinks to children (only water and age-appropriate milk) - Service conducting fundamental movement skills activities for children aged 3 to 5 years every day to at least 90% of children - Service limiting use of small screen recreation by children aged 3 to 5 years to only educational purposes and for learning experiences Implementation strategies: performance review intervention with other resources
Outcomes	Outcome relating to the implementation of childcare service policies, practices or programmes: proportion of services implementing all of the recommended healthy eating and physical activity-promoting practices
Starting date	2013
Contact information	Meghan Finch, meghan.finch@hnehealth.nsw.gov.au
Notes	Australian Clinical Trials Registry ACTRN12614000972628

Jones 2014

Trial name or title	A randomised controlled trial of an intervention to facilitate the implementation of healthy eating and physical activity policies and practices in childcare services
Methods	Study design: randomised controlled trial
Participants	Service type: childcare services (preschools and long daycare services) Region: Hunter region, New South Wales, Australia Number of services participating: 128
Interventions	Number of experimental conditions: 2 (intervention, control) Policies, practices or programmes targeted by the intervention: <ul style="list-style-type: none"> - Written nutrition and physical activity policies - Staff monitoring of children's lunch boxes against written nutritional guidelines and provision of feedback to parents when a non-compliant food is packed

Jones 2014 (Continued)

	<ul style="list-style-type: none"> - Provision of water or reduced fat milk only to children - Staff role modelling of physically active play and healthy eating - Staff provision of prompts and positive comments to children to encourage physical activity and healthy eating - Provision of adult-guided fundamental movement skill development activities - Restriction of sedentary screen time Implementation strategies: <ul style="list-style-type: none"> - Implementation support staff - Executive support - Consensus processes - Staff training - Academic detailing visits - Performance monitoring and feedback - Tools and resources - Communications strategy
Outcomes	Outcome relating to the implementation of childcare service policies, practices or programmes: change in prevalence of services implementing all healthy eating and physical activity policies and practices
Starting date	2012
Contact information	Jannah Jones, jannah.jones@hnehealth.nsw.gov.au
Notes	Australian Clinical Trials Registry ACTRN12612000927820

The Healthy Start Study

Trial name or title	A multilevel intervention to increase physical activity and improve healthy eating among young children (ages 3 to 5) attending early childcare centres: the Healthy Start Study
Methods	Study design: randomised controlled trial
Participants	Service type: early childcare centre Region: Canada Number of services participating: not specified
Interventions	Number of experimental conditions: 2 (intervention, control) Policies, practices or programmes targeted by the intervention: not specified Implementation strategies: <ul style="list-style-type: none"> - Intersectoral partnerships that leads to promoting healthy weights in communities and childcare services - The Healthy Start guide for educators - Customized training - Role modelling and monitoring - An evidence-based resource for both families and educators and supplementary resources from governmental partners - Knowledge development and exchange - Communication strategy

The Healthy Start Study (Continued)

Outcomes	Outcome relating to the implementation of childcare service policies, practices or programmes: early childcare centre practices and policies for physical activity and nutrition
Starting date	2015
Contact information	Holly Hallikainen, hlh664@mail.usask.ca
Notes	ClinicalTrials.gov Identifier: NCT02375490

NAPSACC: Nutrition and Physical Activity Self-Assessment for Child Care

DATA AND ANALYSES

This review has no analyses.

ADDITIONAL TABLES

Table 1. Definition of EPOC subcategories utilised in the review

EPOC subcategory	Definition
Educational materials	Distribution to individuals, or groups, of educational materials to support clinical care, i.e. any intervention in which knowledge is distributed. For example, this may be facilitated by the internet, learning critical appraisal skills; skills for electronic retrieval of information, diagnostic formulation; question formulation
Educational meetings	Courses, workshops, conferences or other educational meetings
Educational outreach visits or academic detailing	Personal visits by a trained person to health workers in their own settings, to provide information with the aim of changing practice
Small incentives or grants	Transfer of money or material goods to healthcare providers conditional on taking a measurable action or achieving a predetermined performance target, for example incentives for lay health workers
Audit and feedback	A summary of health workers' performance over a specified period of time, given to them in a written, electronic or verbal format; the summary may include recommendations for clinical action
Opinion leaders	The identification and use of identifiable local opinion leaders to promote good clinical practice

Table 2. Summary of intervention, measures and absolute intervention effect size in included studies

Study	Implementation strategies	Comparison group	Primary implementation outcome measures	Effect size ^a
Alkon 2014	Educational materials, educational meetings and audit and feedback	Usual practice	Score: nutrition and physical activity policy quality using the CHPHSPC and nutrition and physical activity practices using the EPAO assessed via observation (5 measures) % of staff or services implementing a practice: foods offered to children assessed using the DOCC tool assessed	Median (range)^d: 1.4 (0 to 4.29) Median (range): 0% (0% to 25%) ^c

Table 2. Summary of intervention, measures and absolute intervention effect size in included studies (Continued)

			via observation (10 measures)	
Bell 2014	Educational materials, educational meetings, audit and feedback, opinion leaders, and small incentives or grants	Usual practice	<p>% of staff or services implementing a practice: percentage of services implementing nutrition policies and practices and menus consistent with nutrition recommendations (10 measures)</p> <p>Quantity of food served (servings/items): mean number of items or servings of healthy/unhealthy foods on service menus (4 measures)</p>	<p>Median (range): 9.5% (2% to 36%)</p> <p>Median (range): 0.5 serves/items (-0.4 to 0.8)</p>
Benjamin 2007	Educational materials, educational meetings, and audit and feedback	Usual practice	Score: nutrition, physical activity environments assessed via questionnaire (NAPSACC) completed by service managers (total score)	Mean difference (95% CI)^d: 5.10 (-2.80 to 13.00)
Finch 2012	Educational materials, educational meetings, audit and feedback, opinion leaders and small incentives	Usual practice	<p>% of staff or services implementing a practice: percentage of services implementing physical activity policies and practices (11 measures)</p> <p>Minutes of service or staff implementation of a policy of practice: time (hours/day) spent on structured physical activities (1 measure)</p>	<p>Median (range): 2.5% (-4% to 41%)</p> <p>Mean: 6 minutes</p>
Finch 2014	Educational materials, educational meetings, audit and feedback, opinion leaders and small incentives	Usual practice	Frequency of staff or service implementation of a practice: occasions of implementation of fundamental movement skill activities, staff role modelling and verbal prompts and positive comments (4 measures)	<p>Median (range): 2.6 (12.1 to 0.6)</p> <p>Median (range)^d: 4.3 minutes (-12 minutes to 39 minutes)</p> <p>Median (range): 5 (30 to -20)</p> <p>Median (range): -0.1 (-0.6 to -0.1)</p>

Table 2. Summary of intervention, measures and absolute intervention effect size in included studies (Continued)

			Minutes of service or staff implementation of a policy of practice (per session or day): minutes of fundamental movement skill activities, structured time, television viewing or seated time (4 measures) % of staff or services implementing a practice: services with seated time > 30 minutes or with an activity policy (2 measures) Mean number of resources or equipment per service: (3 measures)	
Gosliner 2010	Ed-ucational materials, ed-ucational meetings, ed-ucational outreach visits or academic detailing with small incentives or grants with staff wellness programme	Ed-ucational materials, ed-ucational meetings, ed-ucational outreach visits or academic detailing	% of staff or services implementing a practice: Provision of food items by staff 'more often' assessed via staff completed questionnaire (8 measures)	Median (range): 17% (0% to 23%)
Hardy 2010	Ed-ucational materials, ed-ucational meetings, ed-ucational outreach visits or academic detailing with small incentives or grants	Usual practice	Minutes of service or staff implementation of a policy of practice: Minutes (per week or session) of structured and unstructured play or fundamental movement skills activities (3 measures) Frequency of staff or service implementation of a practice: Frequency (per week or day) of structured or unstructured play, and of fundamental movement skill activities (3 measures) % of staff or services implementing a practice: conduct of food	Median (range): 7.7 minutes (6.5 minutes to 10.1 minutes) Median (range): 0.2 (-0.9 to 1.9) Median (range)^d: 11% (-7% to 31%)

Table 2. Summary of intervention, measures and absolute intervention effect size in included studies (Continued)

			based activities, development of new rules around food and drink bought from home, and the provision of health information to families (3 measures)	
Johnston Molloy 2013	Educational materials, manager and staff educational meetings and audit and feedback	Educational materials, manager educational meetings, and audit and feedback	Score: On the Health Promotion Evaluation Activity Scored Evaluation form assessed via observation (total score)	Difference in median score: -2 ^b
Ward 2008	Educational materials, educational meetings, and audit and feedback	Usual practice	Score: nutrition and physical activity practices using the EPAO assessed via observation (total score)	Mean difference (95% CI) ^d : 1.01 (0.18 to 1.84)
Williams 2002	Educational materials, educational meetings, educational outreach visits or academic detailing with small incentives or grants	Usual practice	Quantity of food served (servings/grams): Primary outcome - grams of saturated fat assessed via menu audit (one measure)	Median (range): 17% (0% to 23%)

^aEffect size calculated first using the primary outcome (where a single primary outcome was reported); otherwise using a total score (when total and subscale scores were provided); otherwise using the median effect size across measures (where more than one outcome measure was reported and not specified as primary).

^bMean not reported. Represents the difference in median score between manager and staff trained versus manager only trained group.

^cEffect size of measures reported as non-significant (but where data are not reported in manuscript) assumed to be '0'.

^dAdditional data obtained from study authors where unclear or missing.

CHPHSPC: Californian Childcare Health Programme Health and Safety Checklist; DOCC: Diet Observation in Child Care; EPAO: Environment and Policy Assessment and Observation; NAPSACC: Nutrition and Physical Activity Self-Assessment for Child Care

APPENDICES

Appendix I. Search strategy

MEDLINE search strategy

1. exp obesity/
2. Weight Gain/
3. exp Weight Loss/
4. obes*.mp.
5. (weight gain or weight loss).mp.
6. (overweight or over weight or overeat* or over eat*).mp.
7. weight change*.mp.
8. ((bmi or body mass index) adj2 (gain or loss or change)).mp.
9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
10. exp Exercise/
11. physical inactivity.mp.
12. physical activity.mp.
13. exp Motor Activity/
14. (physical education and training).mp.
15. exp "Physical Education and Training"/
16. Physical Fitness/
17. sedentary.mp.
18. exp Life Style/
19. exp Leisure Activities/
20. exp Sports/
21. Dancing/
22. (exercise* adj2 aerobic*).mp.
23. sport*.mp.
24. ((life style or life style) adj5 activ*).mp.
25. (dance* or dancing).mp.
26. 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25
27. exp Diet/
28. nutrition*.mp.
29. (health* adj2 eat*).mp.
30. Child Nutrition Sciences/
31. Fruit/ or fruit*.mp.
32. Vegetables/ or vegetable*.mp.
33. canteen*.mp.
34. Food Services/
35. menu.mp.
36. (calorie or calories or kilojoule*).mp.
37. Energy Intake/
38. energy density.mp.
39. Eating/
40. Feeding Behavior/ or feeding behaviour.mp.
41. dietary intake.mp.
42. Food Habits/
43. Food/
44. Carbonated Beverages/ or soft drink*.mp.
45. soda.mp.
46. sweetened drink*.mp.

APPENDICES

Appendix I. Search strategy

MEDLINE search strategy

1. exp obesity/
2. Weight Gain/
3. exp Weight Loss/
4. obes*.mp.
5. (weight gain or weight loss).mp.
6. (overweight or over weight or overeat* or over eat*).mp.
7. weight change*.mp.
8. ((bmi or body mass index) adj2 (gain or loss or change)).mp.
9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
10. exp Exercise/
11. physical inactivity.mp.
12. physical activity.mp.
13. exp Motor Activity/
14. (physical education and training).mp.
15. exp "Physical Education and Training"/
16. Physical Fitness/
17. sedentary.mp.
18. exp Life Style/
19. exp Leisure Activities/
20. exp Sports/
21. Dancing/
22. (exercise* adj2 aerobic*).mp.
23. sport*.mp.
24. ((life style or life style) adj5 activ*).mp.
25. (dance* or dancing).mp.
26. 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25
27. exp Diet/
28. nutrition*.mp.
29. (health* adj2 eat*).mp.
30. Child Nutrition Sciences/
31. Fruit/ or fruit*.mp.
32. Vegetables/ or vegetable*.mp.
33. canteen*.mp.
34. Food Services/
35. menu.mp.
36. (calorie or calories or kilojoule*).mp.
37. Energy Intake/
38. energy density.mp.
39. Eating/
40. Feeding Behavior/ or feeding behaviour.mp.
41. dietary intake.mp.
42. Food Habits/
43. Food/
44. Carbonated Beverages/ or soft drink*.mp.
45. soda.mp.
46. sweetened drink*.mp.

47. Dietary Fats/
48. confectionary.mp.
49. (school adj2 (lunch* or meal*)).mp.
50. Menu Planning/
51. feeding program*.mp.
52. food program*.mp.
53. (nutrition* adj2 program*).mp.
54. cafeteria*.mp.
55. Nutritional Status/
56. 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55
57. 9 or 26 or 56
58. Child, Preschool/
59. (pre-school* or preschool*).mp.
60. Child Day Care Centers/
61. (childcare* or child care*).mp.
62. (daycare* or day care*).mp.
63. early child*.mp.
64. (nursery or nurseries).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
65. Kinder*.mp.
66. 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65
67. randomized controlled trial.pt.
68. controlled clinical trial.pt.
69. clinical trials as topic.sh.
70. trial*.tw.
71. double blind.tw.
72. single blind.tw.
73. experiment*.tw.
74. (pretest or pre test).tw.
75. (posttest or post test).tw.
76. (pre post or prepost).tw.
77. before after.tw.
78. qua?i randomi?ed.tw.
79. stepped wedge.tw.
80. (non randomi?ed or nonrandomi?ed).tw.
81. interrupted time series.tw.
82. multiple baseline.tw.
83. regression discontinuity.tw.
84. comprehensive cohort.tw.
85. random*.ab.
86. 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85
87. implement*.mp.
88. dissemin*.mp.
89. adopt*.mp.
90. practice*.mp.
91. organi?ational change*.mp.
92. diffus*.mp.
93. (system* adj2 change*).tw.
94. quality improvement*.mp.
95. transform*.mp.
96. translat*.mp.
97. transfer*.mp.

98. uptake*.mp.
99. sustainab*.mp.
100. institutional*.mp.
101. routin*.mp.
102. maintenance.mp.
103. capacity.mp.
104. incorporat*.mp.
105. adher*.mp.
106. ((polic* or practice* or program* or innovation*) adj5 (performance or feedback or prompt* or reminder* or incentive* or penal* or communicat* or social market* or professional development or network* or leadership or opinion leader* or consensus process* or change manage* or train* or audit*)).mp.
107. integrat*.mp.
108. scal* up.mp.
109. 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95 or 96 or 97 or 98 or 99 or 100 or 101 or 102 or 103 or 104 or 105 or 106 or 107 or 108
110. 57 and 66 and 86 and 10

CENTRAL search strategy

1. MeSH descriptor: [Obesity] explode all trees
2. MeSH descriptor: [Weight Gain] this term only
3. MeSH descriptor: [Weight Loss] explode all trees
4. obes*
5. weight gain or weight loss
6. overweight or "over weight" or overeat* or "over eat"
7. "weight change"
8. ((bmi or body mass index) near/2 (gain or loss or change))
9. {or #1-#8}
10. MeSH descriptor: [Exercise] explode all trees
11. "physical inactivity"
12. "physical activity"
13. MeSH descriptor: [Motor Activity] explode all trees
14. "physical education and training"
15. MeSH descriptor: [Physical Education and Training] explode all trees
16. MeSH descriptor: [Physical Fitness] this term only
17. sedentary
18. MeSH descriptor: [Life Style] explode all trees
19. MeSH descriptor: [Leisure Activities] explode all trees
20. MeSH descriptor: [Sports] explode all trees
21. MeSH descriptor: [Dancing] this term only
22. exercis* near/2 aerobic*
23. sport*
24. (life style or lifestyle) near/5 activ*
25. dance* or dancing
26. {or #10-#25}
27. MeSH descriptor: [Diet] explode all trees
28. nutrition*
29. health* near/2 eat*
30. MeSH descriptor: [Child Nutrition Sciences] this term only
31. fruit*
32. MeSH descriptor: [Fruit] this term only
33. vegetable*
34. MeSH descriptor: [Vegetables] this term only

35. canteen*
36. MeSH descriptor: [Food Services] this term only
37. menu
38. calorie or calories or kilojoule*
39. MeSH descriptor: [Energy Intake] this term only
40. "energy density"
41. MeSH descriptor: [Eating] this term only
42. MeSH descriptor: [Feeding Behavior] this term only
43. "feeding behaviour"
44. "dietary intake"
45. MeSH descriptor: [Food Habits] this term only
46. MeSH descriptor: [Food] this term only
47. MeSH descriptor: [Carbonated Beverages] this term only
48. "soft drink"
49. soda
50. "sweetened drink"
51. MeSH descriptor: [Dietary Fats] this term only
52. confectionary
53. school near/2 (lunch* or meal*)
54. MeSH descriptor: [Menu Planning] this term only
55. "feeding program"
56. "food program"
57. nutrition* near/2 program*
58. cafeteria*
59. MeSH descriptor: [Nutritional Status] this term only
60. {or #27-#59} 48804
61. MeSH descriptor: [Child, Preschool] this term only
62. pre-school* or preschool*
63. MeSH descriptor: [Child Day Care Centers] this term only
64. childcare* or "child care"
65. daycare* or "day care"
66. "early child"
67. nursery or nurseries
68. Kinder*
69. {or #61-#68}
70. randomized controlled trial.pt
71. controlled clinical trial.pt
72. clinical trials as topic.sh
73. trial*:ti,ab
74. double blind:ti,ab
75. single blind:ti,ab
76. experiment*:ti,ab
77. pretest or "pre test":ti,ab
78. posttest or "post test":ti,ab
79. pre post or "prepost":ti,ab
80. "before after":ti,ab
81. "qua?i randomi?ed":ti,ab
82. "stepped wedge":ti,ab
83. "non randomi?ed" or nonrandomi?ed:ti,ab
84. "interrupted time series":ti,ab
85. "multiple baseline":ti,ab
86. "regression discontinuity":ti,ab
87. "comprehensive cohort":ti,ab

88. random*:ab
89. {or #70-#88}
90. implement*
91. dissemin*
92. adopt*
93. practice*
94. "organizational change"
95. diffus*
96. system* near/2 change*
97. "quality improvement"
98. transform*
99. translat*
100. transfer*
101. uptake*
102. sustainab*
103. institutional*
104. routin*
105. maintenance
106. capacity
107. incorporat*
108. adher*
109. (police* or practice* or program* or innovation*) near/5 (performance or feedback or prompt* or reminder* or incentive* or penal* or communicat* or social market* or professional development or network* or leadership or opinion leader* or consensus process* or change manage* or train* or audit*) 10599
110. integrat*
111. "scal* up"
112. {or #90-#111}
113. #9 or #26 or #60
114. #69 and #89 and #112 and #113

MEDLINE In Process search strategy

1. obes*.mp.
2. (weight gain or weight loss).mp.
3. (overweight or over weight or overeat* or over eat*).mp.
4. weight change*.mp.
5. ((bmi or body mass index) adj2 (gain or loss or change)).mp.
6. 1 or 2 or 3 or 4 or 5
7. exercis*.mp.
8. physical inactivity.mp.
9. physical activity.mp.
10. motor activity.mp.
11. (physical education and training).mp.
12. Physical Fitness.mp.
13. sedentary.mp.
14. Leisure Activit*.mp.
15. sport*.mp.
16. ((life style or lifestyle) adj5 activ*).mp.
17. (dance* or dancing).mp.
18. 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17
19. diet.mp.
20. nutrition*.mp.
21. (health* adj2 eat*).mp.

22. fruit*.mp.
23. vegetable*.mp.
24. canteen*.mp.
25. Food Service*.mp.
26. menu.mp.
27. (calorie or calories or kilojoule*).mp.
28. Energy Intake.mp.
29. energy density.mp.
30. Eating.mp.
31. feeding behavior*.mp.
32. dietary intake.mp.
33. Food.mp.
34. ((carbonated or sweetened or soft) adj (drink* or beverage*)).mp.
35. soda.mp.
36. Dietary Fat*.mp.
37. confectionary.mp.
38. (school adj2 (lunch* or meal*)).mp.
39. feeding program*.mp.
40. food program*.mp.
41. (nutrition* adj2 program*).mp.
42. cafeteria*.mp.
43. 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42
44. (pre-school* or preschool*).mp.
45. (childcare* or child care*).mp.
46. (daycare* or day care*).mp.
47. early child*.mp.
48. (nursery or nurseries).mp.
49. Kinder*.mp.
50. 44 or 45 or 46 or 47 or 48 or 49
51. randomized controlled trial.pt.
52. controlled clinical trial.pt.
53. trial*.tw.
54. double blind.tw.
55. single blind.tw.
56. experiment*.tw.
57. (pretest or pre test).tw.
58. (posttest or post test).tw.
59. (pre post or prepost).tw.
60. before after.tw.
61. qua?i randomi?ed.tw.
62. stepped wedge.tw.
63. (non randomi?ed or nonrandomi?ed).tw.
64. interrupted time series.tw.
65. multiple baseline.tw.
66. regression discontinuity.tw.
67. comprehensive cohort.tw.
68. random*.tw.
69. 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68
70. implement*.mp.
71. dissemin*.mp.
72. adopt*.mp.
73. practice*.mp.

74. organi?ational change*.mp.
75. diffus*.mp.
76. (system* adj2 change*).tw.
77. quality improvement*.mp.
78. transform*.mp.
79. translat*.mp.
80. transfer*.mp.
81. uptake*.mp.
82. sustainab*.mp.
83. institutional*.mp.
84. routin*.mp.
85. maintenance.mp.
86. capacity.mp.
87. incorporat*.mp.
88. adher*.mp.
89. ((polic* or practice* or program* or innovation*) adj5 (performance or feedback or prompt* or reminder* or incentive* or penal* or communicat* or social market* or professional development or network* or leadership or opinion leader* or consensus process* or change manage* or train* or audit*)).mp.
90. integrat*.mp.
91. scal* up.mp.
92. 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91
93. 6 or 18 or 43
94. 50 and 69 and 92 and 93

EMBASE search strategy

1. exp obesity/
2. weight gain/
3. Weight Loss.mp. or exp weight reduction/
4. obes*.mp.
5. (weight gain or weight loss).mp.
6. (overweight or over weight or overeat* or over eat*).mp.
7. weight change*.mp.
8. ((bmi or body mass index) adj2 (gain or loss or change)).mp.
9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
10. exp exercise/
11. physical inactivity.mp. or physical inactivity/
12. exp physical activity/
13. exp motor activity/
14. "physical education and training".mp.
15. physical education/
16. physical fitness.mp. or fitness/
17. sedentary.mp.
18. lifestyle/
19. Leisure Activities.mp. or leisure/
20. exp sport/
21. dancing/
22. (exercise* adj2 aerobic*).mp.
23. sport*.mp.
24. ((life style or lifestyle) adj5 activ*).mp.
25. (dance* or dancing).mp.
26. 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25
27. exp diet/

28. nutrition*.mp. or nutrition/
29. (health* adj2 eat*).mp.
30. Child Nutrition Sciences.mp. or nutritional science/
31. fruit*.mp. or fruit/
32. vegetable*.mp. or vegetable/
33. canteen*.mp.
34. Food Services.mp. or catering service/
35. menu.mp.
36. (calorie or calories or kilojoule*).mp.
37. Energy Intake.mp. or caloric intake/
38. energy density.mp.
39. eating/
40. feeding behaviour.mp. or feeding behavior/
41. dietary intake.mp. or dietary intake/
42. Food Habits.mp. or feeding behavior/
43. food/
44. carbonated beverage/ or soft drink*.mp. or soft drink/
45. soda.mp.
46. sweetened drink*.mp.
47. Dietary Fats.mp. or fat intake/
48. confectionary.mp.
49. (school adj2 (lunch* or meal*)).mp.
50. Menu Planning.mp.
51. feeding program*.mp.
52. food program*.mp.
53. (nutrition* adj2 program*).mp.
54. cafeteria*.mp.
55. nutritional status/
56. 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55
57. 9 or 26 or 56
58. Child, Preschool/
59. (pre-school* or preschool*).mp.
60. day care/
61. child care/ or childcare*.mp.
62. (daycare* or day care*).mp.
63. early child*.mp.
64. nurseries.mp. or nursery/
65. Kinder*.mp.
66. 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65
67. randomized controlled trial/
68. controlled clinical trial/
69. "clinical trial (topic)"/
70. trial*.tw.
71. double blind.tw.
72. single blind.tw.
73. experiment*.tw.
74. (pretest or pre test).tw.
75. (posttest or post test).tw.
76. (pre post or prepost).tw.
77. before after.tw.
78. qua?i randomi?ed.tw.
79. stepped wedge.tw.

80. (non randomi?ed or nonrandomi?ed).tw.
81. interrupted time series.tw.
82. multiple baseline.tw.
83. regression discontinuity.tw.
84. comprehensive cohort.tw.
85. random*.ab.
86. 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85
87. implement*.mp.
88. dissemin*.mp.
89. adopt*.mp.
90. organi?ational change*.mp.
91. diffus*.mp.
92. (system* adj2 change*).tw.
93. quality improvement*.mp.
94. practice*.mp.
95. transform*.mp.
96. translat*.mp.
97. transfer*.mp.
98. uptake*.mp.
99. sustainab*.mp.
100. institutional*.mp.
101. routin*.mp.
102. maintenance.mp.
103. capacity.mp.
104. incorporat*.mp.
105. adher*.mp.
106. ((polic* or practice* or program* or innovation*) adj5 (performance or feedback or prompt* or reminder* or incentive* or penalt* or communicat* or social market* or professional development or network* or leadership or opinion leader* or consensus process* or change manage* or train* or audit*)).mp.
107. integrat*.mp.
108. scal* up.mp.
109. 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95 or 96 or 97 or 98 or 99 or 100 or 101 or 102 or 103 or 104 or 105 or 106 or 107 or 108
110. 57 and 66 and 86 and 109

PsychINFO search strategy

1. Obesity/
2. Weight Gain/
3. Weight Loss/
4. obes*.mp.
5. (weight gain or weight loss).mp.
6. (overweight or over weight or overeat* or over eat*).mp.
7. weight change*.mp.
8. ((bmi or body mass index) adj2 (gain or loss or change)).mp.
9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
10. exp Exercise/
11. physical inactivity.mp.
12. physical activity.mp. or Physical Activity/
13. Motor Activity.mp.
14. (physical education and training).mp.
15. Physical Education/
16. Physical Fitness/

Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services (Review) 87

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17. sedentary.mp.
18. exp Lifestyle/
19. leisure time/ or recreation/
20. exp Sports/
21. Dance/
22. (exercise* adj2 aerobic*).mp.
23. sport*.mp.
24. ((life style or lifestyle) adj5 activ*).mp.
25. (dance* or dancing).mp.
26. 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25
27. Diets/
28. exp Nutrition/ or Nutrition*.mp.
29. (health* adj2 eat*).mp.
30. Child Nutrition Sciences.mp.
31. fruit*.mp.
32. vegetable*.mp.
33. canteen*.mp.
34. Food Services.mp.
35. menu.mp.
36. (calorie or calories or kilojoule*).mp.
37. Food Intake/ or Energy Intake.mp.
38. energy density.mp.
39. Eating.mp.
40. Eating Behavior/
41. feeding behavior?r.mp.
42. dietary intake.mp.
43. Food/
44. ((carbonated or sweetened or soft) adj (drink* or beverage*)).mp.
45. soda.mp.
46. Dietary Fat*.mp.
47. confectionary.mp.
48. (school adj2 (lunch* or meal*)).mp.
49. feeding program*.mp.
50. food program*.mp.
51. (nutrition* adj2 program*).mp.
52. cafeteria*.mp.
53. 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52
54. 9 or 26 or 53
55. preschool students/ or nursery school students/
56. (pre-school* or preschool*).mp.
57. Day Care Centers/ or Child Day Care/
58. (childcare* or child care*).mp.
59. (daycare* or day care*).mp.
60. early child*.mp.
61. (nursery or nurseries).mp.
62. Kindergarten Students/ or Kinder*.mp.
63. 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62
64. randomi?ed controlled trial*.mp.
65. Clinical Trials/
66. trial*.tw.
67. double blind.tw.
68. single blind.tw.

69. experiment*.tw.
70. (pretest or pre test).tw.
71. (posttest or post test).tw.
72. (pre post or prepost).tw.
73. before after.tw.
74. qua?i randomi?ed.tw.
75. stepped wedge.tw.
76. (non randomi?ed or nonrandomi?ed).tw.
77. interrupted time series.tw.
78. multiple baseline.tw.
79. regression discontinuity.tw.
80. comprehensive cohort.tw.
81. random*.ab.
82. 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81
83. implement*.mp.
84. dissemin*.mp.
85. adopt*.mp.
86. practice*.mp.
87. organi?ational change*.mp.
88. diffus*.mp.
89. (system* adj2 change*).tw.
90. quality improvement*.mp.
91. transform*.mp.
92. translat*.mp.
93. transfer*.mp.
94. uptake*.mp.
95. sustainab*.mp.
96. institutional*.mp.
97. routin*.mp.
98. maintenance.mp.
99. capacity.mp.
100. incorporat*.mp.
101. adher*.mp.
102. ((polic* or practice* or program* or innovation*) adj5 (performance or feedback or prompt* or reminder* or incentive* or penalt* or communicat* or social market* or professional development or network* or leadership or opinion leader* or consensus process* or change manage* or train* or audit*)).mp.
103. integrat*.mp.
104. scal* up.mp.
105. 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95 or 96 or 97 or 98 or 99 or 100 or 101 or 102 or 103 or 104
106. 54 and 63 and 82 and 105

ERIC search strategy

(lobes* OR "weight gain" OR "weight loss" OR overweight OR "over weight" OR overeat* OR over eat* OR "weight change*" OR ((bmi OR body mass index) AND (gain OR loss OR change)) OR Exercise* OR "physical inactivity" OR "physical activity" OR "Motor Activity" OR "physical education" OR "Physical Fitness" OR sedentary OR "leisure activit*" OR sport* OR dance* OR ((life style OR lifestyle) AND activ*) OR Diet OR nutrition* OR (health* AND eat*) OR "Child Nutrition*" OR fruit* OR vegetable* OR canteen* OR menu OR caloric OR calories OR kilojoule* OR "Energy Intake" OR "energy density" OR Eating OR "feeding behaviour" OR "Feeding Behavior" OR "dietary intake" OR food OR ((carbonated OR sweetened OR soft) AND (drink* OR beverage*)) OR soda OR "Dietary Fat*" OR confectionary OR (school AND (lunch* OR meal*)) OR "feeding program*" OR cafeteria*) AND (pre-school* or preschool* or childcare* or "child care*" or daycare* or "day care*" or "early child*" or nursery or nurseries or Kinder*)

AND (Random* or trial* or "double blind" or "single blind" or experiment* or pretest or "pre test" or posttest or "post test" or "pre post" or prepost or "before after" or "stepped wedge" or nonrandomi?ed or "interrupted time series" or "multiple baseline" or "regression discontinuity" or "comprehensive cohort")

AND (Implement* or dissemin* or adopt* or practice* or "organi?ational change*" or diffuse* or (system* and change*) or "quality improvement*" or transform* or translat* or transfer* or uptake* or sustainab* or institutional* or routin* or maintenance or capacity or incorporate* or adher* or ((polic* or practice* or program* or innovation*) and (performance or feedback or prompt* or reminder* or incentive* or penalt* or communicat* or social market* or professional development or network* or leadership or opinion leader* or consensus process* or change manage* or train* or audit*)) or integrat* or "scal* up")

CINAHL search strategy

S111. S58 AND S68 AND S87 AND S110

S110. S88 OR S89 OR S90 OR S91 OR S92 OR S93 OR S94 OR S95 OR S96 OR S97 OR S98 OR S99 OR S100 OR S101 OR S102 OR S103 OR S104 OR S105 OR S106 OR S107 OR S108 OR S109

S109. incorporat*

S108. scal* up

S107. integrat*

S106. ((polic* or practice* or program* or innovation*) n5 (performance or feedback or prompt* or reminder* or incentive* or penalt* or communicat* or social market* or professional development or network* or leadership or opinion leader* or consensus process* or change manage* or train* or audit*))

S105. adher*

S104. capacity

S103. maintenance

S102. routin*

S101. institutional*

S100. sustainab*

S99. uptake*

S98. transfer*

S97. translat*

S96. transform*

S95. quality improvement*

S94. system* n2 change*

S93. diffus*

S92. organi?ational change*

S91. practice*

S90. adopt*

S89. dissemin*

S88. implement*

S87. S69 OR S70 OR S71 OR S72 OR S73 OR S74 OR S75 OR S76 OR S77 OR S78 OR S79 OR S80 OR S81 OR S82 OR S83 OR S84 OR S85 OR S86

S86. AB random*

S85. TI comprehensive cohort OR AB comprehensive cohort

S84. TI regression discontinuity OR AB regression discontinuity

S83. TI multiple baseline OR AB multiple baseline

S82. TI interrupted time series OR AB interrupted time series

S81. TI (non randomi?ed or nonrandomi?ed) OR AB (non randomi?ed or nonrandomi?ed)

S80. TI stepped wedge OR AB stepped wedge

S79. TI qua?i randomi?ed OR AB qua?i randomi?ed

S78. TI before after OR AB before after

S77. TI (pre post or prepost) OR AB (pre post or prepost)

S76. TI (posttest or post test) OR AB (posttest or post test)

S75. TI (pretest or pre test) OR AB (pretest or pre test)

S74. (MH "Experimental Studies") OR "experiment*"

S73. (MH "Single-Blind Studies") OR "single blind"
 S72. (MH "Double-Blind Studies") OR "double blind"
 S71. TI trial* OR AB trial*
 S70. (MH "Clinical Trials")
 S69. (MH "Randomized Controlled Trials")
 S68. S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65 OR S66 OR S67
 S67. Kinder*
 S66. nursery or nurseries
 S65. (MH "Schools, Nursery")
 S64. "early child*"
 S63. daycare* or day care*
 S62. childcare* or child care*
 S61. (MH "Child Day Care") OR (MH "Child Care Providers") OR (MH "Child Care (Saba CCC)") OR (MH "Child Care")
 S60. pre-school* or preschool*
 S59. (MH "Child, Preschool")
 S58. S9 OR S26 OR S57
 S57. S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41
 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56
 S56. (MH "Nutritional Status")
 S55. cafeteria*
 S54. (nutrition* n2 program*)
 S53. "food program*"
 S52. "feeding program*"
 S51. school n2 (lunch* or meal*)
 S50. "confectionary" OR (MH "Candy")
 S49. (MH "Dietary Fats")
 S48. "sweetened drink*"
 S47. soda
 S46. (MH "Carbonated Beverages") OR "soft drink*"
 S45. (MH "Food")
 S44. (MH "Food Habits") OR "Food Habits"
 S43. dietary intake
 S42. (MH "Eating") OR (MH "Eating Behavior")
 S41. "feeding behavior?"
 S40. (MH "Energy Density") OR "Energy Density"
 S39. (MH "Energy Intake") OR (MH "Food Intake")
 S38. calorie or calories or kilojoule*
 S37. (MH "Menu Planning") OR "menu"
 S36. (MH "Food Services")
 S35. "canteen*"
 S34. fruit*
 S33. (MH "Vegetables") OR "vegetable*"
 S32. (MH "Fruit+")
 S31. (MH "Child Nutrition")
 S30. health* n2 eat*
 S29. (MH "Nutrition")
 S28. "nutrition*"
 S27. (MH "Diet+")
 S26. S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24
 OR S25
 S25. dance* or dancing
 S24. (life style or lifestyle) n5 activ*
 S23. sport*

S22. exercis* n2 aerobic*
 S21. (MH "Dancing+")
 S20. (MH "Sports+")
 S19. (MH "Leisure Activities+")
 S18. (MH "Life Style+")
 S17. (MH "Life Style, Sedentary") OR "sedentary"
 S16. (MH "Physical Fitness")
 S15. (MH "Physical Education and Training+")
 S14. physical education and training
 S13. (MH "Motor Activity+")
 S12. (MH "Physical Activity") OR "physical activity"
 S11. physical inactivity
 S10. (MH "Exercise+")
 S9. S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8
 S8. obes*
 S7. ((bmi or body mass index) n2 (gain or loss or change))
 S6. weight change*
 S5. overweight or over weight or overeat* or over eat*
 S4. weight gain or weight loss
 S3. (MH "Weight Loss+")
 S2. (MH "Weight Gain")
 S1. (MH "Obesity+")

SCOPUS search strategy

TITLE-ABS-KEY (obes* OR "weight gain" OR "weight loss" OR overweight OR "over weight" OR overeat* OR over eat* OR "weight change*" OR ((bmi OR body mass INDEX) AND (gain OR loss OR change)) OR exercise* OR "physical inactivity" OR "physical activity" OR "Motor Activity" OR "physical education" OR "Physical Fitness" OR sedentary OR "leisure activit*" OR sport* OR dance* OR ((life style OR lifestyle) AND activ*) OR diet OR nutrition* OR (health* AND eat*) OR "Child Nutrition*" OR fruit* OR vegetable* OR canteen* OR menu OR calorie OR calories OR kilojoule* OR "Energy Intake" OR "energy density" OR eating OR "feeding behaviour" OR "Feeding Behavior" OR "dietary intake" OR food OR ((carbonated OR sweetened OR soft) AND (drink* OR beverage*)) OR soda OR "Dietary Fat*" OR confectionary OR (school AND (lunch* OR meal*)) OR "feeding program*" OR cafeteria*)
 AND TITLE-ABS-KEY (pre-school* OR preschool* OR childcare* OR "child care*" OR daycare* OR "day care*" OR "early child*" OR nursery OR nurseries OR kinder*)
 AND TITLE-ABS-KEY (random* OR trial* OR "double blind" OR "single blind" OR experiment* OR pretest OR "pre test" OR posttest OR "post test" OR "pre post" OR prepost OR "before after" OR "stepped wedge" OR nonrandomized OR "interrupted time series" OR "multiple baseline" OR "regression discontinuity" OR "comprehensive cohort")
 AND TITLE-ABS-KEY (implement* OR dissemin* OR adopt* OR practice* OR "organizational change*" OR diffuse* OR (system* AND change*) OR "quality improvement*" OR transform* OR translat* OR transfer* OR uptake* OR sustainab* OR institutional* OR routin* OR maintenance OR capacity OR incorporate* OR adhere* OR ((polic* OR practice* OR program* OR innovation*) AND (performance OR feedback OR prompt* OR reminder* OR incentive* OR penalt* OR communicat* OR social market* OR professional development OR network* OR leadership OR opinion leader* OR consensus process* OR change manage* OR train* OR audit*)) OR integrat* OR "scal* up")

CONTRIBUTIONS OF AUTHORS

Luke Wolfenden and Jannah Jones led the development of the review. Debbie Booth developed the search strategy. All authors have contributed to the conception and conduct of the research. Jannah Jones, Luke Wolfenden, Christopher M Williams, Amanda J Williams, Kirsty Seward and Sze Lin Yoong screened titles and abstracts and determined study eligibility. Jannah Jones, Meghan Finch, Rebecca Wyse, Flora Tzelepis and Tameka Small extracted data from eligible trials. Melanie Kingsland and Flora Tzelepis assessed risk of bias. Luke Wolfenden and Jannah Jones led the drafting of the manuscript. All authors provided critical comment on drafts.

DECLARATIONS OF INTEREST

Luke Wolfenden, Jannah Jones, Meghan Finch, Rebecca Wyse, John Wiggers, Kirsty Seward and Sze Lin Yoong are currently undertaking a series of randomised trials aiming to facilitate the implementation of healthy eating and physical activity policies and practices by childcare services. The authors have not received any benefit, in cash or kind, any hospitality, or any subsidy derived from any source perceived to have an interest in the outcome of the review. Christopher Williams, Melanie Kingsland, Flora Tzelepis, Amanda J Williams, Tameka Small, Vivian Welch and Debbie Booth declare no conflict of interest.

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DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The review included an additional subgroup analysis that was not specified in the protocol. Specifically the review included examination of the impact of implementation strategies that have been conducted 'at scale', defined as 50 or more childcare services.