



Scheduling frequent opportunities for outdoor free-play – a simple approach to increasing physical activity in childcare

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Keywords

Child, childcare environment, play, preschool, scheduling

Abstract

To address the commonly reported barriers of reliance on educators' resources and skills, this thesis sought to investigate the potential of simple environmental interventions in increasing moderate to vigorous physical activity (MVPA) in childcare. Specifically, it aimed to:

Describe the implementation of current recommended practices and policies encouraging physical activity in Australian childcare services;

Assess the efficacy of modifying the scheduling of outdoor free-play periods on the MVPA of attending children aged 3 to 6 years;

Systematically review the factors affecting the implementation of environmental recommendations to increase children's activity in childcare; and

Provide recommendations for future research and practice arising from this thesis.

The initial cross-sectional study of 309 childcare services reported variable implementation of evidence based physical activity policies and practices but no implementation differences when examined by operational characteristics (service type, size, geographical locality and socioeconomic status). A cluster randomised controlled trial (cRCT) with 10 services (n= 316) found that a simple scheduling intervention, dividing one continuous outdoor free-play period into three periods, without a change in total duration from baseline, increased the child average daily MVPA in the intervention services compared to controls with an adjusted difference between groups of 5.21 minutes (95% CI 0.59-9.83, p=0.03). A second cRCT involving 6 services (n= 231) studied the effect of providing unrestricted access to outdoor areas when no structured programs were

taking place, did not significantly improve child MVPA. Analysis of trial outcomes in both RCTs utilised Generalised Linear Mixed Models; accounting for clustering and repeated measures. A systematic review via a theoretical framework identified that factors influencing the implementation of environmental physical activity recommendations largely belonged to environmental, resource and social domains. This thesis provides further support for the significant potential of ecological interventions in childcare settings for increasing attending children's MVPA. While broadly supportive, further research is required prior to significant government investment in the implementation of greater outdoor free-play opportunities in childcare. These opportunities are described in the thesis and include larger RCTs, with longer term follow-up to confirm the effectiveness of these interventions; formative evaluation to better understand barriers to facilitate the development of implementation strategies, and the conduct of trials of large-scale implementation approaches.

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List of Abbreviations

BMI	Body mass index
CATI	Computer assisted telephone interview
CI	Confidence interval
ECEC	Early childcare and education centres
EPAO	Environment and policy assessment and observation
FMS	Fundamental movement skills
HNELHD	Hunter New England Local Health District
ICC	intra class correlation
IOM	Institute of Medicine
MVPA	moderate-to-vigorous physical activity
NAP SACC	Nutrition and physical activity self-assessment of childcare
NASPE	National Association for Sport and Physical Education
NSW	New South Wales
PA	physical activity
RCT	randomised controlled trial
SED	sedentary
SEM	Social ecological model
Sd.	standard deviation
TDF	Theoretical Domains Framework
TPA	Total Physical Activity
US	United States
WHO	World Health Organization

Definitions

Term	Definition
Best practice	A method or technique that has generally been accepted as superior to any alternatives because it produces results that are superior to those achieved any other means or because it has become a standard way of doing things
Centre-based ECEC	Long day care and preschools
Early years	Typically, children aged 3 to 6 years old
Guidelines	An overall rule, principle or form of advice that offers guidance to proper actions and behaviour. Guidelines are not binding and are not enforced
Physical activity	Any bodily movement produced by skeletal muscle that results in energy expenditure above resting
Policy	A document or system that justifies a regulatory measure and/or action by a government or legislative body also known as a law, generally a mandatory principle
Recommendation	A suggestion for the most appropriate plan of action especially when promoted by an authority
Regulation	A rule or condition that guides behaviour or instruction that is legally binding

Statement of Originality

I hereby certify that the work embodied in the thesis is my own work, conducted under normal supervision. The thesis contains no material which has been accepted, or is being examined, for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made. I give consent to the final version of my thesis being made available worldwide when deposited in the University's Digital Repository, subject to the provisions of the Copyright Act 1968 and any approved embargo.

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Disclosure of Editing Services

This thesis was professionally edited by Dr Guenter Plum from Functionaledit.com. Specifically, he assisted in the formatting of this thesis, checking references, and fixing typographical errors. His services were completed in accordance with the ‘Guidelines for editing research theses’.

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 declaration from each co-author, endorsed in writing by the Faculty Assistant Dean (Research Training), attesting to my contribution to any jointly authored papers.

By signing below, I confirm that **Lubna Abdul Razak** contributed

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This thesis includes three published, one accepted and one journal articles under review (Chapters 2 through 6). All authors and the journals where in each chapter is published are attributed in this thesis under the statement ‘Thesis by publication’ and at commencement of each related chapter. Such chapters were published under the following Creative Commons Licenses:

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Chapter 6:

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Conflict of Interest Statement

Lubna Abdul Razak reports no conflict of interest.

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This PhD thesis is dedicated to my family and friends for their wonderful support and continuous prayers, of which I am profoundly indebted. To my husband, you are my rock and always will be. I am eternally grateful that due to immersing myself in the field of physical activity in young children, my own daughter who was five when I started is living proof of the benefits of outdoor free-play.

Presentations arising from this Thesis

The candidate presented results from this thesis at one international and one national conferences (2 oral and 2 posters). A co-author presented results arising from this thesis at one international conference (one oral presentation)

Conference Presentations – Oral Presentations

International

1. Impact of a free-play scheduling intervention on the physical activity of children aged 3-6 years attending childcare: a randomised controlled trial. ISBNPA 2018 Hong Kong 3-6 June 2018 (Presenter)
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National

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Conference Presentations – Poster Presentations

International

1. Childcare physical activity policies and practices in Australia. ISBNPA 2018 Hong Kong 3-6 June 2018 (Presenter)

2. Effect of a free-play scheduling intervention to increase physical activity during childcare: a randomised controlled trial. ISBNPA 2018 Hong Kong 3-6 June 2018
(Presenter)

Statement of Personal Contribution

I was involved in all aspects of the research undertaken as part of this thesis including ethical approval, recruitment, intervention development, implementation and evaluation of the primary trials reported in Chapters 3 -5. A summary of my contributions are as follows:

Study planning and preparation

I led the planning and preparation for all the research included in this thesis. This included undertaking literature reviews, developing resources for data collection and consultations with childcare services to assess the acceptability and feasibility of interventions. I also consulted with my Aboriginal and Torres Islander colleague to ensure the data collection tools were culturally appropriate. Under the guidance of an advisory group, I developed project timelines, milestones and key performance indicators and monitored progress against these. Under my primary supervisor's direction, agreement was rendered with Early Childhood Specialists to deliver the intervention with the cooperation of the room leaders and educators in participating childcare services according to study protocols.

Ethics approval and registering the trial

In collaboration with my supervisors, I assisted in drafting applications, variations and submitting ethics applications through the Human Research Ethics Committees of the Hunter New England Local Health District (reference 15/11/18/4.03) and the University of Newcastle (reference H-2016-0088). This involved the completion of all ethics forms, designing recruitment materials, developing information statements, and consent forms and data collection tools. I was also responsible for addressing committee feedback and

updating progress reports at set timeframes. I registered the trial with the Australian New Zealand Clinical Trials Registry (reference 12616000347460).

Study measures

In consultation with the project team, I developed and adapted the measures used for research within the thesis. This included adapting the NAP SACC questionnaires and use of other validated physical activity related questionnaires for the parent computer assisted telephone interviews (CATI), EPAO tool (physical activity environment component), iPad based cognitive function tests and the practices and policies interview questions for the nominated supervisors.

Recruitment and Data collection

Partnering with the project manager, I was responsible for the organisation of recruitment and data collection. I was responsible for developing training materials and data collection protocols. I also oversaw the training of CATI interviewers and took on problem solving responsibility real time. In addition, I developed the CATI scripts to contact parents to conduct the parental survey. I facilitated the data collection training for the research assistants and was physically present for the first days of recruitment and data collection. This involved training team of research assistants at three time points to: fit and remove accelerometers; follow-up missing information from the nominated supervisors' survey; conduct the EPAO; and facilitate the cognitive function assessments.

Data entry, cleaning and management

Entry, cleaning, merging and de-identifying all the data collected from the different sources and the development of a database for analysis in consultation with a

biostatistician was my responsibility. This involved ensuring all data collection devices were in working order and charged prior to deployment to services, and initialising and downloading data from the accelerometers. I was also responsible for the data management, adhering to privacy standards and ensuring all files were backed up accordingly.

Data analysis

I corresponded directly with Dr Kelli Cain from the Meterplus consultancy who were commissioned to clean the accelerometer raw files and the developer of the cognitive function apps to clarify datasets matters. I determined the methods of statistical analysis in consultation with a biostatistician. I ensured data de-identification to allow for blinded outcome assessment of primary and secondary outcomes. I was responsible for the interpretation of the results and presentation of the data with the guidance of my primary supervisor.

Systematic review

I was involved in all stages of the systematic review as described in Chapter 6. I was responsible for drafting and registering the study protocol with the International Prospective Register of Systematic Reviews (PROSPERO). The search strategy was initially developed upon consultation with a librarian who had previously been involved in other systematic reviews. Thereafter, the search strategy was further refined with assistance from my supervisors before the search was performed. Regular meetings were held between reviewers to ensure data screening, extraction and synthesis were reliable and consensus was achieved.

Dissemination of thesis findings

The results of the research within this thesis have been presented at one local and three international conferences. I was the corresponding author for journal submissions and this involved preparing the manuscript for submission, addressing reviewer comments under my supervisors' direction and managing the publication process.

Chapter 1: Introduction

Overview

This chapter introduces the background of the thesis as a whole by firstly outlining the burden of chronic disease caused by inadequate physical activity and its financial implications. Next, a description of population adherence to physical activity guideline recommendations among adults and children follows. The rationale for focussing on childcare services as a potential setting for physical activity intervention is then explored, followed by a description of existing policies and practices to support child physical activity while in childcare. The chapter concludes with the thesis context and aims.

The burden of insufficient physical activity

Insufficient physical activity is a leading cause of mortality and morbidity. Internationally, the Global Burden of Diseases study estimated that insufficient physical activity was responsible for 1.3 million deaths per year globally in 2017, based on adult risk factor data from 195 countries and territories worldwide (1). Insufficiently active individuals were found to have a 20% to 30% higher risk of death from all causes compared to those who are sufficiently active (2). Low levels of physical activity are also a major contributor of morbidity from numerous non-communicable diseases including ischaemic heart disease, stroke, Type 2 diabetes mellitus, and breast and colorectal cancer (1). The Global Burden of Diseases study also found that low physical activity was attributable to 24.3 million disability adjusted life years (DALYs) internationally (1).

In Australia, the burden of chronic disease due to insufficient physical activity is substantial. Using the latest data available, the Australian Burden of Disease Study (ABDS) reported that 2.6% of the total disease burden in Australia was attributable to physical inactivity (116,676 DALYs) (3). The study quantified the risk of seven diseases attributable to low

physical activity, including Type 2 diabetes (19%), bowel cancer and uterine cancer (16%), breast cancer (11%), dementia (14%), coronary heart disease (11%) and stroke (10%) (3). Moreover, if adults increased their physical activity levels by walking briskly for 30 minutes daily, the total disease burden due to inactivity in Australia could be decreased by 26% (3).

The financial cost of physical inactivity is sizeable, with estimates suggesting the cost of insufficient physical activity to health-care systems worldwide was approximately INT\$53.8 billion in 2013, with physical inactivity related deaths contributing to an annual INT\$13.7 billion in productivity losses (4). The authors concluded that their calculations were likely to be a conservative estimate as they did not include costs associated with mental ill health or the bone and musculature system (4). In Australia, the total financial costs attributable to physical inactivity were estimated to be AUD\$805 million in 2013 (Ding et.al 2016). This included AUD\$640 million in healthcare costs and AUD\$165 million in productivity losses. Such economic burden places physical inactivity high on the national preventive health agenda (5).

Physical activity guideline recommendations

Adults and older children

Across many countries, governments and other professional organisations have developed evidence-based guideline recommendations for physical activity in adults and children. Such guidelines have been formulated following systematic syntheses of scientific evidence and provide key population-level recommendations in order to reduce the burden of disease associated with physical inactivity and improve public health outcomes (6, 7). For adults, national guidelines from countries including the United Kingdom (UK) (8), Canada (9) and the United States (10) recommend that adults be active for at least 150 minutes per week at a moderate intensity. For older children aged 5-17 years, national guidelines from those same

countries recommend that children be active for at least 60 minutes per day at a moderate to vigorous intensity (MVPA) to reduce their risk of developing chronic diseases (11).

In Australia, national guidelines recommend that adults accumulate 150 to 300 minutes of moderate intensity physical activity or 75 to 150 minutes of vigorous intensity physical activity, or an equivalent combination of both moderate and vigorous activities, each week (12). Australian national guidelines recommend that older children aged 5-17 years undertake 60 minutes of moderate to vigorous intensity physical activity per day (13, 14).

Young children aged 3-5 years

National physical activity guidelines in New Zealand, UK, and the US also recommend that young children aged 3-5 years engage in 180 minutes of total physical activity spread across the day (10, 15, 16). In 2017, Canada released updated physical activity guidelines to reflect the 24 hours of movement for the early childhood years (comprising of physical activity, sedentary behaviour and sleep) (17). The guidelines recommend that children aged 3-5 years participate in 180 minutes of physical activity each day, including 60 minutes of energetic play (such as running, jumping and kicking and throwing) (17). This 24-hour integrated movement guidelines recognised the whole day approach whereby any change in the amount of time in one behaviour would affect time spent in another behaviour.

In the Australian context, physical activity guidelines published by the Commonwealth Government for pre-school aged children were also updated in 2017 based on the Canadian 24-hour guidelines (18). In addition to the recommendation of spending 180 minutes engaged in physical activity spread throughout the day, limiting sedentary screen time to no more than 1 hour and 10-13 hours of good quality sleep, 60 minutes of energetic play (included within the 180 minutes) is also recommended for this age group (19). In 2019, the World Health Organization officially endorsed the few existing national physical activity guidelines specifically for young children aged 3-5 years (15, 17, 19, 20).

Current levels of physical activity among children aged 3 to 6 years

Low levels of total physical activity in children and youth have been reported globally (21). An overall physical activity level grade of 'D' was assigned in the 2014 Australian Report Card on Physical Activity in Children and Youth (22). This is based on national parent-reported data that just 72% of 2- 4-year-olds and 20% of 5-17-year-olds met the daily total physical activity guidelines recommendations. Similarly, with the release of the 24-hour Movement Guidelines for the Early Years, Australian researchers found a high proportion (93.1%) of preschool aged children (n=248) reached the physical activity guidelines (measured using ActiGraph accelerometers) (23).

Several systematic reviews have investigated the physical activity levels of pre-school aged children. Collectively the reviews have reported considerable heterogeneity in estimates of objectively measured physical activity among children (24-26). For example, a meta-analysis involving 6,309 pre-schoolers aged 3 to 6.2 years from 29 studies estimated daily participation in MPVA to be 43 minutes, assessed via accelerometer (54 minutes and 45 minutes for boys and girls respectively) (25). Similarly, a review of pre-school-aged children's physical activity from 40 studies (18 from the US) found that pre-school children aged 2-5 years spent approximately 47 minutes of their day engaged in MVPA (26). A further review identified six studies, which also assessed physical activity using accelerometers in 1,900 children aged 3-6-years and found MVPA to range from <20 minutes to <60 minutes per day (24).

The varied estimates of child physical activity reported within studies included in these systematic reviews is suggested to be partly explained by the different measurement methods used (24-26). For example, the classification of physical activity intensity could vary across individual studies utilising accelerometers, including the choice of device (e.g. Actigraph/ Actical), location the device is mounted (hip/ wrist), epoch length (60 s vs 5 s), cut-off points

for different intensities, some age dependent variables and wear duration of the device (minimum wear time e.g. 6 hours a day) (27). Differences in sample characteristics are also likely to be responsible for between study variability in physical activity estimates (28). Regardless, collectively the findings of the reviews indicate that there is room to improve the current physical activity levels of children in the early childhood years internationally.

Childcare services as a setting to increase physical activity of children aged 3 to 6 years

Increasingly, centre-based childcare services have been identified as a promising setting in which to intervene to support the physical activity levels of pre-school aged children (29, 30). The report of the Commission on Ending Childhood Obesity, together with the US Centers of Disease Control acknowledge that early childhood settings, including centre-based childcare, are a critical setting to promote physical activity in young children for several key reasons (29, 30). Firstly, in many countries, childcare services provide access to a large and growing number of children. For example, an average of 80% of children aged 0-5 years across 33 OECD countries were enrolled to attend some form of childcare in 2015 (31). Enrolment of pre-school aged children in childcare ranges from 54% of 3 and 4 year-olds in the US, to 79% in Australia and up to 95% of children in the UK (31). For many children, a greater proportion of their waking hours during weekdays is spent at childcare compared to at home (31). On average, children in Australia spend up to 20 hours attending childcare each week (32). Such settings, therefore, provide centralised access to large numbers of young children for prolonged periods.

Secondly, supporting children's physical activity is consistent with international childcare accreditation standards and regulations for the sector (33, 34). Such regulations require childcare services to implement policies, practices and programmes that promote the health and physical development of children in their care. For example, in Australia, childcare

services operate according to the Australian National Quality Framework for Early Childhood Education and Care. Element 2.2.2 of this national standard requires physical activity to be promoted through planned and spontaneous experiences in a way that is appropriate for each child. Similarly, the Physical Environment Standard 3.2 requires the environment to be inclusive, promote competence, and enable independent exploration and learning through play.

Thirdly, there are a range of health benefits for children who are physically active. The scientific evidence on the benefits of accruing recommended physical activity in early childhood (0-4 years) has been summarised in a systematic review comprising of >70K participants from 36 countries (35). The researchers found that physical activity was associated with improved motor development (e.g. gross motor skills, fine motor skills, locomotor and object control skills), cognitive development (e.g. language development, attention, executive functioning), psychosocial health (e.g. self-efficacy, self-esteem, prosocial behavioural aggression, social functioning, quality of life, depressive and anxiety symptoms), and cardio-metabolic health (e.g. blood pressure, insulin resistance, blood lipids). They concluded that higher intensities are associated with better health outcomes.

Finally, evidence regarding the physical activity behaviours of pre-school-aged children indicate that physical activity levels during attendance at childcare are generally low, both internationally and in Australia (36). For example, a study conducted in the US (using Actical accelerometers) found that although almost all (n=379) pre-school aged children achieved 180 minutes of total physical activity, only 3 of 398 children (<1%) were found to meet the guideline of 60 minutes of MVPA per day (median of 14 minutes, IQR 7,25) (37). Another American study (ActiGraph accelerometer) found that 42% - 50% of the children attending childcare met the guidelines of 3 hours of daily PA, with higher percentage of boys (54-58%) compared to girls (34-46%) meeting recommended activity levels, but no differences in activity between racial/ethnic and parent education groups (38).

An Australian study, using ActivPAL accelerometers with 301 children in 11 services found that 19.1% of their six-hour day was spent doing physical activity (TPA – 10.98 minutes/hour equivalent to just under 66 minutes) (39). A further Australian study (Actigraph accelerometer) of 731 children (54 % boys) from 81-93 services found boys were more active than girls (50.9 % vs 47.8 %; $p < 0.0001$) but the total physical activity time was low. (TPA= 29.61 minutes/hour) (40). In this study, children were significantly less active during the hours they spent in childcare than out of care on weekdays (51.1 % vs. 52.4 %, $p = 0.01$; 48.0 % vs. 51.5 %, $p < 0.0001$). These findings suggest that there is substantial scope to improve children's physical activity levels during attendance at childcare.

Interventions to increase physical activity in childcare settings

Evidence from systematic reviews demonstrate that interventions aiming to improve pre-school aged children's physical activity levels in care can be successful; however, to date their effects have been modest (41). Summary findings of 7 systematic reviews of childcare-based interventions to improve child physical activity are presented in Table 1. The reviews differed in the designs of the studies they included but more broadly consistent in their conclusions regarding the potential benefits of interventions in this setting and the need for further research. For example, in a review of 11 studies of which 10 were randomised controlled trials, Gordon and colleagues concluded that the most effective interventions focussing on MVPA were interventions were short in duration, provided in the early years setting, directed by teachers, included outdoor activity, and featured unstructured activity (42). The meta-analysis concluded small to moderate effect sizes of for TPA (Hedges $g = 0.44$, $p < .05$, $n = 73$ ESs) and moderate for MVPA (Hedges $g = 0.51$, $p < .05$, $n = 39$ ESs). Furthermore, a realist synthesis recently conducted suggested adult-directed interventions, such as adults changing their own habits, to effect change in children's physical activity (43). This was based

on 34 studies conducted in the childcare setting. The review's meta-analysis found an overall non-significant mean difference for LPA (0.03 minutes per day, $Z=0.04$, $p=0.97$) but a small positive effect for MVPA (2.88 minutes per day, $Z=4.20$, $p<0.001$).

Collectively the reviews identify a number of interventions and intervention characteristics that have been associated with positive improvements in child physical activity. Notably, interventions that included modifications to outdoor environments and increased structured physical activity opportunities were found to be associated with greater physical activity among children attending childcare (42). Evidence regarding the use of portable play equipment and playground markings suggests that these prompts may improve child activity (44, 45). Training of educators was identified in a number of reviews as an important effect modifier, as was the use of theoretically developed interventions and those delivered by physical education specialists (43, 46-48). Interestingly one meta-analysis compared the effectiveness of interventions trialled under ideal research conditions (explanatory trials) with those undertaken in more real world contexts (pragmatic trials) (48). The meta-analysis of 16 randomised trials found that whilst explanatory trials reported interventions that were effective in increasing physical activity of children attending childcare (SMD 0.80, 95% CI 0.12-1.48), pragmatic trials did not (SMD 0.10 95% CI -0.13-0.33) (48). Structured activity, environmental enhancements and use of theory are recommended strategies identified in this review.

Table 1: Summary of systematic review evidence regarding the effectiveness of childcare-based interventions to increase child physical activity.

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
Ward, 2010	This article reviewed existing intervention studies targeting physical activity conducted within a child care setting (including pre-schools, nursery schools, and day care).	(a) use of a child care setting; (b) implementation of an intervention trial; (c) targeting young children (birth to 5 years); (d) inclusion of a primary or secondary focus on physical activity,	Eight studies included a specific measure of physical activity (5 curricular and 3 environmental); they found 6 out of 19 studies had reported on objective measurement of physical activity and only 2 involved a randomised controlled design.	Narrative	The findings suggest that regularly provided, structured physical activity programs can increase the amount and intensity of physical activity in children. Modifications to the child care environment, such as additional equipment, teacher training, and altered physical activity policies/practices have the potential to improve child physical activity outcomes but require additional investigation.

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
		broadly defined as physical activity, physical fitness, motor skills, sedentary time, or policies that affect physical activity; and (e) publication within peer-reviewed journal			
Gordon, 2013	Conducted a meta-analysis to examine the effectiveness	Contained statistics necessary to compute an	15 independent studies with 2618 participants	Meta-analysis	A small-to-moderate effect on pre-schoolers' general physical activity levels and a moderate effect on their level of MVPA. Physical activity occurring outdoors had a large effect

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
	of interventions that target physical activity participation among pre-school-aged children. Also examined the extent to which intervention characteristics (i.e., moderator variables), including	effect size (ES), examined physical activity in pre-schoolers, incorporated a physical activity intervention, and targeted pre-school-aged children aged 2.0 to 5.9 years.			on children's engagement in MVPA; unstructured physical activity had a large effect on children's MVPA levels. In comparison with other types of interventions, those that incorporate environmental changes may show the most promise for increasing pre-schoolers' MVPA.

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
	intervention length, location, leadership, type, activity- reporting method, location of play (i.e., indoor vs. outdoor), and nature of physical activity (i.e., unstructured vs. structured), influence moderate-to-				

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
	vigorous physical activity (MVPA).				
Mehtala, 2014	Examined the physical activity component of interventions designed to promote physical activity in children. The aim, utilising the socio-ecological approach, was to identify	(a) 2-6-year-old children with no diagnosed diseases or health problems; (b) at least one intervention component of the study was targeted at increasing children's physical	23 childcare studies, involving 2-6-year-olds, with pre- and post-intervention physical activity levels measured	Narrative	In addition to structured physical activity, the use of physical activity-specific in-service teacher training as intervention strategy was potentially fruitful. Overall, in this review theory-based studies were not more effective than non-theory-based studies.

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
	potential targets (modifiable intrapersonal, interpersonal, organisational, community and/or policy level factors) and leverage these to achieve change in childcare-aged children's physical activity promotion programs in a	activity; (c) children's physical activity levels were measured (proxy- reported or objectively measured); (d) the study was carried out in a childcare setting (day- care centre, pre-school, nursery, long day-care centre); and (e) the study had			

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
	childcare setting.	been peer-reviewed			
Broekhuizen, 2014	Presented an overview of the existing evidence on the value of (pre)school playgrounds for children's health in terms of physical activity, cognitive and social outcomes. Also aimed to identify which	Children from 2 to 18 years old	13 experimental and 17 observational studies	Narrative	The experimental studies generated moderate evidence for an effect of the provision of play equipment and no evidence for an effect of decreasing playground density, the promotion of physical activity by staff and increasing recess duration on children's health.

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
	playground characteristics are most effective, and for which subgroups of children effects are most distinct.				
Temple, 2014	Reviewed interventions that have been effective in pre-school aged children to promote physical activity.	Interventional studies in which physical activity was the outcome; young children and pre-school-aged children enrolled in	14 studies, 6 environmental, 4 cognitive/behavioural and 4 combination of these	Narrative	Significant effects were predominantly environmental and consisted mainly of playground interventions. Objectively measured studies detected an increase related to the intervention.

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
		childcare settings			
Finch, 2016	Randomised controlled trials of interventions to increase child physical activity delivered in centre-based childcare was conducted. The broad aim of the review was to assess the effectiveness of	(a) Include children aged under 6 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	17 unique intervention articles	Meta-analysis	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, 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.

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
	interventions to improve physical activity among children aged 0 to 6 years attending childcare.	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			

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
		(including pedometer or accelerometer); (d) employ a randomised study design (including cluster-randomised controlled trials)			
Hnatiuk, 2018	Dual approach (a) Meta-analyses – to determine overall effectiveness of interventions;	(a) Peer reviewed in the English Language; (b) Randomised or controlled trial design to increases	21 out of 34 objectively assessed physical activity studies	Meta-analysis / narrative	Mean difference of MVPA minutes/ day was 2.88 (95% CI = 1.54, 4.23) indicating a small but statistically significant effect (Z=4.20, p<0.001). Realist review proposed tailoring, provision of structured materials and incorporated into daily routines, having hands on training to build staff skills may affect children's physical activity

Author, year	Aim	Inclusion criteria	Number of included studies	Methods/ synthesis	Key conclusions
	(b) Realist review – to collate evidence on ‘what works’, for whom, why and in what circumstances	children’s physical activity; (c) Reported an objectively assessed physical activity as an outcome measure in children aged 0-6 years at baseline and post intervention			

Child physical activity guideline recommendations in childcare

A number of guidelines have been published for childcare services recommending the implementation of policies and practices to improve child physical activity (34, 49, 50). The US Caring for Our Children (CFOC) guidelines (34) recommend that childcare services implement active opportunities for physical activity including two or more structured educator-led activities (e.g. games that come with instructions such as throwing) and two or more occasions of active play outdoors daily (e.g. child led running). In addition, caregivers'/ teachers' encouragement of physical activity (e.g. providing prompts for children to be active), policies and practices that promote physical activity (e.g. children to spend 60 to 120 minutes each day outdoors), and limiting screen time to those with special health care needs were advised. The US National Academies of Sciences, Engineering and Medicine (NASEM) recommend that children are: active for at least 15 minutes each hour they are in childcare (equivalent to 25% of the day); provided with outdoor time on a daily basis; able to access a variety of portable play equipment; and provided with sufficient space for the child to move actively (49). To reduce sedentary behaviour, services are also recommended to limit sitting or standing to no more than 30 minutes at a time. In Canada, the Director of Licensing Standard of Practice – Active Play recommends that childcare services use both un-facilitated play and facilitated games and activities during periods of outdoor play (50). The Standard also recommends incorporating physical literacy, fundamental movement skills, and injury prevention programs into daily routines and limiting screen time to 30 minutes or less each day.

In Australia, the 'Get Up and Grow' guidelines for the childcare sector were developed by a consortium of stakeholders namely Early Childhood Australia, the Murdoch Children's Research Institute, the Royal Children's Hospital Melbourne and the Australian Government Department of

Health and Ageing. They were designed to align with the Belonging, Being and Becoming – the Early Years Learning Framework for Australia (51). Recommendations include having unstructured and structured play opportunities, prompting whole body movements across the day and providing opportunities for outdoor play. Unstructured play could include playing in playgrounds or rumble and tumble play, whereas structured play requires adult guidance in performing certain movements. More specifically, the guidelines recommend allowing children aged 1-5 years to be physically active every day for at least three hours, spread throughout the day (52).

Table 2 summarises the childcare best practice guidelines for supporting physical activity in the US, Canada and Australia.

Table 2: Summary of physical activity guidelines for supporting in childcare in the US, Canada and Australia.

Country (Name of guideline)	Physical activity (daily)	Outdoor time (daily)	Fixed play equipment	Portable play equipment	Staff behaviour	Physical Activity training/ education	Written physical activity policies
US Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC)	At least 120 min. teacher led activity two times per day	2 times a day	Wide variety, age appropriate, outdoor play space includes open grassy areas and a path for wheeled toys, indoor space available including for running Visible support for physical activity	Large variety, available at all times	Staff join active play, encourage children to be active, playtime not withheld for punishment	Provided to children at least 1 time per week Parental education provided to children two times a year	Staff training 2 times per year Written policies should be available and followed

Country (Name of guideline)	Physical activity (daily)	Outdoor time (daily)	Fixed play equipment	Portable play equipment	Staff behaviour	Physical Activity training/ education	Written physical activity policies
			provided in classrooms and common areas through use of posters, pictures, and displayed books				
US Caring for Our Children (CFOC)	Two to 3 occasions of active play, Two or more structured 120 minutes per 8-hour day, including running	60 to 90 total minutes	Adequate space for indoor and outdoor play		Physical activity never withheld from children who misbehave Staff modelling of health behaviour		

Country (Name of guideline)	Physical activity (daily)	Outdoor time (daily)	Fixed play equipment	Portable play equipment	Staff behaviour	Physical Activity training/ education	Written physical activity policies
US National Academies of Sciences, Engineering and Medicine (NASEM)	Providing opportunities for light, moderate, and vigorous physical activity at least 15 minutes per hour while children are in care; a combination of developmentally appropriate structured and unstructured physical activity experiences	Providing daily outdoor time for physical activity when possible	Secure perimeter, some shade, natural elements, an open grassy area, varying surfaces and terrain, and adequate space per child	Variety of portable play equipment indoors and outdoors	Joining the children in physical activity; Integrating physical activity into activities designed to promote children's cognitive and social development; Avoid punishing children for being	Seek consultation yearly from an expert in early childhood physical activity	Staff trained in ways to encourage physical activity and decrease sedentary behaviour in young children through certification and continuing education

Country (Name of guideline)	Physical activity (daily)	Outdoor time (daily)	Fixed play equipment	Portable play equipment	Staff behaviour	Physical Activity training/ education	Written physical activity policies
					physically active; Avoid withholding physical activity as punishment		
Canada Director of Licencing Standard of Practice - Active Play (DOLSOP)	Minimum of 120 minutes of facilitated and unstructured physical activity	At least 60 minutes of outdoor play	Display visual and interactive materials that support physical activity (posters, pictures, books, etc)	Make equipment that encourages throwing, catching, kicking and striking available	Offer at least two facilitated activities targeting fundamental movement skills every day. Incorporate at least one of the following throwing,	Provide physical activity learning opportunities for families when possible Share the physical activity habits of the child(s)	Provide education opportunities for staff related to physical activity and physical literacy Write policies that promote safe physical

Country (Name of guideline)	Physical activity (daily)	Outdoor time (daily)	Fixed play equipment	Portable play equipment	Staff behaviour	Physical Activity training/ education	Written physical activity policies
					catching, striking or kicking activities every day. Integrate other learning activities with physical activity and physical literacy	day with the family Provide families with opportunities to participate in physical activities Share ideas with families to continue active play at home	activity practices
Australia; Get Up and Grow	Pre-schoolers (3 to 5 years) should be physically active every day	No specific time specified		Active play equipment (toys or everyday objects) in	Staff to show children how to enjoy different equipment and		

Country (Name of guideline)	Physical activity (daily)	Outdoor time (daily)	Fixed play equipment	Portable play equipment	Staff behaviour	Physical Activity training/ education	Written physical activity policies
	for at least three hours, spread throughout the day			indoor and outdoor play spaces that are safe and age appropriate	join in children's active play.		

Prevalence of childcare service characteristics which support physical activity in children

Despite the existence of best practice guidelines, and reviews and randomised trials demonstrating the positive effects of physical activity promoting interventions, many childcare services do not implement physical activity practices that are consistent with guideline recommendations (53). For example, in a recent study of 50 childcare services in North Carolina, US , only 38% provided the recommended ≥ 60 minutes of outdoor play to children, and even fewer centres (20%) provided the recommended ≥ 2 occasions of teacher-led physical activity on at least 3 of the 4 days that observations were conducted (54). Additionally, a study comparing implementation rates of 128 US centre-based services from 2010 to 2016 revealed improvements for 5 out of 8 recommended physical activity best practices (mean change 1.2 (0.24); $p < 0.0001$) (55).

Other high-income countries also report comparable findings. In a recent Canadian assessment of 514 centre-based childcare facilities, 44% of services indicated having a written physical activity policy (56). In the same study, 63% services included the amount of time children spend outdoors, 16% conducted teacher-led active play and provided education for children. Further, in New Zealand, it was found that only 1 in 3 licenced childcare services had a written physical activity policy, although they reported having adequate equipment, space and time for physical activity (more than 3 hours of child led activities) (57).

There has been a small number of Australian studies describing the implementation of evidence-based practices or policies to promote physical activity in childcare (58-60). None of which have provided contemporary data (in the last 5 years) and the studies were restricted to the assessment of a limited range of policies and

practices. A 2008/2009 study of 71 childcare services and 63 pre-schools in Melbourne (58) found services offered 144 minutes per day of outdoor play time for children, 20 % allowed children to watch TV and sit for more than 30 minutes ≥ 1 time per day, 8% had formal physical activity teaching ≥ 3 times/day and 28% reported having a physical activity policy. Other Australian studies in New South Wales reported that two thirds offer unstructured outdoor playtime for $\geq 25\%$ of their opening hours in 2013 (59), 46–60 % of childcare services programmed time each day for fundamental movement skill development, less than 50% had a written physical activity policy and a quarter of services provided daily opportunities for sedentary screen time (60). While more recent estimates of the prevalence of implementation are required, the existing evidence base suggests that there is considerable scope for improvement in the implementation of recommended physical activity promoting policies and practices in Australia and internationally.

Barriers to childcare services' implementation of physical activity programs

A number of factors are likely to impede the adoption and implementation of guideline recommendations in childcare. These include interventions or recommendations which are: overly complex (61, 62); time consuming or intensive (62); reliant on staff skills (63) which are not common in the workforce (61); require additional and ongoing resources to support (64); or are not consistent with organisational priorities, values or culture (65, 66). Furthermore, childcare service staff report barriers to the implementation of health promotion programs such as competing child development priorities, and a lack of staff time, skills, and resources (67).

Internationally, the implementation of physical activity interventions has proved to be a considerable challenge. For example, although occurring in the context of a fully funded efficacy randomised trial, and even after providing considerable pre-intervention training and support, Trost and colleagues (68) reported childcare staff in Kansas State, US were unable to deliver structured physical activities with children as required by the intervention. A Swiss randomised trial of 56 childcare services, in which training, funding, group meetings and support were provided to support implementation of daily physical activity programs reported poor intervention fidelity (69). Similarly, a randomised trial of the US Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) program found no significant improvement in physical activity promoting environments despite childcare staff receiving educational workshops and technical support for staff (70).

Challenges in implementing evidence-based interventions have also been frequently reported in Australian studies (71, 72). In Australia, a quasi-experimental population-based dissemination trial of over 200 childcare services increased adoption of just two out of eight targeted physical activity-promoting practices in services (71). The authors attributed their limited implementation success to; poor fidelity to the training components; lack of programme integration and lack of tailoring support. Likewise, an intervention to support the implementation of obesity prevention practices across the State of Victoria, reported significant increases in only one of 24 healthy eating and physical activity practices in long day care services (72). Similarly, a parallel randomised controlled trial of 128 services was only able to affect two out of seven policies and practices, despite utilising comprehensive intervention strategies including providing implementation support staffing, securing executive support, providing staff training, employing a consensus process, providing academic detailing

visits, giving performance monitoring and feedback and using a communications strategy (73). Such findings suggest that current physical activity interventions or the existing support provided to childcare services to implement them, is insufficient to overcome the implementation barriers experienced by childcare services staff.

Unless interventions are implemented with sufficient fidelity to impact on child physical activity, they offer little benefit to public health. Understanding implementation barriers to physical activity interventions, therefore, is critical in order to appropriately develop implementation support strategies (74). As barriers to intervention implementation are likely to be highly dependent on context (including the intervention that is subject to implementation, the characteristics of services and the capacity and resources available to staff) research synthesising barriers that is considerate of such contextual factors is required. Despite this, to the best of our knowledge there has not been any systematic review of implementation challenges faced by childcare educators in adopting evidence based physical activity programs. Such an evidence-gap represents an important impediment to addressing the poor rates of implementation of physical activity interventions in this setting, which this thesis will address.

Developing physical activity interventions that are more easily implemented

One opportunity to improve the impact of physical activity research in the childcare setting and increase research translation is to develop and test interventions that are more suitable for implementation. Ecological interventions, that is, changes to the physical environment of childcare services, may represent one such approach. Such interventions may not require the knowledge, skills or time of structured program

approaches to physical activity promotion, such as educator led group fundamental movement skill programs or activities that have been characteristic of most previous trials. Furthermore, such interventions, when implemented, may be more likely to be sustained without the need for ongoing implementation support and resources for childcare services and their staff to deliver. Qualitative research, for example, of childcare service staff has reported ecological interventions to be highly acceptable and amenable to sustained implementation (75). Furthermore, longitudinal studies looking at adherence to childcare best practice recommendations have found more rapid adoption and sustained implementation of environmental changes (ecological interventions) than structured activities or curricula-based policies or practices (55, 59).

Changing the scheduling of existing activities in childcare centres may be a particularly effective ecological-based strategy to increase physical activity, which is suitable for population-wide implementation. Pre-school children's activity is characterised by short, intense bouts of activity of between 3 to 15 minutes, followed by extended recovery periods of sedentary behaviour or light activity (76-79). While children's physical activity intensity peaks during periods of outdoor play (78, 79), children are most likely to be moderately-to-vigorously physically active during the initial period of outdoor play (79-81). Scheduling multiple periods of shortened outdoor free-play therefore could enable increase in physical activity. As such an intervention is congruent with children's natural patterns of physical activity (78-80), it is less reliant on staff skills, or service infrastructure, or resources to promote physical activity and thus overcomes many of the barriers to implementation of physical activity interventions in this setting. Notwithstanding its potential, to the best of our knowledge, such an approach has not been previously investigated.

Thesis Outline

Thesis context and aims

The broad aim of the thesis is to assess opportunities to improve the implementation of policies and practices to increase physical activity in children attending childcare.

The specific objectives of the thesis are:

To describe the implementation of recommended practices and policies to increase physical activity in children attending childcare (Chapter 2);

To evaluate the efficacy of modifying the scheduling of outdoor free-play periods on the MVPA of children aged 3 to 6 years (Chapters 3 – 5).

- Describe the main trial methods and outcomes
- Assess the efficacy of scheduling multiple periods of outdoor free-play per day in increasing the time children spend in MVPA during childcare relative to one outdoor play time of the same duration
- Assess the efficacy of a childcare based intervention in increasing child MVPA while in care by allowing children access to outdoor areas for free-play when a structured activity is not taking place

To systematically review barriers and facilitators of implementation of physical activity environmental interventions in the childcare setting (Chapter 6); and

To discuss the significance of thesis findings and suggest future research directions (Chapter 7).

Table 3 outlines my PhD thesis structure. The thesis encompasses seven chapters, five of which have been written in the style of a journal article in accordance with the University of Newcastle rules regarding ‘submission by publication’ including five published papers.

Table 3: Thesis structure.

Chapter number	Chapter type	Title	Status
1	Introduction		
2	Prevalence paper	Implementation of policies and practices to increase physical activity among children attending centre-based childcare: a cross-sectional study	Conducted May-Jul 2017, accepted Jun 2019
3	Protocol paper	A randomised controlled trial of multiple periods of outdoor free-play to increase moderate-to-vigorous physical activity among 3 to 6-year-old children attending childcare: study protocol.	Published Aug 2016
4	Outcome paper 1	Impact of scheduling multiple outdoor free-play periods in childcare on child moderate-to-vigorous physical activity: a cluster randomised trial	Conducted Jun-Aug 2016, published Mar 2018
5	Outcome paper 2	Efficacy of a free-play intervention to increase physical activity during childcare: a randomized controlled trial	Conducted Aug-Dec 2016, published Oct 2018

6	Systematic review paper	Barriers to and facilitators of the implementation of environmental recommendations to encourage physical activity in centre-based childcare services: a systematic review	Conducted Jul 2017-Jul 2018, revised after minor reviewer comments and submitted Jun 2019
7	Discussion and future research directions		

Chapter 2: Implementation of policies and practices to increase physical activity among children attending centre-based childcare: a cross-sectional study

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Additional materials are available in Appendices 2.

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Abstract

Issue addressed: Supporting centre-based childcare services to create PA (PA) environments is a recommended strategy to improve child PA. This study aimed to describe the implementation of PA policies and practices by these services, and to examine the associations with service characteristics.

Methods: Nominated supervisors of childcare services (n=309) in the Hunter New England region, New South Wales, Australia, completed a telephone interview. Using previously validated measures, the interview assessed the implementation of evidence-based practices shown to be associated with child PA. This includes: (a) provision of active play opportunities, (b) portable play equipment availability, (c) delivery of daily fundamental movement skills, (d) having at least 50% of staff trained in promoting child PA the past 5 years, and (e) having written PA and small screen recreation policies.

Results: Although 98% (95% CI 96-99) of childcare services provided active play opportunities for at least 25% of their daily opening hours, only 8% (95% CI 5, 11) of services fully implemented all policies and practices; with no service characteristic associated with full implementation. Long day care service had twice the odds of having a written PA policy (OR 2.0, 95% CI 0.7, 5.8), compared to preschools (adjusted for service size, socio-economic disadvantage, and geographical location).

Conclusions: Improvements could be made to childcare services' operations to support the promotion of child PA.

So what?: To ensure the benefits to child health, childcare services require support to implement a number of PA promoting policies and practices that are known to improve child PA.

Keywords: childcare, implementation, PA, policy, practice

Introduction

Physical Activity (PA) is a major protective factor against the development of non-communicable diseases such as cardiovascular disease, stroke, diabetes and some cancers (1). PA, defined as ‘any bodily movement produced by skeletal muscles that requires energy’ broadly includes movement concepts such as body, space, effort and relationship (2). Early childhood is a key developmental period for the establishment of healthy lifestyle behaviours, including PA (3). As such, ensuring children are sufficiently active is essential for future chronic disease prevention (4). Australian PA guidelines recommend that children under five years of age accumulate at least 180 minutes of PA including 60 minutes of moderate to vigorous PA (MVPA) each day (5). However, similar to research findings in other countries (6), < 20% of Australian children under 5 years currently met this recommendation (7, 8).

To realise the health benefits of PA in children (3), environments where children spend a substantive amount of their time need to be supportive of PA (9, 10). In Australia, 54% of 2 and 3-year-olds, and 42% of four-year-olds attend formal childcare, spending an average of 18 hours per week in such care (11). As such, childcare services are a recommended setting for the implementation of initiatives to increase child PA levels as they provide broad reach to a large proportion of young children for prolonged periods. Encouraging child PA while in care is consistent with the philosophy of the childcare sector (12) and supported by staff as they believe this to be part of their professional role and responsibility (13). In addition, childcare services also have existing infrastructure (e.g. indoor and outdoor space, equipment) and program delivery structures (e.g. curriculum) to facilitate the implementation of policies and practices to increase child PA (14). The implementation of physical environments that facilitate activity is also

consistent with government approaches to regulation, assessment and quality improvement for the early childhood education and care setting released in 2012.

Importantly, a recent meta-review that synthesised the findings of 16 systematic reviews (15) identified several centre-based childcare policies and practices that were associated with higher levels of child PA in care. These included the implementation of practices such as the provision of planned structured active lessons, sufficient outdoor spaces, availability of PA equipment, and the existence of PA policies, together with relevant educator qualifications and training (15). As such, regulatory guidelines for the childcare setting (16) and best practice recommendations (17-19) recommend the routine implementation of PA promoting policies and practices in childcare services.

Several national and international studies have previously described childcare service implementation of such evidence-based policies and practices. The most recent population-based survey in Australia was undertaken with 104 Western Australian childcare services in 2015, and assessed a limited number of PA promoting policies and practices (20). The study reported that just 16% of services had a PA policy, 52% had adequate portable indoor play equipment, and 37% provided sufficient opportunity for children to achieve the recommended 180 minutes of daily PA (20). In New South Wales (NSW), previous research reported inconsistent implementation of PA and nutrition policies and practices across childcare services in 2006-13 (21, 22).

Since the conduct of these studies, there have been critical changes to the regulatory environments of Australian childcare services that may have an impact on the implementation of PA promoting policies and practices. This includes the introduction of new licensing and accreditation standards for the sector in 2017 (23) as well as, continued investment by the NSW state government that enables childcare services to prevent excessive weight gain by creating

environments supportive of PA and healthy eating (24). In addition, there has been rapid progress in the evidence-on the types of PA promoting practices associated with improved child activity in care (15). Given substantial evidence of differences in PA levels by socio-economic status (25) and geographic location (26), assessment of the implementation of PA promoting policies and practices by such characteristics is needed. An updated assessment of childcare implementation, examining a wider range of policies and practices, is therefore warranted to provide a better understanding of the current PA environments of childcare services to inform health promotion efforts in the future.

This study aimed to describe the prevalence of evidenced-based PA promoting policies and practices implemented in a sample of Australian centre-based childcare services. A secondary aim was to investigate the associations between implementation of policies and practices and service characteristics, including type of service (preschool or long day care service); service size; geographic location; and socio-economic status (SES) of the surrounding community, to examine whether the tailoring of future intervention efforts in this setting may be needed.

Methods

Study design

A cross-sectional study (prevalence study whereby the exposure and the outcomes are measured at the same point in time (27)) was conducted with childcare services located in one region in NSW, Australia. Ethics approval to conduct the study was obtained from the Hunter New England Health Human Research Ethics Committee (reference 06/07/26/4.04) and the University of Newcastle Human Research Ethics Committee (reference H-2008-0343). The study is reported in

accordance with the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines for cross-sectional studies (28).

Sample and recruitment

All centre-based childcare services (including preschools and long day care services) located within the Hunter New England Local Health District of NSW, Australia (n=364) were invited to participate in a computer assisted telephone interview (CATI). A list of all centre-based childcare services located in the study region was obtained from the government licensing authority and served as the study sample. These include long day care services, that are open for 8 or more hours per day for 5 days per week, enrolling children from 6 weeks to 6 years, and preschools that are open for < 8 hours per day with children aged 3 to 5 years enrolled (11). Services that catered exclusively for children with special needs, those that only opened occasionally (where children attend care for short periods of time), NSW Department of Education and Communities services, family day care, and mobile services, were excluded from the study. Childcare services were sent a study information statement and an invitation to participate. Two weeks following, nominated supervisors were contacted by a CATI interviewer via telephone to confirm eligibility and request verbal consent to participate in the study. In Australia, nominated supervisors are certified, hold a diploma in early childhood education and/or 3 years' experience and oversee day to day operations. Their responsibilities for educational programs, supervisions and safety of children, entry and exit of premises, food and beverages, medication administration, sleep and rest, excursions and staffing are liable under the Law and Regulations (29).

Data collection

Interviews occurred between May and July 2017 and were undertaken as part of routine data collection conducted by the local health promotion unit (a department tasked by the NSW Ministry of Health to conduct health promotion service delivery including to early childhood education and care services). Each telephone interview took approximately 20 minutes and participants were able to complete the interview in multiple sittings if preferred. Survey items previously validated and used by the research team (30-32) were amended to reflect the new accreditation standards and evidence-based recommendations. The items were administered by trained CATI interviewers using standardised protocols. Prior to the commencement of data collection, a member of the research team provided training to four CATI interviewers on how to administer the interview questions. Interviewer adherence fidelity to training protocols was monitored throughout the survey period. More specifically, this included the use of log sheets and notes within the interview program highlighting any potential deviations. The research assistant also met with a statistician weekly to monitor the data and where the anomalous trends were identified, this was addressed with the interviewers immediately.

Measures

Interviews were completed by one nominated supervisor per service who reported on behalf of their childcare service. Nominated supervisors reported on the service operational characteristics (i.e. service type (preschool or long day care service), number of children enrolled, number of staff, opening and closing times, postcode) and current implementation of PA promoting policies and practices. The policies and practices examined in this study were identified as being: (a) associated with improved child PA in care (as informed by systematic reviews) (15); (b) recommended by international and national best practice guidelines (17, 18); and (c) local health

service priorities in the study region (33). Specifically, the survey items assessed the following seven policies and practices:

1. Service scheduling of $\geq 25\%$ of opening time for physically active play (including indoor and outdoor free-play and educator-led activities)
2. Service provision of accessible portable play equipment both indoors and outdoors
3. Service provision of enough quantities and types of portable play equipment for all children who regularly use them
4. Service scheduling time for daily fundamental movement skills (FMS) activities for 3 to 5-year-olds
5. Existence of a written PA policy with required elements
6. Existence of a written small screen recreation (SSR) policy with required elements
7. Service has at least 50% of staff that who have received training (by an external agency or other trained staff) in promoting child PA in the past 5 years

A detailed description of the items and measures is provided in Table S1.

Data analyses

All analyses were performed using the statistical software SAS v9.3 (SAS Institute Inc., Cary, NC, USA) and statistical level was set at 0.05. Descriptive statistics were used to describe service operational characteristics and implementation of the PA policies and practices. The prevalence of services implementing each individual policy and practice, and all seven policies and practices were reported as percentages with 95% confidence intervals, and according to service operational characteristics. In the association analyses, childcare services were grouped by the following: (a) service type - preschool or long day care service; (b) service size - dichotomised as ≥ 80 or < 80

children enrolled; (c) SES of the surrounding community - childcare services with postcodes ranked in the top 50% of NSW postcodes based on their SES were categorised as being located in “higher SES areas,” while those in the lower 50% were categorised as being located in “lower SES areas” using the 2016 socio-economic indexes for Australia (34); and (d) geographic location - childcare services were categorised as “regional/remote” (those located in inner/outer regional, remote, and very remote areas) or “major cities” (those areas in regional cities) based on their postcode using the Accessibility/Remoteness Index of Australia (35). For each individual policy and practice and the summation of all, chi-square analyses were performed to assess the differences by the above service operational characteristics. All four service operational characteristics were then entered into multivariate logistic regression models, to identify which characteristics were significantly associated with implementation after adjusting for each other.

Results

Sample

Of all the services invited to participate, 45 refused, four could not be contacted, and three were ineligible (two were preschools under the NSW Department of Education and Communities, and one a mobile service). The nominated supervisors of 309 services (85.6%) provided consent to participate in the study and completed the telephone interview.

Service operational characteristics

Nominated supervisors of childcare services reported a median enrolment of 89 children, with almost all (96%) being open 5 days each week (Table 1). Seventy-four percent were open for eight hours or more each day, with 106 operating as preschools and 203 as long day care services. Forty-

seven percent of participating services were located in regional/remote areas and 60% were located in lower socio-economic areas.

PA policies and practices

Overall, 98% (95% CI 95.8-99.1) of services reported providing opportunities for PA for at least 25% of their daily opening hours (Table 2). Almost all services (95%, 95% CI 92.2, 97.0) reported having sufficient portable PA equipment that were accessible for children indoors and outdoors. Sixty-nine per cent (95% CI 63.7, 74.1) of participating services reported having sufficient types and quantities of such equipment. Daily FMS activities were delivered by 64% (95% CI 58.4, 69.1) of services. Sixty-nine per cent (95% CI 63.7, 74.1) of services reported having educators who had attended training on promoting child PA in care in the past 5 years. Thirty-nine per cent (95% CI 33.4, 44.3) of services reported having a written PA policy (that included all recommended elements) and 26% (95% CI 21.3, 31.1) of services reported a written SSR policy with all required elements. Eight per cent (95% CI 5.3, 11.3) of services implemented all seven PA policies and practices.

Service operational characteristics associated with the implementation of PA policies and practices

In the univariate analyses, long day care services (compared to preschools) had statistically significant higher odds of having a written PA policy (OR 1.9, 95% CI 1.1, 3.1, $P=0.01$) and a written SSR policy (OR 2.0, 95% CI 0.1, 3.6, $P=0.02$) (Table 3). Thirty-two per cent of larger services had a written SSR policy compared to 20% of smaller services (OR 1.9, 95% CI 1.1, 3.3, $P=0.02$). There were no significant differences in the implementation of any of the policies and

practices by service SES or geographic location in the univariate analyses (Table 3). In the multivariable logistic regression analyses, long day care services had double the odds of having a written PA policy compared to preschools (OR 2.0, 95% CI 0.7, 5.8), when adjusted for socioeconomic status, geographic locality and service size. None of the examined service characteristics was associated with the implementation of all seven policies and practices in the multivariable regression (see Table 4).

Discussion

This study investigated the current implementation of PA promoting policies and practices in childcare services in Australia, together with examination of service operational characteristics associated with implementation. The study found that implementation of evidence-based PA policies and practices in the region is variable. However, there was little variability in the prevalence of policy and practice implementation by service characteristics.

Encouragingly, almost all services (98%) reported scheduling $\geq 25\%$ of their opening hours for physically active play time and providing access to portable play equipment while indoors and outdoors. Most services (64-69%) reported having sufficient types and quantities of portable play equipment, providing daily FMS activities, and having educators trained in PA. Such rates of implementation are higher than previously documented in a similar survey of childcare nominated supervisors in the region in 2013 (22). The findings suggest that changes to accreditation standards and ongoing investment in PA promotion in this setting by federal and NSW government may have yielded further improvements in implementation.

However, only 39% of services reported having a written PA policy and 26% a written SSR policy, rates similar to New Zealand childcare services (36). Additionally, just 8% of services

reported implementing all seven policies and practices assessed in the study, suggesting that there remains scope for support to implement a broader range of PA promoting policies and practices. Challenges with implementing PA promoting policies and practices such as having daily FMS sessions have consistently been documented in Australia (21, 37) and internationally (38, 39); due to implementation predominantly being reliant on staff knowledge and skills (40). The lack of comprehensive PA and screen time policies could be due to beliefs that such policies are not important to support child activity or a lack of time and/or knowledge to review and update policies so they are consistent with recent changes in guidelines. Given the high turnaround documented in the early childhood profession (41), implementation support strategies that address such beliefs, skills and knowledge gaps in an ongoing manner are required if the implementation of these policies and practices is to be further enhanced. While our study found that approximately 70% of childcare services reported that over half of their educators had been trained in PA in the last 5 years, it appears that attendance at training online (provided as part of a State-wide healthy eating and PA program for the early childhood sector) may be insufficient to produce comprehensive changes to implementation of service practices. The purpose of the online training was to deliver educational modules to two educators per service (42). The training covered six health promoting key messages including how to promote PA in early childhood settings and sought to further reinforce knowledge and skills development of educators. In contrast, the majority of services report being able to implement environmental or structural (e.g. 95% have sufficient portable equipment) practices. Hence it is possible that future efforts to identify other environmental practices associated with child activity may be a promising way of supporting childcare services with improving their environment.

Few service characteristics were found to be associated with the implementation of PA promoting policies and practices. In the multivariable logistic regression analyses, long day care services had significantly higher odds of having a written PA policy. This could be due to the staged introduction of the National Quality Framework (16) which was introduced to long day care services prior to preschools. It is possible that the different operational characteristics, including service size and opening hours, may have accounted for these differences as well. Future studies examining potential reasons for such differences are needed to understand the differential implementation amongst service types. The lack of significant associations with service socio-economic and geographic characteristics found here is reassuring, and suggests that current efforts to support implementation may be having a similar impact across childcare services. Such findings are in contrast with previous studies conducted in the region which found variances in daily FMS provision by geographical location and socio-economic areas (21). This suggests that the built-in focus on equity in state and national obesity prevention programs is essential to support the population health improvements to child PA.

Strengths of this study include the high participation rate (>80%), large sample size and sampling of all centre-based childcare services within one large and diverse health district in NSW. Nevertheless, the study findings need to be interpreted in light of several limitations. Assessing practice implementation by self-report could have resulted in social desirability bias (43) which may have led to an overestimation of the prevalence reported. However, a previous validation study has shown that organisational representatives can provide accurate data on their organisation's policies and practices, with high agreement observed between data collected via self-report and that of direct observation (32). While all services within the region were approached, the study was conducted in a nonmetropolitan region of NSW. Although the

demographic profile of the Hunter New England region (44, 45) approximates that of the broader NSW population (46), the policies and practices of childcare services located in major metropolitan areas may differ to that of the study sample. Lastly, a number of evidenced-based practices were not examined in this study including providing opportunities for free-play, time spent outdoors, size of the outdoor play area and educator role modelling due to survey length and participant burden. Future studies should include assessment of such practices to provide a more comprehensive picture of the modifiable environments of centre-based childcare services. Also, studies should consider assessing practices that influence child activity for infants and toddlers.

Conclusion and implications

This study highlights that centre-based childcare services continue to have suboptimal implementation of a number of PA promoting policies and practices. Future strategies focusing on changing practices that require less reliance on educator knowledge and skills may be a tenable strategy to effect change.

Further investment in supporting childcare services with implementing evidence-based PA policies and practice is needed to achieve the potential of childcare services to improve child PA.

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Tables

Table 1: Operational characteristics of childcare services

	N (%)
Number of children enrolled, median (SD)	89 (50.2)
Open 8 hours or more each day	228 (73.8)
Open 5 or more days per week	295 (95.5)
Long day care service†	203 (65.7)
Preschool‡	106 (34.3)
Located in regional /remote areas	144 (46.6)
Located in major city	165 (53.4)
Located in lower socio-economic area	183 (60.2)
Located in higher socio-economic area	121 (39.8)

†Long day care services enrol children from birth to 5 years of age and are generally open for 8 or more hours per day.

‡Preschools cater primarily for children aged between 3 and 5 years of age and are usually open for less than 8 hours per day.

SD, standard deviation.

Table 2: Prevalence of childcare service implementation of physical activity (PA) policies and practices

PA policies and practices	N = 309 % (95% CI)
1. Service provides active play time for 25% or more of operating hours	98.1 (95.8, 99.1)
2. Service provides access to portable PA equipment indoors and outdoors	95.2 (92.2, 97.0)
3. Service provides enough types and quantities of portable PA equipment	68.9 (63.7, 74.1)
4. Service has daily fundamental movement skills sessions (3-5 years)	63.8 (58.4, 69.1)
5. Service has a written policy, procedure or guideline encouraging PA with required elements	38.9 (33.4, 44.3)
6. Service has a policy, procedure or guideline restricting small screen recreation (SSR) with required elements	26.2 (21.3, 31.1)
7. Service has at least 50% educators that have accessed professional development (by an external agency or trained staff) in PA in the past 5 years	68.9 (63.7, 74.1)
Implementation of all 7 policies and practices	7.8 (5.3, 11.3)

Table 3: Association of childcare services adopting physical activity (PA) promoting practices with service type, service size, locality and disadvantage

(n=309)

	Service type			Service size			Locality			Disadvantage		
Service policies and practices	Long day Care N=203	Preschool N=106	P-value	>80 enrolled	≤80 enrolled	P-value	Major Cities	Regional / remote	P-value	Higher SES	Lower SES	P-value
	% (95% CI)	% (95% CI)		% (95% CI)	% (95% CI)		% (95% CI)	% (95% CI)		% (95% CI)	% (95% CI)	
1. Service provides active play time for 25% or more of operating hours	97.0 (93.6, 98.6)	100 (97.2, 100.0)	0.95	96.6 (93.6, 99.5)	99.3 (98.1, 100.0)	0.13	98.8 (97.1, 100.0)	97.2 (94.5, 99.9)	0.33	96.0 (92.1, 99.9)	99.0 (97.7, 100.0)	0.10
2. Service provides access to portable PA equipment indoors and outdoors	94.1 (90.0, 96.6)	97.2 (92.0, 99.0)	0.24	92.5 (88.2, 96.8)	97.4 (94.8, 99.9)	0.06	96.4 (93.5, 99.3)	93.8 (89.8, 97.7)	0.29	95.0 (90.6, 99.3)	95.1 (91.3, 98.1)	0.95
3. Service provides enough types and quantities of portable PA equipment for all children who regularly use them	67.5 (61.0, 74.0)	71.7 (63.0, 80.4)	0.45	69.4 (61.9, 76.9)	68.6 (61.2, 76.0)	0.89	67.9 (60.7, 75.0)	70.1 (62.6, 77.7)	0.67	69.7 (60.6, 78.8)	67.8 (61.4, 74.2)	0.74
4. Service has daily fundamental movement skills sessions (3-5 years)	63.6 (56.9, 70.2)	64.2 (54.9, 73.4)	0.92	64.6 (56.9, 72.4)	62.8 (55.0, 70.5)	0.73	66.7 (59.4, 73.9)	60.4 (52.4, 68.5)	0.25	65.7 (56.3, 75.1)	63.4 (56.8, 70.1)	0.70
5. Service has a written policy,	43.8 (37.0, 50.7)	29.3 (20.4, 38.1)	*0.01	38.1 (30.2, 46.0)	40.5	0.67	40.0	37.5	0.65	34.3	41.0	0.27

procedure or guideline encouraging PA with required elements					(32.7, 48.4)		(32.5, 47.5)	(29.6, 45.5)		(24.9, 43.8)	(34.2, 47.8)	
6. Service has a policy, procedure or guideline restricting small screen recreation (SSR) with required elements	30.5 (24.2, 37.0)	17.9 (11.8, 26.3)	*0.02	32.0 (24.4, 39.6)	19.6 (13.3, 26.0)	*0.02	27.9 (21.0, 34.8)	24.3 (17.3, 31.4)	0.48	20.2 (12.3, 28.2)	29.3 (23.0, 35.5)	0.09
7. Service has at least 50% educators that have accessed professional development (by an external agency or trained staff) in PA in the past 5 years	65.5 (58.9, 72.1)	75.5 (66.5, 82.7)	0.07	67.4 (59.7, 75.0)	72.6 (65.4, 79.7)	0.33	66.7 (59.4, 73.9)	71.5 (64.1, 78.9)	0.36	69.7 (60.6, 78.0)	69.3 (62.9, 75.6)	0.94
Implementation of all 7 policies and practices	9.4 (6.1, 14.2)	4.7 (2.0, 10.6)	0.16	9.5 (4.8, 14.3)	6.5 (2.6, 10.5)	0.34	7.3 (3.3, 11.3)	8.3 (3.8, 12.9)	0.73	4.0 (0.1, 7.9)	9.8 (5.7, 13.8)	0.09

*significant at a two-sided $p < 0.05$ level

Table 4: Results of multivariate logistic analyses for service characteristics associated with services implementation of all seven examined PA (PA) policies and practices

Policy/ practice	Variable		Odds ratio [95% confidence interval]	P
Implementation of all 7 policies and practices [†]	Service type	LDC vs preschool	1.99 (0.68, 5.82)	0.21
Implementation of all 7 policies and practices [‡]	Disadvantage	Upper half vs Lower Half	0.41 (0.13, 1.26)	0.12
Implementation of all 7 policies and practices [§]	Locality	Major cities vs regional/remote	0.97 (0.41, 2.34)	0.94
Implementation of all 7 policies and practices [¶]	Size	≥80 vs <80 children enrolled	1.22 (0.50, 2.99)	0.67

*significant at a two-sided $p < 0.05$ level

[†]Controlled for disadvantage, locality, size

[‡] Controlled for service type, locality, size

[§] Controlled for service type, disadvantage, size

[¶] Controlled for service type, disadvantaged, locality

Implementation of policies and practices to increase physical activity among children attending centre-based childcare: a cross-sectional study

Supplementary Table 1: Physical activity (PA) policy and practice survey items and measures

PA policies and practices	Telephone survey items	Measures
1. Service provides active play time for 25% or more of operating hours	On average, how much time each day do children have available to spend in child-initiated, free physically active play (any time when children are running, jumping, dancing or engaging in activities that increase their heart rate)? This includes both indoor and outdoor free active play	Services were classed as implementing the practice if they reported having $\geq 25\%$ of their opening time scheduled for physically active play
	How often do you provide time for children to participate in educator-led active play? <i>Examples include active circle time, music, dancing or planned activities to develop movement skills. The total amount of adult led activity time may include multiple short activities added up over the course of the day</i>	
	On average, how much time do children spend participating in educator-led active play?	
	Total time in both free and educator led play were added and divided by service total opening time.	

PA policies and practices	Telephone survey items	Measures
2. Service provides access to portable PA equipment indoors and outdoors	Does your service provide easy access to portable physical activity equipment for children to use? <i>Portable physical activity equipment includes any toys that children can carry, throw, push, pull, or kick, as well as loose parts that help children explore and learn about the natural world. This equipment can be homemade or store bought. Portable physical activity equipment does not include equipment fixed to the ground like swings or monkey bars, but does include fabric tunnels, mats and other larger items that educators can easily move and switch around.</i>	Supervisors had to answer yes to both indoors and outdoors to be classed as implementing the practice
	Areas within your service are children provided opportunities for physically active play?	
3. Service provides enough types and quantities of portable PA equipment	Describe the availability of the portable physical activity equipment? This refers to all children who regularly use the equipment.	Services were classed as implementing the practice if they answered yes to both having enough types and enough quantities

PA policies and practices	Telephone survey items	Measures
4. Service has daily fundamental movement skills sessions (3-5 years)	On how many days in the last week did your service Educators intentionally teach activities to develop fundamental movement skills for all children at your service? <i>Fundamental movement skills are basic gross motor movement skills such as running, catching, jumping, kicking, galloping, leaping, hopping, ball dribbling, side-sliding, striking a ball, underarm rolling and over arm throwing. Development of such skills involves educators explaining, demonstrating and providing feedback to children for each skill.</i>	Services were classed as implementing this practice if they reported providing scheduled time for fundamental movement skills every day for all their 3 - 5-year-olds
	What percentage of the 3 - 5-year-olds at your service would usually participate in activities to develop fundamental movement skills?	
5. Service has a written policy, procedure or guideline encouraging PA with required elements	Does your service have a written policy on physical activity?	Services were classed as implementing this practice (physical activity policy) if they reported to providing a positive environment for physical activity, communicating with families about PA and FMS, having a written policy which referred to the National physical activity recommendations for children 0-5 years and having physical activity opportunities embedded in the daily curriculum.
	Does your policy specifically refer to:	
	Promoting participation in a range of FMS experiences	
	Providing a positive environment for promoting PA	
	Communication with families about PA and FMS	
	Being inclusive of particular population groups	
	Providing Tummy time (where appropriate)	
	National Physical Activity Recommendations for Children 0-5 Years	
	Physical activity opportunities are embedded in the daily curriculum such as free and educator led play time and fundamental movement skills	
	Addressing injury prevention during active play activities	
	Policy has been reviewed in the last 12 months	

PA policies and practices	Telephone survey items	Measures
6. Service has a policy, procedure or guideline restricting small screen recreation (SSR) with required elements	Does your service have a written policy on restricting child viewing of small screen devices (this could include TV, DVD, iPad or computer)?	Services were classed as implementing the SSR policy if they reported that the policy referred to the National physical activity recommendations for children 0-5 years, not using screens as a reward or for behaviour management, limiting time children spent watching TV & DVDs, and communicating with families about SSR.
	Does your policy specifically refer to	
	National Physical Activity Recommendations for Children 0-5 Years (Sedentary Behaviour Recommendations)	
	Not using screen as a reward or to manage challenging behaviours	
	Policy has been reviewed in the last 12 months	
	Limiting time children spend watching TV & DVDs	
	Communication with families about SSR	
7. Service has at least 50% educators that have accessed professional development (by an external agency or trained staff) in PA in the past 5 years	How many of your Primary contact Educators (someone qualified in early childhood education (including Cert III, Diploma and Degree level)) have received training on promoting child physical activity (included training provided by an external agency or by other trained staff in your service) in the past five years?	The service was classed as implementing this practice if percentage (number of educators who received training divided by overall number of staff in the service) was $\geq 50\%$

Chapter 3: A randomised controlled trial of multiple periods of outdoor free-play to increase moderate-to-vigorous physical activity among 3 to 6-year-old children attending childcare: study protocol

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STUDY PROTOCOL

Open Access



A randomised controlled trial of multiple periods of outdoor free-play to increase moderate-to-vigorous physical activity among 3 to 6 year old children attending childcare: study protocol

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Abstract

Background: The implementation of physical activity interventions in centre-based childcare services has been recommended to improve child health. This study aims to evaluate the efficacy of scheduling multiple periods of outdoor free play in increasing the time children spend in moderate-to-vigorous physical activity (MVPA) during childcare.

Methods: The study will employ a between group cluster randomised controlled trial design. Fourteen childcare services in the Hunter New England region of New South Wales, Australia, who currently implement a single session of free outdoor play between their core operational hours of 9 am to 3 pm will be recruited into the trial. Childcare services will be randomised to an intervention or a no intervention control group. Childcare services in the intervention group will be supported by an early childhood education specialist to provide three periods of outdoor free play for children between the hours of 9 am to 3 pm. Each period of outdoor free play will be at least 15 min in duration but must equate to their total usual duration of outdoor play. Services in the control group will continue to implement a single period of outdoor play. The primary trial outcome is minutes of time children spend in MVPA whilst in care assessed objectively via accelerometer over 5 days. Outcome assessment will occur at baseline and 3 months post baseline. Generalised Linear Mixed Models (GLMM) under an intention to treat framework will be used to compare differences between groups in the primary trial outcome at follow-up. Sensitivity analysis will be conducted to test assumptions of missing data. Per protocol analysis will be performed using services that implemented the intervention as intended and subgroup analysis undertaken by gender and baseline physical activity levels of children.

Discussion: The study tests a simple ecological intervention that has the potential to increase child physical activity in care.

Trial registration: Australian New Zealand Clinical Trials Registry 12616000347460. Prospectively registered 17th March 2016.

Keywords: Physical activity, Randomised controlled trial, Intervention, Childcare, Preschool, Outdoor play, Activity breaks

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Background

Inadequate physical activity is associated with the most prevalent causes of mortality and morbidity including obesity, diabetes, cardiovascular disease and some cancers [1]. Physical activity in early childhood has immediate beneficial effects on blood pressure, lipid profile, motor skill and bone development [2–4] with greatest benefit accruing at moderate-to-vigorous intensity [3, 4]. Despite these benefits, research in Australia and internationally has demonstrated that most children aged 2 to 6 years do not engage in physical activity consistent with current national guidelines [5, 6].

A number of characteristics of centre-based childcare services suggest that they represent an ideal setting for interventions to improve physical activity in young children. First, centre-based childcare provides access to a significant proportion of the population aged less than 5 years, often for prolonged periods. For example, approximately 55 % of Australian children aged 0 to 5 years attended some form of centre-based care in 2014 [7]. Second, reviews suggest that young children are not sufficiently active during attendance at centre-based care, necessitating interventions in this setting [8]. Third, childcare service staff believe in the importance of children being physically active as a part of their professional responsibility and are amenable to interventions to support improvements in child activity [9].

Modifying the frequency of outdoor free-play may represent a potentially innovative and effective strategy in improving the physical activity of children attending childcare. Unstructured outdoor free-play (as opposed to structured, staff-guided play) has been consistently associated with greater child physical activity among children in care [10, 11]. However, findings of a randomised trial suggest that increasing the duration of time that children in childcare have available for outdoor free-play may not be effective in improving child physical activity [12]. A likely explanation for this is that extending outdoor free-play time alone does not account for children's natural physical activity patterns. Children's activity in care is characterised by short, intense bouts of activity of between 3 and 15 min occurring at the start of outdoor free-play opportunities, followed by extended recovery periods of sedentary behaviour or light activity [13–16]. As such, extending periods of outdoor play alone may not increase child moderate-to-vigorous physical activity (MVPA). However, even if the total duration of outdoor free-play time for children remains constant, scheduling shorter but more frequent opportunities for outdoor free-play may enhance child physical activity by promoting more spontaneous bouts of intense activity ('activity peaks') that is characteristic of the first 15 min of outdoor free-play [13].

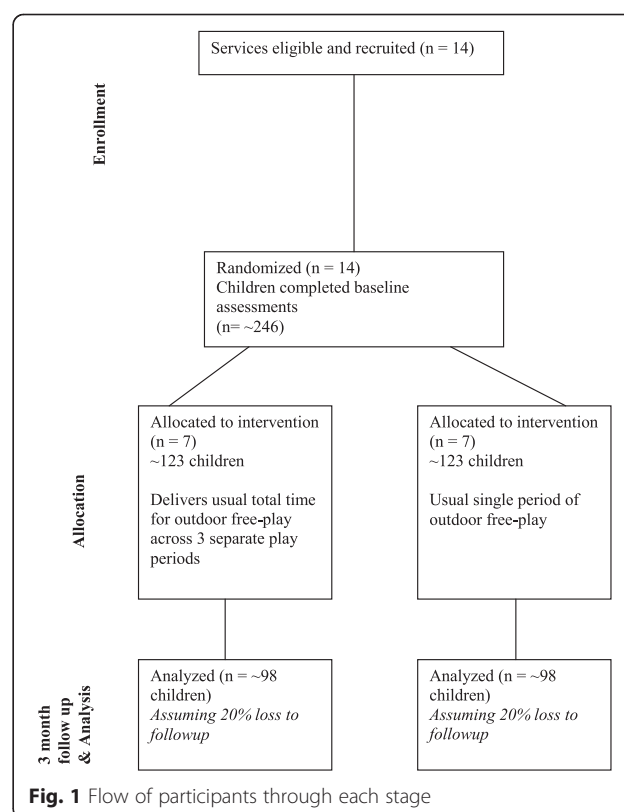
In this context the aim of this study is to assess the efficacy of scheduling multiple periods of outdoor free-

play per day in increasing the time children spend in MVPA during childcare relative to one outdoor play time of the same duration. This manuscript describes the trial methods and trial outcomes of the study.

Methods

Design

The study will employ a between group, cluster randomised controlled trial design (see Fig. 1). Fourteen centre-based childcare services with one period of outdoor free-play (of at least 45 min duration) will be randomised to an intervention or control group. Intervention services will change their scheduling of outdoor free-play such that their usual total time for outdoor free-play is broken into multiple separate periods of at least 15 min in duration each with an indoor period of at least 30 min in between. Control services will continue to provide their usual total period of outdoor free-play time across a single continuous period. Intervention efficacy will be determined by comparing differences between groups in the minutes children spend in MVPA per day at childcare. MVPA will be assessed via accelerometer over 5 days at baseline and 3 months later. Approval to conduct the study was obtained from Hunter New England Human Research Ethics Committee (reference number 15/11/18/4.03) and the University of



Newcastle Human Research Ethics Committee (reference number H-2016-0088).

Participant eligibility and evidence-based recruitment strategy

Childcare services

To be eligible to participate in the trial, centre-based childcare services (defined as long day care services or preschools) will be required to have an enrolment of least 25 children aged between 3 to 6 years, be located within the Hunter or New England regions of New South Wales, Australia, and have only one outdoor free-play session occurring between the core operational hours of 9 am to 3 pm. Childcare services catering solely for special needs populations, or those participating in other physical activity interventions will be excluded from participating in the trial.

A list of all childcare services that are licensed to provide care for 3 to 6 year-old children located within the study region will be obtained from the licensing agency. Supervisors of childcare services across the study region will be sent study information prior to telephone contact to assess eligibility and to invite study participation among eligible services. Recruitment will continue until 14 services have consented to participate. Previous studies in childcare utilising this recruitment approach have yielded a childcare service participation rate of 81–84 % [17–19].

Children

Active parental consent will be required for study participation. To be eligible for the data collection component of the study, children will be required to be aged 3 to 6 years and attend participating services between 9 am and 3 pm on one or more days in the week of data collection. Children with an intellectual or physical impairment that may impact on their physical activity capacity or prevent them from complying with data collection protocols will be excluded.

To maximise study participation, children will be recruited utilising an evidenced-based strategy recommended for obtaining active parental consent for child participation in school-based research, which will include a mail out of study information and consent forms prior to onsite recruitment, face to face dissemination of information sheets and provision of consent forms to parents during periods of drop-off or pick-up from childcare [20]. Such a recruitment strategy has been utilised in previous trials of interventions for preschool aged children in this setting [21–23].

Randomisation, allocation and blinding

A statistician with no other involvement in recruitment or data collection will allocate services to either the intervention or control condition in a 1:1 ratio using a

computerised random number generator. Randomisation of childcare services will be stratified by the socioeconomic status of the area where the service is located, and on the service type (long day care service or preschool) based on evidence of an association between these factors and the physical activity policies and practices of services [24].

Intervention

The intervention will seek to create a childcare environment more supportive of child physical activity by scheduling multiple opportunities for outdoor free-play in a way which is consistent with children's developing fitness levels [25] and natural physical activity patterns [10, 13, 26]. Specifically, within a 6 h day (9 am to 3 pm) the intervention will divide their usual total time of outdoor free-play for children across three periods of at least 15 min duration.

Three periods of outdoor free-play was selected as: i) research has demonstrated repeated spikes in activity across the day in childcare coinciding with scheduled breaks [13, 16]; and ii) that the start of such breaks stimulate between 3 and 15 min of intense activity, sufficient to achieve an additional 10 min MVPA [27]. The minimum period of outdoor free-play of 15 min was selected given evidence that MVPA often attenuates after this period [13]. Furthermore, services will be required to schedule at least 30 min of indoor time (structured or unstructured play) between periods of outdoor free-play, based on evidence that children may be more likely to be moderate-to-vigorously physically active following prolonged indoor periods [28]. Immediately following baseline data collection, intervention services will be supported by a member of the research team and an early childhood education specialist to implement the intervention. This support will include written materials and at least two site visits and two telephone support calls prior to follow-up data collection to re-orient their operations to incorporate the scheduling change. No other intervention support will be provided to children, childcare service staff or parents.

Control

Services allocated to the control group will schedule their usual single period of outdoor free-play for children across the day. Control services will also be instructed to continue the one outdoor free-play period of the same duration (except during inclement weather) across the study period.

Data collection and measures

Data will be collected at baseline and approximately 3 months post baseline.

Primary trial outcome—minutes spent in moderate-to-vigorous physical activity in care

The primary trial outcome is the number of minutes children spend in MVPA during the core hours of service operation (9 am to 3 pm). MVPA will be objectively assessed using an Actigraph GT3X+ accelerometer using recommended cut-points [29]. The Actigraph accelerometer has established utility, validity and reliability and is the current gold standard for assessment of activity in children aged 3 to 6 years old [30].

Accelerometers will be worn by children during the core operational hours of childcare (9 am to 3 pm). Two data collectors, not blinded to allocation at follow-up, will attend services to fit and collect accelerometers using a standard protocol [29]. Accelerometers will be placed above the iliac crest at the hip of the child using a clip or band. Accelerometer data will be collected on every day of 1 week (5 days in total) of the data collection period at baseline and follow-up. Children will wear the accelerometer each day (up to 5 days) that they attend care. The accelerometer will be fitted as the children arrive at the childcare service and removed at 3 pm or earlier when the child departs the service. Despite evidence to suggest that increases in child activity at childcare do not result in decreased activity at home [31], at baseline and follow-up, consent will be sought for children to wear accelerometers during ‘out of care’ hours also to assess potential compensatory effects.

Secondary trial outcomes

Secondary trial outcomes include total child activity (counts per minute collected in 5 s epochs) in care [32] and percent of time children spend in MVPA adjusted for wear time, assessed via accelerometer. Additionally, as a potential adverse effect of the intervention, during interviews with childcare services, the number of injuries requiring documentation will be assessed using items taken from previous childcare physical activity studies [21].

Child and parent characteristics

A computer-assisted telephone interview with parents will be conducted to collect: child and parent demographic information (age, gender, household income, and parent education); usual parent physical activity; and child and parent height and weight, using items from the New South Wales Population Health Survey [33] and items to assess the home environment from the pre-school age physical activity questionnaire (Pre-PAQ) questionnaire [34]. The survey will be conducted at baseline and follow-up.

Service characteristics

During a telephone interview with supervisors of participating childcare services the following service characteristics

will be assessed: postcode of locality (to assess the socioeconomic status of the area) [35]; number of years in operation; total number of 3 to 6 year-old children enrolled; number of staff; staff qualifications; and service governance (Department of Education service or privately owned). Such items were drawn from previous studies [17, 24].

Service outdoor free-play schedule and physical activity environment

Observations at childcare services will be conducted by data collectors (not blind to group allocation) to record the duration (via stop watch), timing and frequency of outdoor free-play to ensure that services are implementing outdoor free-play periods consistent with the study protocol. Data collectors will also collect information regarding the childcare service physical activity environment using a comprehensive environment assessment tool (Environment and Policy Assessment and Observation instrument, EPAO) [36]. The following types of physical activity observation elements will be conducted: Active play opportunities, sedentary opportunities, sedentary environment, portable play environment, fixed play environment, staff behaviour physical activity, physical activity training and education and physical activity policy.

Intervention fidelity

The research team will visit the services during the intervention period to observe if childcare services have implemented the intervention prior to follow-up data collection. A checklist developed by the research team will be used to monitor whether the intervention was delivered as per the study protocol on the day of data collection.

Analysis

Minutes of MVPA will be determined using age-specific child-validated equations (cut points) [29]. Generalised Linear Mixed Models (GLMM), to take account of the repeated measures on children (daily measures during baseline and follow-up periods) as well as clustering of individuals within services, will be used under an intention to treat framework to test for a difference in change in minutes of MVPA between groups. The GLMM will include terms for time (baseline and follow-up), group (intervention or control group), and the interaction of time and group, and will control for child gender and total outdoor play time. A sensitivity analysis will be performed using multiple imputation for missing data to assess robustness of the main analysis [37]. Per protocol analysis will be performed using services that implemented the intervention as intended and subgroup analysis undertaken by gender and baseline physical activity levels of children.

Sample size and power calculation

The study will approach approximately 500 children from 14 childcare services across the study region. Assuming the standard deviation of MVPA is 2.7 min/h [38] and assuming an intraclass correlation coefficient of 0.1 [39], a sample of 14 children per cluster (assuming a conservative participation rate of approximately 50 and a 20 % loss to follow-up) will provide the study with 80 % power to detect a change of 9.9 min in MVPA. An increase of 10 min of MVPA in children aged 3 to 6 years old has been found to have clinically significant beneficial effects on fat mass and peak bone mass [3, 4].

Discussion

Supporting physical activity in early childhood is a recommended strategy [40] to reduce the community health burden of inactivity, as physical activity in childhood persists over time [41], and health behaviours in adolescents and adults [42]. While previous observational studies have reported that children are frequently sedentary or engaged in light activity, in recent years has research began to accumulate that describes patterns of activity among children aged 3 to 6 years old across a day in childcare [10, 13, 16]. Through the use of experimental methods, the trial will provide rigorous evidence to indicate whether interventions sensitive to child activity patterns by increasing the frequency of bouts of outdoor free-play are effective. Even if moderately effective, the intervention has the potential to improve the health and wellbeing of the hundreds of thousands of Australian children who attend some form of centre-based childcare through reducing the risk of the precursors of chronic disease.

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Availability of data and materials

Study materials and data will be held by the Administering Institution. De-identified data-sets and all study materials are available on request from the corresponding author.

Authors' contributions

LW, JW, PM conceived the study and secured funding. SY, LW, PM, JW, JJ, LAR designed the study procedures. LW led the drafting of the manuscript. All authors contributed to, read and approved the final version of the manuscript.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable.

Ethics approval and consent to participate

Ethical approval to conduct the study has been obtained from the Hunter New England Human Research Ethics Committee (reference number 15/11/18/4.03) and the University of Newcastle Human Research Ethics Committee (reference number H-2016-0088). Active parental consent will be required for child participation in the study.

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**Chapter 4: Impact of scheduling multiple outdoor free-play periods in
childcare on child moderate-to-vigorous physical activity: a cluster
randomised trial**

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RESEARCH

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Impact of scheduling multiple outdoor free-play periods in childcare on child moderate-to-vigorous physical activity: a cluster randomised trial

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Abstract

Background: Increasing the frequency of periods of outdoor free-play in childcare may represent an opportunity to increase child physical activity. This study aimed to assess the efficacy of scheduling multiple periods of outdoor free-play in increasing the time children spend in moderate-to-vigorous physical activity (MVPA) while attending childcare.

Methods: The study employed a cluster randomised controlled trial design involving children aged 3 to 6 years, attending ten childcare services in the Hunter New England region of New South Wales, Australia. Five services were randomised to receive the intervention and five to a control condition. The intervention involved services scheduling three separate periods of outdoor free-play from 9 am to 3 pm per day, each at least 15 min in duration, with the total equivalent to their usual daily duration of outdoor play period. Control services implemented the usual single continuous period of outdoor free-play over this time. The primary outcome, children's moderate-to-vigorous physical activity (MVPA) while in care per day, was measured over 5 days via accelerometers at baseline and at 3 months post baseline. Secondary outcomes included percentage of time spent in MVPA while in care per day, total physical activity while in care per day and documented child injury, a hypothesised potential unintended adverse event. Childcare services and data collectors were not blind to the experimental group allocation.

Results: Parents of 439 (71.6%) children attending participating childcare services consented for their child to participate in the trial. Of these, 316 (72.0%) children provided valid accelerometer data at both time points. Relative to children in control services, mean daily minutes of MVPA in care was significantly greater at follow-up among children attending intervention services (adjusted difference between groups 5.21 min, 95% CI 0.59–9.83 $p = 0.03$). Percentage of time spent in MVPA in care per day was also greater at follow-up among children in intervention services relative to control services (adjusted difference between groups 1.57, 95% CI 0.64–2.49 $p < 0.001$). Total physical activity while in care per day, assessed via counts per minute approached but did not reach significance (adjusted difference between groups 14.25, 95% CI 2.26–30.76 $p = 0.09$). There were no differences between groups in child injury nor subgroup interactions for the primary trial outcome by child age, sex, or baseline MVPA levels.

(Continued on next page)

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Conclusion: Scheduling multiple periods of outdoor free-play significantly increased the time children spent in MVPA while in attendance at childcare. This simple ecological intervention could be considered for broader dissemination as a strategy to increase child physical activity at a population level.

Trial registration: This trial was prospectively registered with the Australian New Zealand Clinical Trials Registry (ANZCTR) ([ACTRN1261000347460](https://www.anzctr.org.au/Trial/Registration/TrialRegistration.aspx?ACTRN1261000347460)). Prospectively registered 17th March 2016.

Keywords: Child day care services, Preschool, Childcare, Young children, Physical activity, Outdoor, Scheduling, Intervention, Randomised controlled trial,

Background

Sufficient physical activity in early childhood (under 6 years) can accrue immediate metabolic benefits in blood pressure and lipid profile and reduce the risk of unhealthy weight gain [1]. Adequate physical activity is also associated with social, emotional, cognitive [2], and motor skill development [3]. Furthermore, physical activity in early childhood tracks into adulthood [4]. Despite this, just 41.6 to 50.2% of preschool-aged children in the US [5] and 10% in Australia [6] currently meet recommended levels of at least 15 min physical activity per hour while in care [7], measured objectively.

Childcare services are a key setting in which to intervene to improve physical activity levels given that they provide access to a large number of children [8] for prolonged periods. In Australia, children in long day care spend 20 h each week on average, with 43% attending three to 5 weekdays and 57% attending just one to 2 weekdays [9]. For preschools, children attend an average of only 13 h a week with 54% attending 1–2 weekdays in care. Long day care services provide centre-based care for eight or more hours per day for 5 days a week and typically enrol children from 6 weeks to under 6 years [10]. Preschools provide centre-based care for 6 to 8 h per day and enrol children between 3 and 6 years. Childcare services also have infrastructure that can be utilised to create environments supportive of physically active play via outdoor space and equipment which cater to children's varying activity interests [11].

A recent meta-analysis of randomised trials of childcare-based physical activity interventions reported that their effectiveness was equivocal [12]. The review identified poor implementation of multi-component and complex interventions requiring staff training and resources as a potential contributing factor [13–15]. One potential opportunity to improve the impact of physical activity interventions in the childcare setting may be to design interventions that are more likely to be implemented. Previous research has established that preschool children's activity is characterized by short intense bouts of activity between 3 and 15 min occurring at the start of periods of outdoor free-play, followed by extended recovery periods of sedentary

behaviour or light activity [16–19]. Increasing the frequency of outdoor free-play opportunities may, therefore, capitalise on the natural tendency for children to be active at the start of outdoor free-play periods [16, 19]. Furthermore, incorporating such changes into childcare service scheduling and programming may not require additional skills, training or expensive resources to implement, frequently reported barriers to the delivery of other physical activity interventions in this setting [20].

A recently published study assessed the effect of scheduling more frequent periods of free-play, as part of a multi-component intervention, on children's physical activity levels and sedentary time in care [21]. Specifically, intervention services scheduled four 30 min periods of outdoor free-play, with trained educators in physical activity promotion, during which additional portable equipment such as balls, hula hoops, hopscotch mats, obstacle courses, stepping domes, ribbon wands and hop along bouncers was also made available. The 8 week intervention was found to be effective while the more frequent outdoor free-play periods were implemented as scheduled, but not at 12 months follow-up; when services were observed to have ceased their implementation. Furthermore, being multi-component, this trial was unable to delineate which components of the trial had been effective in improving child activity.

Given the promising effects observed for outdoor free-play period scheduling, in combination with trained staff and equipment provision, the current study sought to extend the evidence base and isolate the effectiveness of repeated periods of outdoor free-play opportunities on child physical activity. Specifically, the aim of the study was to assess the efficacy of scheduling three periods of outdoor free-play each day in childcare services in increasing the time children spend in MVPA when attending childcare, compared to a period of continuous play of equal duration.

Methods

The trial is reported in accordance with the CONSORT statement and its extension on cluster randomised trials

[22]. A detailed protocol for this trial has been previously published [23].

Design and setting

The study employed a between group, cluster randomised controlled trial design (see Table 1). Ten centre-based childcare services, with only one scheduled period of outdoor free-play during their core operating hours of 9 am to 3 pm (of at least 45 min duration) were randomised to an intervention or control group (1:1 ratio). Services were selected from the Hunter New England region of New South Wales, Australia. The intervention was 3 months in duration. Data on child physical activity during care were assessed on a cohort of children, via accelerometer over a 5-day period at baseline and immediately post intervention at approximately 3 months post baseline.

Participants and recruitment

Childcare services

To be eligible to participate in the trial, services were required to have a daily enrolment of at least 25 children aged 3 to 6 years. Services also needed to have an existing schedule of outdoor free-play time for children consisting of a single period of at least 45 min during the core hours of service from 9 am to 3 pm. Services that reported already having more than one outdoor free-play period were ineligible to participate in the trial. Services catering solely for occasional care or children with special needs (e.g. requiring specialist support, which may affect physical activity scheduling) were excluded from the trial as were services currently participating in other interventions trials within the study region (nutrition and educator trials).

Recruitment was conducted from April to June 2016. A member of the research team, who was not involved in the delivery of the trial or data collection, made telephone contact with childcare services to assess eligibility, and invited eligible services to participate in the study. Once verbal consent was obtained, services were invited to take part in a short telephone interview. Study information forms and consent forms were sent to the services to distribute to parents of eligible children enrolled at consenting childcare services (14 out of a potential 219 services) across the study region.

The trial originally sought to utilise probability-sampling methods to recruit childcare services; however

a change in recommended practice for the setting (that services provide ongoing rather than structured opportunities for outdoor free-play across the day) meant that a large proportion of services (58%) were ineligible for the current study [24]. As such, a convenience sample of 14 eligible services were identified and consented to participate. A further four services were deemed ineligible at baseline due to not having one period of outdoor free-play in core hours of 9 am to 3 pm.

Parents and children

To be eligible to participate in the data collection component of the study, children were required to be aged 3 to 6 years and, to have attended participating services between 9 am to 3 pm on 1 or more days during the week of data collection. During the week prior to the agreed week of baseline data collection, a research assistant was also deployed during periods of drop-off or pick-up of children to distribute information and consent forms to parents at each service. Parents were invited to provide consent for their child to participate in measurement i) at childcare and ii) at home (using accelerometers). Parents could consent to children wearing accelerometers in care but not at home. All parents of participating children were also invited to participate in a computer -assisted telephone interview (CATI).

Randomisation, allocation and blinding

A statistician with no other involvement in recruitment or data collection allocated services to either the intervention or the control condition in a 1:1 ratio using a computerised random number generator, following baseline data collection. Randomisation of childcare services were stratified by the socioeconomic status of the areas where the services were located (using their postcode), and the service type (long day care service or preschool) based on previous finding of an association between these factors and the physical activity policies and practices of services [25]. Services were informed of their experimental group allocation after baseline data collection by a member of the research team. Data analysts were blinded to the group allocation of intervention and control services.

Intervention

The intervention sought to create a childcare environment supportive of child physical activity by scheduling multiple

Table 1 Illustration of the flow of trial

3 weeks	5–7 days	3 months	5–7 days
Recruitment	Baseline data collection	After randomisation,	Follow-up data collection
-Services (verbal)	NS Interviews	intervention services –	In-care & out of care
-Parent (informed consent)	In-care & out of care accelerometry	3 outdoor free-play periods;	accelerometry
-Child (verbal)	EPAO	control services – maintain	EPAO
	Parent CATI	1 continuous free-play period	

opportunities for outdoor free-play in a way that is consistent with a child's natural physical activity patterns [26, 27]. Specifically, within a 6 h day (9 am to 3 pm), the intervention involved dividing the single usual period of outdoor free-play from children into three periods of at least 15 min duration per period. For example, an intervention service, which usually scheduled one 60 min continuous free-play period, was rescheduled to two shorter periods in the morning of 15 min each, and one period in the afternoon of 30 min. Services were encouraged to keep the total duration of outdoor free-play across the day consistent with that assessed at baseline.

Immediately following baseline data collection services allocated to receive the intervention were contacted by a member of the research team and an early childhood education specialist to support the implementation of the intervention. All services were asked to accept two visits and two telephone calls to their service to assess if implementation was taking place and provide the opportunity to give feedback to those services experiencing any difficulties. Services were also offered written materials covering national guidelines on physical activity, "Get up & Grow" materials, Sun Smart Shade manual, benefits of outdoor play resources from the Raising Children network, relevant National Quality Standard professional learning newsletters. A standardised recording template were used to record the delivery of a site visit, telephone contacts and resources (if any) supplied to the service to support implementation.

Control

Services allocated to the control group were asked to continue to schedule their usual single period of outdoor free-play in the core hours of 9 am to 3 pm. Control services agreed not to make any changes to the total duration of this single continuous period throughout the duration of the study. No other support was offered to control services during the study period.

Data collection procedures and measures

Baseline data collection was conducted between May and July 2016 (autumn/fall–winter season) and follow-up data collected 3 months later (August–November 2016; winter–spring season). (Table 1).

Parent and child characteristics

At baseline, parents, provided brief demographic information on the child's consent form, including the child's date of birth and sex. Other data collected included the number of days the child attended the childcare service each week and their residential postcode to assess the socioeconomic status of their usual place of residence.

In addition, a computer-assisted telephone interview (CATI) was conducted with consenting parents to collect:

child and parent demographic information (parent age, parent sex, Aboriginal and/or Torres Strait Islander status, household income and parent education); usual levels of parent physical activity; and child and parent weight and height, using items from the New South Wales Population Health Survey [28].

Services characteristics

During recruitment, a baseline telephone interview was conducted with supervisors of participating childcare services that assessed the following: postcode (to assess the socioeconomic status of the area) [29], number of years' the service has been in operation and the total number of 3 to 6 year-old children enrolled.

Service outdoor free-play schedule and physical activity environment

Observations at childcare services were conducted by pairs of trained data collectors to record the duration (via stopwatch), timing and frequency of outdoor free-play to ensure that services were implementing outdoor free-play periods according to the study protocol.

The two data collectors also collected information regarding the broader childcare service physical activity environment and educator physical activity practices using a comprehensive assessment tool (Environment and Policy assessment and observation instrument, EPAO) [30]. This information was collected daily over the 5 day data collection period at baseline and at follow-up. EPAO assessment conducted over 5 days have been shown to provide more reliable estimates of usual childcare environments than those conducted over a single day [31]. The following types of physical activity observation elements were assessed as part of the EPAO: active play opportunities, sedentary opportunities, sedentary environment, portable play environment, fixed play environment, staff behaviours (e.g. prompts and positive statements), physical activity training, education, and existence of a written physical activity policy. These items are used to calculate a sub-score and an overall score. Other data collected included the number of children in attendance, number of room staff working on the days of data collection, outdoor play area size (m^2), and minimum and maximum daily temperatures [32] and UV index [33].

Child physical activity

Accelerometers (Actigraph GT3X+) were used to collect information on child physical activity. The accelerometers were worn by children from the time they first arrived at the childcare service until 3 pm on each day of attendance. Accelerometer data were collected on every day of 1 week (5 days in total) of the data collection period at baseline and follow-up. Two data collectors (not blinded to experimental group allocation) attended the services during the

data collection period to fit and collect the accelerometers using a standard protocol. Accelerometers were placed above the left iliac crest at the hip of the child using a clip or band. Children with at least 50% of wear time during childcare hours on 1 day/week were considered to have valid wear time. All participating children wore an 'in care' accelerometer each day (up to 5 days) that they attended care. Data from children consenting to also wear an additional accelerometer 'out of care' was used for descriptive purposes to assess any potential compensatory effect in children's physical activity during out of care periods on days children attend care.. These children had their 'in care' device removed at 3 pm on each day of attendance or earlier if they left the service for the day, but kept on wearing the 'out of care' device. Data collectors also recorded if children removed accelerometers during naps or other times when the belt was removed. On the first day of wearing for home, parents were reminded of their agreement to keep a daily log of their child's activities, when they did not wear the device, and periods of sleep.

Primary outcome

The primary trial outcome was the mean daily minutes that children spent in MVPA from the time of arrival at the service until 3 pm, over the course of 1 week (5 days) and for every day of care attendance (ranging from 1 to 5 days). Minutes of MVPA were assessed using recommended cut points [34]. The Actigraph accelerometer has established utility, validity, and reliability and is the current gold standard for assessment of activity in children aged 3 to 6 years [35].

Secondary outcomes

Secondary trial outcomes included total child activity (counts per minutes in 5 s epochs) while in care per day [36], and percent of time children spent in MVPA adjusted for wear time per day, as assessed by accelerometer. Counts per minute were calculated from the total activity counts recorded divided by the total time the accelerometer was worn ($1440 \times$ number of valid days).

To identify any potential adverse effect of the intervention, the number of injuries requiring documentation during the past 3 months was assessed during interviews with childcare services' supervisors, at baseline and at follow-up using items taken from a previous childcare physical activity study conducted by the research team [14].

Sample size and power calculations

The study aimed to approach approximately 500 children from 14 childcare services across the study region. We assumed a standard deviation of MVPA of 2.7 min/h [37] and an intra-class correlation coefficient of 0.1 [38], that a sample of 14 children per cluster (assuming a conservative

participation rate of approximately 50% and a 20% loss to follow-up) would provide the study with 80% power to detect a change of 9.9 min in daily MVPA. An increase in 10 min of MVPA in children aged 3 to 6 years have been found to have clinically significant beneficial effects on fat mass [39] and peak bone mass [40].

Statistical analyses

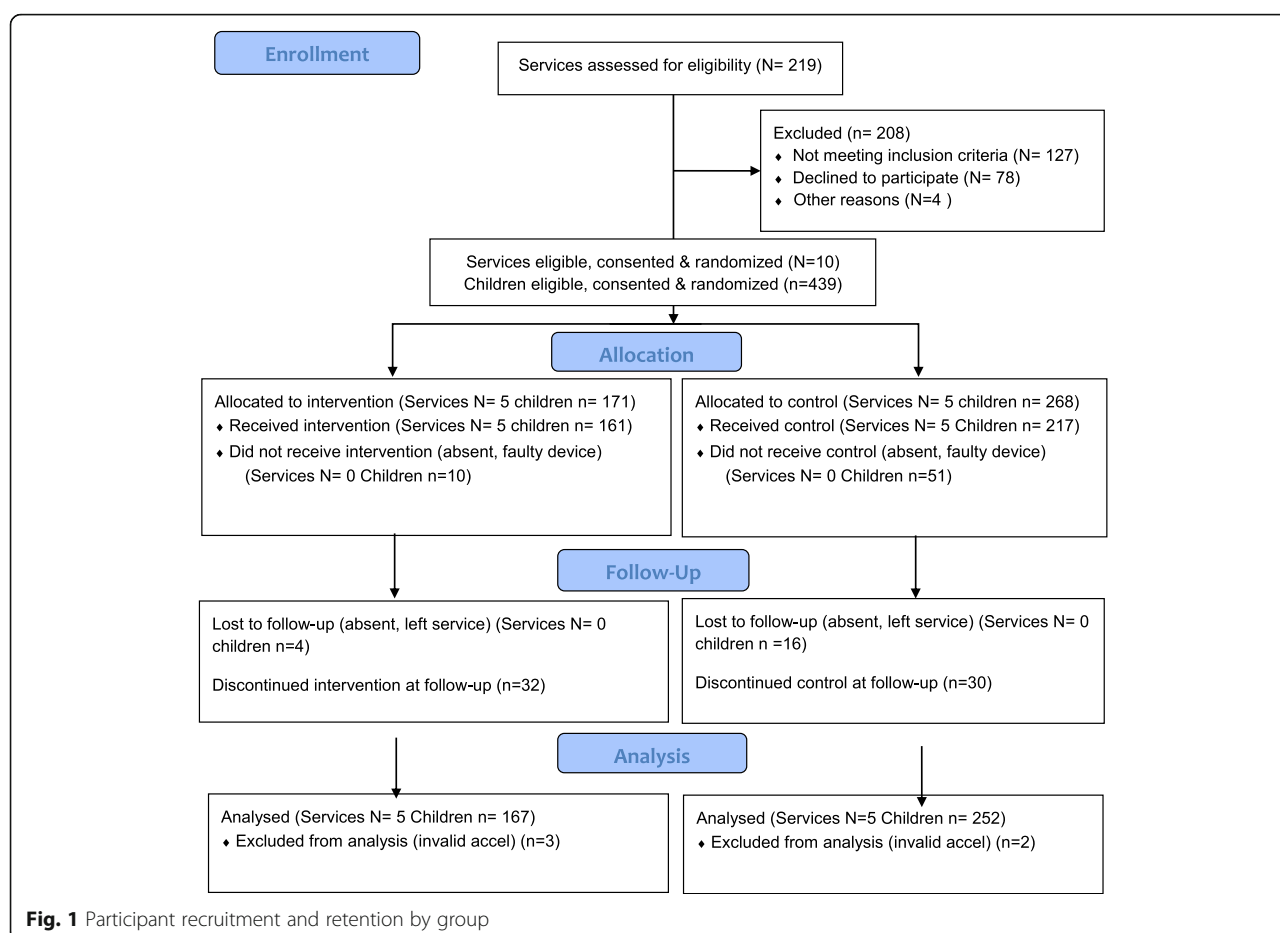
All statistical analyses were performed using SAS (version 9.3) statistical software. All statistical tests were two tailed with an alpha value of 0.05. Summary statistics were used to describe all variables of interest. Accelerometer data were cleaned using the Meterplus software. Twenty minutes of consecutive, 0 min were classified as non-wear and eligible data for in-care periods was based on a least 50% of wear time during the school day. Invalid wear days were removed from the analysed dataset. Generalised Linear Mixed Models (GLMM), to take into account the clustering of individual children within services, were used for primary and secondary physical activity outcomes. An intention to treat framework was used to test a mean difference between groups after 3 months, while adjusting for baseline assessment of outcomes. Each GLMM also controlled for child age, sex and total outdoor free-play duration at follow-up. Analyses entailed multiple imputation for missing data [41] and also performed first using all available (complete case analysis) data without multiple imputation. Pre-specified subgroup analysis for the primary trial outcome was undertaken by child age, sex and baseline activity levels (classified as more or less active based on the median MVPA value of children at baseline). This was undertaken to assess differential changes between groups by introducing a group by subgroup interaction term into the models.

To assess any compensatory changes in physical activity which occurred outside the hours of care as a result of the intervention, average daily minutes of MVPA for out of care periods (for the days the child attended the service) were also analysed. Differences in adverse events over time were assessed using a non-parametric test (Wilcoxon rank-sum test) comparing by group at follow-up for the mean number of reported child injuries per service.

Results

Sample

From the ten participating services, consent was obtained from 439 (71.6% of enrolled children). At baseline, 378 children had valid data (86.1% of consenting children) children (Fig. 1). At follow-up, 357 children (81.3% of consenting children) had their physical activity assessed via accelerometer and found to have adequate wear time. At the child level there was 2.3% loss to follow-up in intervention group services and 6.0% loss to follow-up in control group services. The primary reasons for loss to



follow-up were absences, refusal to wear an accelerometer, and faulty accelerometers (Additional file 1).

At baseline, 161 (total wear time in care – 813.7 min (sd. 373.3) and 217 (total wear time in-care – 724.4 min (sd. 334.3) children provided valid data in the intervention and control services respectively. At both time points, adequate wear time for analysis was provided for 167 (96.4% of children wearing accelerometer at baseline) children in the intervention services and 252 (86.8% of children wearing accelerometer at baseline) children in the control services (Fig. 1).

For analyses of out of care physical activity to assess any compensatory effects, valid accelerometer data was available for 33 (70.2% of children wearing an out of care accelerometer) children in the intervention services and 100 children (67.6% of children wearing an out of care accelerometer) in the control services.

Of those who had valid accelerometer data at baseline, 244 out of 282 (64.6%) consenting parents/guardians completed the telephone survey.

Parent and child characteristics

The characteristics of participating children were similar at baseline for most characteristics (including age, sex,

Aboriginal and/Torres Islander status, body mass index (BMI) (Table 2). The mean days of childcare attendance for children attending in the intervention services did not differ than for children attending control services. There were a higher proportion of families in the control services with a higher household income and with a parent with a university education.

Services characteristics

Service characteristics by intervention and control group are shown in Table 2. Four out of five intervention services were long day care as were two out of five control services. Intervention services had a larger median outdoor play area compared to control services.

Intervention fidelity

At baseline, one of the five control services had 4 days out of five valid days of data collected, due to inclement weather. All five intervention services scheduled their outdoor play on each of the 5 days of data collection. At follow-up, intervention services had a total of 20 days of data collection days whereas control services had 21 days.

Table 2 Child, parent, and Service characteristics by group at baseline

	Intervention	Control
Child characteristics		
No of children ^a	161	217
Age of child; mean (years, sd.)	3.73 (0.59)	3.80 (0.68)
Male, <i>n</i> (%)	92 (57.14)	110 (50.69)
Aboriginal and Torres Island Status ^b (<i>n</i> , %)	17 (18.08)	21 (14.00)
BMI ^b in kg/m ² , mean (sd.)	18.07 (5.10)	16.28 (2.12)
Days per week the child usually attends, mean (sd.)	2.75 (0.92)	2.40 (0.88)
Usual residence socio-economic area (<i>n</i> , %)		
Upper 50% of New South Wales	99 (61.49)	71 (33.18)
Lower 50% of New South Wales	62 (38.51)	143 (66.82)
Parent characteristics		
Number of parents ^c	95	150
Mother (<i>n</i> , %)	81 (85.26)	131 (87.33)
Age 30–39 years (<i>n</i> , %)	54 (56.84)	80 (53.33)
Country of birth (Australia) <i>n</i> , %	92 (96.84)	138 (92.00)
Consenting parent had university qualifications, <i>n</i> (%)	33 (34.74)	79 (52.67)
Parent income > \$80 K per year, <i>n</i> (%)	55 (58.51)	107 (71.81)
Usual physical activity (PA) (meeting national PA guidelines), <i>n</i> (%)	38 (40.43)	62 (41.89)
Service Characteristics		
Number of services	5	5
Service Type; Long Day Care, <i>n</i> (%)	4 (80)	2 (40)
Years of operation, mean (sd.)	19.67 (17.22)	16.35 (19.01)
Service geographical location (<i>n</i> , %)		
Urban	2 (40.00)	3 (60.00)
Rural	3 (60.00)	2 (40.00)
Service socio-economic area (<i>n</i> , %)		
Upper 50% of New South Wales	2 (40.00)	1(20.00)
Lower 50% of New South Wales	3 (60.00)	4 (80.00)
Children aged 3–6 years enrolled – overall, mean (sd.)	54.8 (6.26)	80 (16.09)
No of primary contact staff, mean (sd.)	2.18 (0.46)	2.75 (1.16)
Outdoor play area in m ² , mean (sd.)	634.95 (226.01)	458.00 (152.15)
Median (min, max)	689.3 (306.44, 927.68)	467.23 (251.61, 698.79)

All measured at baseline

^aAll children who had valid in care accelerometer data at baseline^bDenominator is children who had a parent complete the baseline computer-assisted telephone interview^cParents of children who had valid accelerometer data at baseline

Among intervention services, two services received two site visits by the research team and three services received a single site visit. Four services received two telephone support calls and one service did not receive any telephone support contact. None of the services were interested in receiving additional implementation support resources. In four of the five services, full implementation of the scheduling intervention occurred prior to follow-up data collection. This was verified from site visits and telephone contacts. One service

only implemented the intervention for the week of data collection (at 3 months).

Outdoor free play duration and physical activity environment

The average total outdoor free play duration in the control childcare services was 160.98 min (sd. 76.19) per day at follow-up. In the intervention services, the average total outdoor free-play duration was 103.13 min (sd. 35.86) per day at follow-up.

Analysis of the EPAO total scores found no significant changes over time in measures of the physical activity environment (adjusted difference 0.66 (95% CI -4.18–2.86, $p = 0.68$). Specifically, the mean total physical activity environment score was 12.30 (sd. 2.38) at baseline and 12.13 (sd. 2.04) at follow-up for intervention services. For the control services, the baseline and follow-up mean total physical activity environment score for the control services were 12.74 (sd. 3.07) and 12.78 (sd. 2.73) respectively (Table 3).

The maximum temperature and the EPAO subscore for educator training were found to be significantly different between groups, but there was no association when tested against the primary outcome. Precisely, the maximum temperature difference between groups was 0.03 degrees celcius (95% CI -1.40–1.33, $p = 0.95$) whereas the PA training and education was -0.47 (95% CI -1.19–0.24, $p = 0.37$).

Child physical activity

Primary outcome

Relative to children in control services, mean daily minutes of MVPA in care was significantly greater at follow-up among children attending intervention services when multiple imputation for missing data was applied (adjusted difference between groups 5.21 min, 95% CI 0.59–9.83, $p = 0.03$). These effects were also significant when complete case analysis was undertaken (adjusted difference between groups 6.11 min, 95% CI 0.54–11.68, $p = 0.04$) (Table 4). Of note, 15 children in one service spent part of 1 day of the week off site on a field excursion. However, after removing their data, the

difference between groups for mean daily minutes of MVPA in care remained significant (adjusted difference 6.08 min, 95% CI 0.38–11.77), $p = 0.04$).

Among children with valid data in the out of care period, children attending intervention services had higher mean daily minutes of MVPA during the out-of-care period on childcare days than children attending control services (adjusted difference between groups 7.64 min, 95% CI 3.51–18.80, $p = 0.14$); however this difference was non-significant.

Secondary outcomes

After imputation, adjusted differences in the percentage of wear time in MVPA in care per day for children in intervention services relative to control services was 1.57% (95% CI 0.64–2.49, $p < 0.001$). For complete case analysis, the adjusted difference between groups was 1.78% (95% CI 0.72–2.83, $p < 0.01$). Total physical activity in care per day, as assessed via counts per minute, not significant at 14.25 counts per minute (95% CI -2.26–30.76, $p = 0.09$) for imputed data analysis (an effect equivalent to 7.75 min of activity across the day). Likewise, this was not significant for the completed case analysis with the adjusted difference being 16.95 counts per minute, (95% CI -4.63–38.52, $p = 0.11$), (an effect equivalent to 8.94 min of activity across the day). (Table 4).

The median number of child injuries requiring documentation in intervention services was 33.5 (range 19–71) and in control services 35.0 (range 0–80) at baseline. At follow-up, the number of child injuries was lower at

Table 3 Changes in EPAO scores and weather from baseline to 3 month follow-up

	Intervention		Control		Intervention-control	
	Baseline Mean <i>n</i> = 38	Follow-up Mean <i>n</i> = 31	Baseline Mean <i>n</i> = 48	Follow-up Mean <i>n</i> = 41	Adjusted difference between group (95% CI)	<i>p</i> -value
Physical Activity Environment Total Score	12.30 (2.38)	12.13 (2.04)	12.74 (3.07)	12.78 (2.73)	0.66 (-4.18–2.86)	0.68
Physical activity environment subscales						
Active Opportunities	12.24 (4.02)	14.03 (3.96)	12.92 (2.93)	12.74 (4.53)	1.11 (-4.73–6.95)	0.67
Sedentary Opportunities	21.17 (3.87)	19.25 (4.53)	18.22 (5.06)	18.86 (4.81)	0.59 (-4.14–5.32)	0.78
Sedentary Environment	13.33 (0.00)	17.33 (3.65)	13.33 (9.43)	9.33 (7.60)	8.00 (-0.70–26.70)	0.07
Portable Play Environment	11.43 (2.86)	9.71 (3.83)	12.00 (4.69)	11.43 (4.52)	-1.71 (-7.82–4.40)	0.54
Fixed Play Environment	6.75 (1.90)	7.00 (3.01)	8.00 (1.90)	10.25 (1.85)	-3.25 (-6.90–0.40)	0.07
Staff Behaviours	14.42 (3.33)	11.42 (4.45)	14.92 (3.52)	13.02 (2.80)	-1.33 (-4.71–2.06)	0.39
Physical Activity Training and Education	11.33 (7.30)	8.67 (5.58)	15.33 (7.30)	16.67 (4.71)	8.00 (-15.53–0.47)	0.04
Physical Activity Policy	4.00 (8.94)	8.57 (10.69)	4.00 (8.94)	4.00 (8.94)	4.00 (-17.05–9.05)	0.50
Weather						
Minimum temperature (degrees Celsius, mean, SD)	10.33 (3.2)	17.83 (2.7)	8.16 (3.5)	15.32 (2.4)	1.46 (-1.05–3.97)	0.22
Maximum temperature (degrees Celsius, mean, SD)	21.72 (3.1)	29.95 (4.4)	23.53 (1.8)	31.41 (4.9)	3.20 (0.44–5.96)	0.03
UV index (mean, SD)	4.74 (0.9)	9.82 (0.9)	5.22 (0.9)	9.58 (0.6)	-0.47 (-1.33–0.40)	0.25

p-value < 0.05 is considered significant added

Table 4 Outcomes by group (adjusted for age, sex, and outdoor free-play duration at follow-up)

	Intervention		Control		Intervention-Control (complete case)		Multiple imputation (missing data at both time points)	
	Baseline N = 161	Follow-up N = 135	Baseline N = 217	Follow-up N = 222	Adjusted difference between groups (95% CI)	p-value	Adjusted difference between groups (95% CI)	p-value
Primary outcome								
Mean daily minutes of physical activity in care (sd.)								
MVPA (ICC-0.09)	58.53 (21.19)	58.70 (20.10)	51.72 (17.39)	52.21 (16.81)	6.11 (0.54–11.68)	0.04	5.21 (0.59–9.83)	0.03
Secondary outcomes								
Mean daily minutes of physical activity in care (sd.)								
Vigorous PA	23.54 (11.01)	23.06 (10.34)	19.80 (8.50)	19.82 (8.38)	2.59 (–0.91–6.09)	0.13	2.09 (–0.56–4.75)	0.12
Moderate PA	34.98 (11.35)	35.64 (11.37)	31.92 (9.67)	32.40 (9.42)	3.52 (1.19–5.86)	< 0.01	3.12 (0.91–5.33)	< 0.01
Light PA	54.96 (14.17)	55.86 (13.37)	53.27 (11.55)	54.41 (11.70)	2.70 (–2.61–8.01)	0.27	2.44 (–1.56–6.45)	0.23
Total PA	113.49 (32.19)	114.56 (30.88)	104.99 (26.77)	106.63 (26.09)	8.94 (–1.43–19.31)	0.08	7.75 (–0.38–15.88)	0.06
Counts per minute in care per day (total child PA in care) (sd.)								
Counts per minute (ICC – 0.10)	196.81 (64.22)	197.06 (61.40)	176.50 (52.24)	178.67 (50.40)	16.95 (–4.63–38.52)	0.11	14.25 (–2.26–30.76)	0.09
Percentage of wear time in care per day (%) (sd.)								
% MVPA (ICC –0.12)	17.56 (5.96)	17.51 (5.34)	15.27 (4.70)	15.10 (4.33)	1.78 (0.72–2.83)	< 0.01	1.57 (0.64–2.49)	< 0.001

ICC intra-cluster correlation

p-value < 0.05 is considered significant added

27.5 (range 13–42) for intervention services and 28.0 (range 3–40) for control services. There was no significant difference observed in the number of injuries reported across the study period between groups ($p = 1.0$).

Subgroup analyses

There were no subgroup interactions for the primary trial outcome by child age, sex, or baseline MVPA levels. (Table 5).

Discussion

This study assessed the efficacy of a simple scheduling intervention in increasing the time preschool-aged children spent in MVPA while in care. The intervention was effective in increasing daily MVPA in children attending care by approximately 5 min. Further to this, enhanced physical activity during the childcare hours did not reduce physical activity levels in periods out of care, nor result in adverse effects such as injuries. Modifying the scheduling of outdoor free-play periods in childcare services may therefore, provide an effective strategy to contribute to population level improvements at child physical activity.

The findings from this study are consistent with another trial that has modified the scheduling of outdoor free-playtime to enhance child activity. The intervention trialled by Tucker and colleagues [21] combined staff

training, provision of portable play equipment and four opportunities for outdoor free-play (four 30 min blocks) and found that the intervention increased children's MVPA by 1.28 min per hour compared to control services. In addition, a pilot study conducted in Belgian pre-schools [42] found that by scheduling extra recesses to reduce playground density by dividing children playing at the same time, small increases in MVPA were observed. The findings from the current study are also consistent with ecological interventions in other settings, which have aimed to modify the scheduling of free-play. For example, ecological interventions conducted in schools [43, 44] have also reported increases in child physical activity and observational studies have reported an association between periods of outdoor free-play and child activity [45, 46]. Collectively such findings provide an increasing evidence base for supporting the implementation of scheduling based interventions in childcare services.

Subgroup analysis did not support a moderator of the intervention effect for age, sex, or physical activity at baseline. These findings are in contrast to other effective physical activity interventions in this setting that have reported differences in intervention effects in subgroup analysis including sex and age. Such subgroup effects have been previously observed in trials that have targeted a range of organisational, social, and

Table 5 Average daily MVPA subgroup analysis (adjusted for age, sex, and outdoor free-play duration at follow-up)

Subgroup	Subgroup Level	Intervention		Control		Group x subgroup	
		Baseline N = 161	Follow-up N = 135	Baseline N = 218	Follow-up N = 222	estimate (95% CI)	p value
Sex	Boys	64.69 (21.03)	64.85 (19.49)	57.20 (17.85)	57.13 (17.05)	2.87 (−4.69–10.43)	0.41
	Girls ^a	50.30 (18.56)	50.27 (17.88)	46.08 (14.99)	47.11 (15.00)	–	
Baseline moderate-to-vigorous activity	More active	72.77 (14.28)	65.06 (17.13)	67.15 (10.29)	58.65 (16.32)	0.82 (−6.9–8.54)	0.81
	Less active ^a	39.05 (9.97)	47.78 (18.85)	38.77 (9.15)	44.27 (13.11)	–	
Age	3 year olds	52.94 (23.56)	55.64 (21.41)	45.39 (16.39)	48.89 (16.52)	2.53 (−9.42–14.68)	0.66
	4 year olds	60.72 (19.79)	59.17 (18.02)	53.74 (17.21)	52.72 (15.93)	1.84 (−9.43–13.11)	0.73
	5 year olds ^a	67.56 (13.79)	66.72 (25.62)	59.93 (14.10)	57.15 (19.31)	–	

^aDenotes subgroup level used as a reference for the interaction estimate

environmental determinants of child activity in care. The findings suggest that, unlike such complex interventions, simple interventions targeting environmental stimuli that align with natural physical activity patterns of children may produce more equitable intervention effects for females and children of varying ages.

The recently released 24-h physical activity guidelines recommend that children accumulate 180 min of active play of which 60 min are energetic in nature. The mean daily total physical activity among children in our sample are well below the current 180 mins recommended [47] and increased, relative to control by approximately 5 min in the intervention group. The findings suggests that while the intervention may make an important contribution to achieving the new guidelines, additional intervention is likely required. The addition of other ecological interventions, such as reducing playground density in childcare services [42] where crowding is an issue, or the introduction of portable play equipment [48–52] may provide additional enhancement to the effects of intervention. Reviews have also identified a range of other policies and practices that childcare services could undertake to enhance child physical activity [53]. However, intervention in this setting alone will not be sufficient to achieve the movement guidelines. Investment in interventions across community settings and in the home is therefore warranted.

Collectively the findings of this study, and previous research [21] support the implementation of interventions to increase the frequency of opportunities for outdoor free-play. However further research is required to identify what specific types of support services may be required to assist them to do so in the long term. In the current study, anecdotally, four of the five intervention services, continued to deliver the intervention following trial completion. By contrast, in the trial by Tucker and colleagues [21], services reported difficulties in implementing four periods of outdoor free-play as part of their curriculum and at a longer follow up, implementation had ceased. A greater understanding of the barriers to implementation of such interventions reported by

representative samples of childcare services are required to better assess the potential for setting wide uptake of the intervention. During this study, educator concerns include disruption of routines for children with behavioural challenges, additional time taken for the application of sunscreen and hats, and having to adjust the childcare curriculum. Consideration of such barriers are required if large-scale dissemination and uptake of the intervention is to be achieved.

Strengths of this study include the use of a randomized trial design, and objective measurement of child physical activity over five consecutive days. The addition of reporting child injury also complements the assessment of physical activity to allay carer safety concerns that comes with outdoor risky play [54]. However, participating families in the study were from higher educated and higher incomes brackets than the general population, which could limit the representativeness of the study. Furthermore, the study used a convenience sample, a group that may be pre-disposed to implementation of the intervention. Data collectors were not blind to group allocation, and while research assistants were instructed to limit any interactions with children or staff during data collection, the presence of research assistants may have influenced typical physical activity practices or staff child interactions in both intervention and control services. The use of other data collection methods that are less intrusive, such as light sensors or global positioning systems [55, 56], may reduce the potential for any researcher reactivity in future trials. Lastly, data were collected over a change of seasons [37], which may have affected the number of days available for outdoor free-play. Future studies may look into conducting their data collection over a period of 2 years to remove the effect of season change on the availability of outdoor free-play time.

Conclusions

Low levels of physical activity amongst preschool-aged children continue to be of concern. The study found that modest but meaningful improvements in child activity in

this setting can be achieved with simple changes to scheduling of outdoor play periods. Future research identifying optimal methods to support implementation of the intervention is warranted.

Additional file

Additional file 1: Accelerometer items to report. (DOCX 13 kb)

Abbreviations

CI: Confidence intervals; ICC: Intra-class correlation; MVPA: Moderate-to-vigorous physical activity; PA: Physical activity; sd.: standard deviation; SES: Socio-economic status

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Availability of data and materials

Study materials and data will be held by the Administering Institution. De-identified data-sets and all study materials are available on request from the corresponding author.

Authors' contributions

First author, LAR led the development of this manuscript. Authors LW, JW, PM conceived the study and secured funding. Authors SY, LW, PM, JW, JJ, MF, RS and LAR designed the study procedures. Authors LAR, JJ and LW conducted the research. All authors contributed in reading, and approving the final version of the manuscript.

Ethics approval and consent to participate

Ethical approval to conduct the study has been obtained from the Hunter New England Human Research Ethics Committee (reference number 15/11/18/4.03) and the University of Newcastle Human Research Ethics Committee (reference number H-2016-0088). Active parental consent was required for child participation in the study.

Competing interests

The authors have no competing interests to declare.

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Additional file

Appendix 1: Accelerometer items to report

Brand and model of accelerometer used	ActiGraph GT3x+
Epoch length used for data collection and analysis	Data collection: 15 s epochs
	Data analysis: 5s epochs
Placement of accelerometer and side of body	Right hip, anterior axillary line
Number of participants receiving accelerometer	Baseline: 379 participants
	12 weeks post-intervention: 348 participants
Days of data collected at each time point	Baseline: In-Care: 5 days (arrival to 3 pm)
	All-day: 7 days, all waking hours
	Post-intervention: In-care (arrival to 3 pm)
	All-day: 7 days, all waking hours
Criteria for defining non-wear of accelerometer	≥ 20 min of continuous 0s
Number of valid days and number of minutes per day of accelerometer data needed to be included in analysis	In Care: wear time for at least 50% of the school day and any day present at Childcare
	All day: ≥ 3 days with ≥ 6 hours of wear-time

Accelerometer data PA outcome of interest and the interpretation method	Time in moderate-to-vigorous PA (MVPA) in-care, percent MVPA (adjusted for wear time) , total PA (counts per minute)
	Pate 2006 cut-points, Sedentary (<25 counts/15 seconds); light (25–419 counts/15 seconds); MVPA (\geq 420 counts/15 seconds); and total (\geq 200 counts/15 seconds)
Number of participants non-compliant or who had accelerometer malfunction issues	3 participants did not meet wear-time at baseline 1 participant did not meet wear time at follow-up

As advised in

Montoye, A. H., et al. (2016). "Reporting accelerometer methods in physical activity intervention studies: a systematic review and recommendations for authors." *Br J Sports Med*: bjsports-2015-095947.

Chapter 5: Efficacy of a free-play intervention to increase physical activity during childcare: a randomised controlled trial

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Efficacy of a free-play intervention to increase physical activity during childcare: a randomized controlled trial

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Abstract

The primary aim of this study was to assess the efficacy of a childcare-based intervention in increasing child physical activity by allowing children unrestricted access to outdoor areas for free-play when structured activity is not taking place. A randomized controlled trial was conducted in six childcare services. Intervention services provided children unrestricted access outdoors for active free-play, while control services provided their usual scheduled periods of outdoor play. Consent was obtained from 231 children. Child moderate to vigorous activity (MVPA), the primary trial outcome, was assessed via accelerometer at baseline and 3 months post baseline. Intervention effects were examined using Generalised Linear Mixed Models. Controlling for child age, gender and baseline outcome measure, at follow-up there were no significant differences between groups in minutes of MVPA in-care (mean difference: 4.85; 95% CI: –3.96, 13.66; $P = 0.28$), proportion of wear time in-care spent in MVPA (mean difference: 1.52%; 95% CI: –0.50, 3.53; $P = 0.14$) or total physical activity in-care (mean difference in counts per minute: 23.18; 95% CI: –4.26, 50.61; $P = 0.10$), nor on measures of child cognition ($P = 0.45–0.91$). It was concluded that interventions

addressing multiple aspects of the childcare and home environment might provide the greatest potential to improve child physical activity.

Introduction

In young children, adequate physical activity has been shown to be associated with healthy weight, bone and skeletal health, motor skill development and improved psychosocial wellbeing [1, 2]. Research also suggests that physical activity may improve child cognitive development. For example a recent study found preschool children that were adherent to the recommendations of the Australian 24-h movement guidelines performed better on tests of emotional understanding [3]. As such, promoting physical activity in early childhood is recommended to support child health [4]. Centre-based childcare services have a particularly important role to play in providing opportunities for child activity, as in developed countries, childcare services provide access to a large proportion of this population for extended periods [5]. Furthermore, accreditation processes and best practice guidelines for the childcare sector recommend services create environments that are supportive of child physical activity [6].

Evidence for the effectiveness of interventions, which focus on building the capacity of childcare

service staff to implement structured physical activities with children, is equivocal [7]. Modifying opportunities for children to engage in unstructured outdoor free-play, however, has been suggested as a promising opportunity to improve child physical activity [8]. In many childcare services, opportunities for children to engage in outdoor free-play are restricted to scheduled periods during the day [9]. A recent randomized trial found that increasing the number of scheduled periods children are allowed outdoors to play can significantly improve child moderate-to-vigorous physical activity (MVPA) while in care [10]. A likely explanation for these findings is provided by epidemiological studies demonstrating that children's activity during care is characterized by short, intense bouts of activity of between 3 and 15 min during the start of outdoor play periods [11–14].

Allowing children to move freely between indoor and outdoor areas of childcare may support them to more frequently use outdoor spaces and so benefit from more frequent bouts of physically active play. In Australia, such a model of childcare operation is consistent with national quality standards for the sector that encourage childcare services to allow children flexible use of outdoor spaces when not undertaking a structured activity [6]. Despite this policy alignment and the potential to improve child physical activity, a recent systematic review identified no previous trials examining the impact of providing such access to outdoor environments for children [7].

In this context, the primary aim of this exploratory study was to assess the efficacy of a childcare-based intervention in increasing child physical activity by allowing children access to outdoor areas for free-play when a structured activity is not taking place. The primary outcome of the trial was child MVPA while in care. Secondary outcomes included the proportion of time children spent in MVPA in care, total child physical activity in care and child cognitive function.

Materials and methods

The trial was prospectively registered with the Australian New Zealand Clinical Trials Registry

(reference ACTRN12616001008415). Ethical approval to conduct the study was obtained from the Hunter New England (reference 15/11/18/4.03) and the University of Newcastle (reference H-2016-0088) Human Research Ethics Committees. The research is reported in accordance with the requirements of the CONSORT Statement for cluster trials [15].

Design and setting

An exploratory parallel arm, cluster randomized controlled trial was conducted in six centre-based childcare services in the Hunter Region of New South Wales, Australia from August to December 2016.

Participant eligibility and recruitment procedures

Childcare services

To be eligible to participate in the trial, centre-based childcare services (defined as long day care services or preschools) were required to have an enrolment of at least 25 children aged between 3 and 6 years, be located within the Hunter region of New South Wales, Australia and provide scheduled periods of outdoor play for children. Childcare services catering solely for special needs populations, or those participating in other physical activity interventions were excluded from participating in the trial. Service managers from a convenience sample of 73 childcare services across the study region were sent study information prior to telephone contact to assess eligibility and to invite study participation among eligible services. Recruitment continued until six eligible services consented to participate.

Children and parents

Informed parental consent was required for participation in the data collection component of the study. Children were eligible to participate if they were aged between 3 and 6 years and attended childcare between 9.00 a.m. and 3.00 p.m. on one or more days per week. Children with an intellectual or

physical impairment that may have impacted on their physical activity capacity or prevented them from complying with data collection protocols were excluded. Parents were invited to provide consent for: (i) their child to wear an accelerometer on each day of attendance at childcare (from arrival to 3.00 p.m.) over 1 week (to assess the primary trial outcome); (ii) their child to wear an additional accelerometer outside of care hours (e.g. at home) over 1 week (to assess if any increases in child activity at care were displaced during out of care hours); (iii) their child to complete an assessment of cognitive function and (iv) their own participation in a computer-assisted telephone interview.

Parents were recruited using evidenced-based strategies recommended to increase child research participation in education settings and previously applied in the childcare setting by the research team [16–19]. Specifically, (i) study information and consent forms, including institutional logos and a contact number for more information, were distributed to parents via the childcare service; (ii) recruitment packs were also handed directly to parents during child drop off or pick up from the services during which time research staff could respond to questions or concerns regarding participation; (iii) reminder letters were sent to parents approximately 1–2 weeks after initial information packs were distributed and (iv) study co-ordinator was employed to monitor recruitment rates and oversee recruitment strategies.

Randomization and allocation

Following the completion of baseline data collection, childcare services were randomly allocated via a block randomization procedure to either the intervention or control condition by an independent statistician using a random number function in a 1:1 (intervention:control) ratio. Randomization of services was stratified by the socioeconomic status of the area where the service was located based on evidence of an association between service locality and service physical activity policies and practices [20]. Services were not blind to study allocation.

Intervention group

Within a 6-h day (9.00 a.m.–3.00 p.m.), intervention services provided unrestricted access to outdoor areas of the service, to allow children the opportunity to engage in active free-play. The only time when an opportunity for outdoor free-play was not available for children was when structured indoor or outdoor activities were scheduled (e.g. structured physical activity, circle time, meal time, rest time or indoor-seated learning activity time). At all other times, children were free to move between indoors and outdoors areas as they wished. All other service activities remained unchanged. Intervention services were provided with access to an early childhood education specialist if they required support or advice to make changes to their operations to implement the intervention and were visited prior to the day of data collection to ensure that the intervention had been implemented.

Control group

Participating services randomized to the control group continued with their usual scheduled periods of outdoor free-play for children.

Data collection and measures

Baseline data collection occurred between August and September 2016. Follow-up data collection occurred approximately 3 months post-baseline between November and December 2016.

Service characteristics

At baseline, a telephone interview was conducted with participating service managers to assess: service days and hours of operation; type of service (preschool or long day care service); postcode; number of three to 6-year-old children enrolled; and years the service had been in operation. The items used to assess service characteristics have been used in other Australian surveys of childcare services conducted by the research team [21, 22] and are intended to provide contextual information to assess the external validity of the study findings.

Child and parent characteristics

At baseline, parents provided information on their child's age, sex, residential postcode and usual number of days per week attending childcare on the child consent form. Consenting parents also completed a computer-assisted telephone interview to collect parent demographic information using items from the New South Wales Population Health Survey [23]. Such data were used to describe the trial sample, and undertake sub-group analyses.

Primary trial outcome: minutes of MVPA in care

The primary trial outcome was the number of minutes children spent in MVPA from the time that children arrived at care until 3.00 p.m. across 1 week (5 days). MVPA was assessed using Actigraph GT3X+ accelerometers using recommended cut-points [24] and used data for each day a child attended care (ranging from 1 to 5 days). Accelerometers were worn by the children during the core hours of service operation (from arrival through to 3.00 p.m.). Accelerometer data were collected every day for 1 week (5 days in total) of the data collection period at baseline and follow-up. Two trained data collectors attended services to fit and collect accelerometers. Accelerometers were placed above the iliac crest at the hip of each child using an elasticized band and were fitted as they arrived at the childcare service, and removed at 3.00 p.m. (or earlier if the child departed the service). Assenting children wore an accelerometer each day (up to 5 days) that they attended at childcare. While not a trial outcome, for descriptive purposes, among all parents consenting for their children to wear a second accelerometer at home, physical activity outside of care was assessed to examine any potential compensatory intervention effects in children's physical activity period on the days that children attended care. These children had their 'in care' accelerometer removed at 3.00 p.m. on each day of attendance (or earlier if they departed the service for the day), but continued to wear the 'out of care' accelerometer.

Secondary trial outcomes

Proportion of time spent in MVPA in care (% MVPA). The proportion of time children spent in MVPA in care was assessed, adjusted for wear time.

Total child activity in care (counts per minute). Total child activity in care, assessed via counts per minute collected in 5-s epochs [25] was also included as a secondary outcome. Counts per minute were calculated from the total activity counts recorded divided by the total time the accelerometer was worn.

Other physical activity measures. Total minutes of physical activity in care; total minutes engaged in activity at various intensities (vigorous, moderate, light activity) as well as time spent sedentary were also assessed. Cut points described by Pate *et al.* [24] were used to classify physical activity intensities and periods of sedentary behaviour. These measures were included for descriptive purposes, are not trial outcomes, and were not prospectively registered.

Child cognitive function. Child cognitive function was measured using three tests from the validated Early Years Toolbox that uses games to assess inhibition, visual-spatial working memory and cognitive flexibility/shifting [26]. The tests were delivered via iPad-based games with built-in verbal instructions for children. Specifically the Early Years Toolbox 'Go/No-Go' task evaluated the ability to inhibit a dominant behavioural response in response to a less frequently presented 'no-go' stimulus; the 'Mr Ant' task assessed visual-spatial working memory, or the amount of visual information that concurrently can be activated in the mind; and a card sorting task was used to measure children's ability to disengage and re-direct attention. Data collectors administered the three tests to children once during their attendance at childcare on the days of field data collection. Data collectors ensured that the child understood the instructions for each test and gave clarification where needed. Tests were conducted in a quiet private location.

Service free-play schedule and physical activity policies, practices and environment

At baseline and follow-up, observations at childcare services were conducted by trained data collectors

(not blind to group allocation) across 1 week (5 days) to record the duration, timing and frequency of indoor and outdoor free-play, to (i) assess the degree to which intervention and control services were implementing a free-play schedule that adhered to the study protocol; and (ii) identify other changes in potential prognostic factors to aid interpretation of trial findings. Data collectors also gathered information regarding the childcare service physical activity policies, practices and environment using a modified version of the validated Environment and Policy Assessment and Observation instrument (EPAO) [27]. Information on minimum and maximum daily temperatures was obtained from the local meteorological bureau website [28] and daily UV index retrieved from the Australian Radiation Protection and Nuclear Safety Agency website [29]. Such factors have been associated with child physical activity in care [30, 31] and have been included to aid the interpretation of trial findings and to provide contextual information to enable assessments of broader generalizability.

Statistical analyses

All statistical analyses were performed using SAS (version 9.3) statistical software. All statistical tests were two tailed with an alpha value of 0.05.

Descriptive statistics were used to describe the service, child and parent characteristics of intervention and control group participants at baseline. Service socioeconomic characteristics were determined using service postcodes, which were classified as being in the top or bottom 50% of New South Wales according to the Socio-Economic Indices for Areas (SEIFA) [32]. Geographic characteristics of the service locality were classified as either urban or rural according to the Australian Statistical Geography Standard [33].

Minutes of MVPA were determined using age-specific child-validated equations (cut points) [24]. Accelerometer data were cleaned using Meterplus software, with 20 min of consecutive 0 min classified as non-wear time. The valid wear time for children when attending childcare was classified as at least 50% of wear time during the childcare day. Days classified as invalid were removed from the dataset.

Generalised Linear Mixed Models (GLMM), to take account of the clustering of individual children within services, were used under an intention to treat framework to test for a difference in mean minutes of MVPA between groups over time. The GLMM included terms for group (intervention or control), and the interaction of group and time, and controlled for child age and sex and baseline outcome value (for the primary outcome this was MVPA). The same approach was used to test for a difference between groups over time in the proportion of time children spent in MVPA in care (adjusted for wear time) and total child physical activity in care (assessed via counts per minute collected in 5 s epochs in care) and other child physical activity measures. Analysis was performed using all available (complete case analysis) data as well as an analysis using multiple imputation for missing data. Multiple imputation was performed on missing values at either baseline or follow-up using the MI Procedure in SAS [34]. Any compensatory behaviour in activity occurring outside care changes between groups in mean minutes of MVPA was assessed using all available valid data. Subgroup analysis for the primary trial outcome was undertaken for age, sex and baseline physical activity levels (classified as higher or lower based on the median MVPA value of children at baseline). Child cognitive function was also analysed using GLMM, adjusting the clustering of individual children within services, the baseline value of the outcome and controlled for child age and sex.

Results

Sample

Figure 1 shows the participation of services, children and parents throughout the trial. Six service managers consented for their service to participate in the study. Of the 350 eligible children, consent was obtained for: (i) 231 (66.0%) to wear an accelerometer on each day of attendance at childcare; (ii) 128 (36.6%) to wear an additional accelerometer outside of care hours and (iii) 231 (66.0%) to complete an assessment of cognitive function. Trial outcome data were not collected during periods of

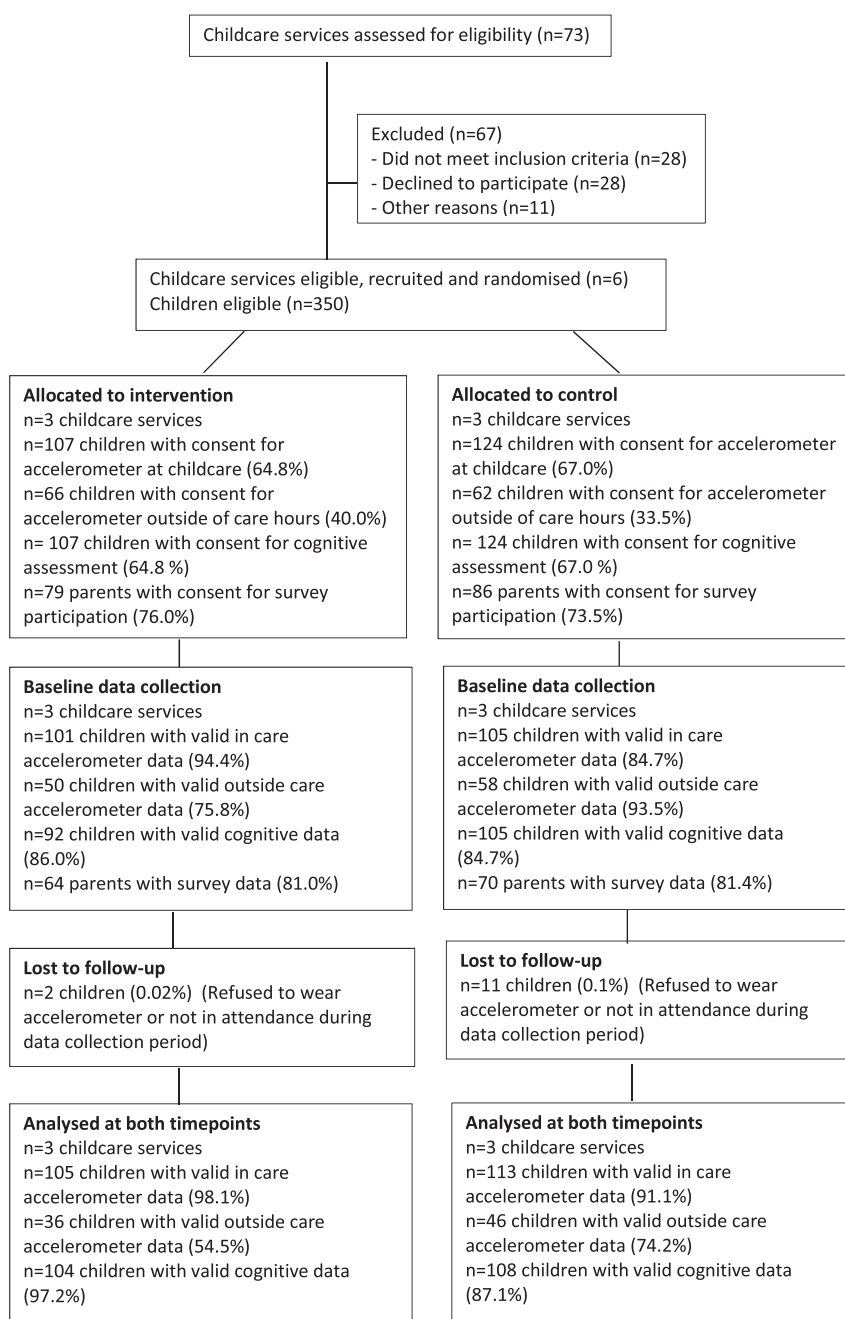


Fig. 1. Participant recruitment and retention by group.

inclement weather. As such, data were collected for 14 of 15 days planned (5 days per service) within control services and 14 of 15 days among intervention services at baseline. At follow-up data were collected for 14 of 15 days within control services and 13 of 15 days within intervention services. Of the 221 eligible parents, 165 (74.7%) provided consent to participate in the computer-assisted telephone interview. For the primary trial outcome (minutes of MVPA in care), 206 children (89.2%) provided valid accelerometer data at baseline and 174 (75.3%) at follow-up.

Service, child and parent characteristics

For most characteristics, baseline service, child and parent characteristics by intervention and control group were similar suggesting baseline equivalence was achieved via randomization for most characteristics. All services were open 5 days, and five of the six services were located in urban localities. Only one service was located in a rural area, and was allocated to the intervention group. The proportion of boys in the sample ranged from 52% to 61% between intervention and control groups, the mean age ranged from 4.0 to 4.1 years, and body mass index ranged from 16.1 to 16.3. In both groups, 44% of children were meeting physical activity guideline recommendations at baseline. However, children in the intervention group appeared more likely to be from higher income households (68% versus 46%) and have a parent with a University qualification (43% versus 25%) (Table I).

Primary trial outcome: minutes spent in MVPA in care

Adjusted differences in changes over time in child physical activity outcomes between groups are shown in Table II. In both groups, mean minutes of MVPA reduced over time from baseline to follow-up. Analyses utilizing complete case showed a mean difference of MVPA in care of 5.63 min (95% CI $-8.25, 19.52$; $P=0.32$) between groups, an effect that was non-significant. Multiple imputation for missing data found that, controlling for child age, gender and baseline values of the

outcome measure, child minutes of MVPA at follow-up also did not differ significantly between groups (mean difference: 4.85; 95% CI: $-3.96, 13.66$; $P=0.28$; ICC 0.069).

Among children with valid accelerometer data during the out of care period, children attending intervention services had lower mean minutes of MVPA during the out-of-care period on childcare days than children attending control services (adjusted difference between groups: -3.72 ; 95% CI: $-18.82, 11.38$; $P=0.53$); however this difference was non-significant.

There were no significant subgroup interactions for the primary trial outcome by child sex, or baseline physical activity levels (Table III). For the age specific analyses, the difference was significant for 3 year olds compared with 5 year olds (adjusted mean minutes between subgroups: -14.96 ; 95% CI: $-29.9, 0.01$; $P=0.05$).

Secondary trial outcomes

Proportion of time spent in MVPA in care and total child activity in care (counts per minute)

Controlling for child age, gender and baseline values of the outcome measure, at follow-up, there were no significant differences in between groups on any of the trial secondary outcomes assessed using complete case or multiple imputation analyses. There was a non-significant 1.52 percentage increase (95% CI $-0.50, 3.53$; $P=0.14$) in the proportion of wear time in care spent in MVPA for children attending intervention relative to control services at follow-up in multiple imputation analyses (Table II). Similarly, measures of total physical activity (counts per minute) in care was also higher among children attending intervention relative to control services (mean difference in counts per minute: 23.18; 95% CI: $-4.26, 50.61$; $P=0.10$) at follow-up in multiple imputation analyses, however the difference was not significant.

Other outcome measures

Controlling for baseline measure, child age and gender there were no significant differences in

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Table I. Baseline child, parent and service characteristics

	Intervention	Control
Child characteristics		
Number of children ^a	101	105
Boys (<i>n</i> , %)	54, 52.4%	65, 60.8%
Age of child (mean, SD years)	4.0, 0.7	4.1, 0.7
Days per week attending childcare (mean, SD)	2.50, 0.96	2.55, 1.05
Country of birth—Australia (<i>n</i> , %) ^b	58, 95.1%	61, 100%
BMI (kg/m ²) ^b	16.1, 2.3	16.3, 2.6
Parent characteristics		
Number of parents ^c	61	61
Mother (<i>n</i> , %)	49, 80.3%	52, 85.3%
Age 30–39 years (<i>n</i> , %)	31, 50.8%	40, 65.6%
University qualification (<i>n</i> , %)	26, 42.6%	15, 24.6%
Married or living in a relationship (<i>n</i> , %)	53, 86.9%	47, 78.3%
Household income >\$80 000 per year (<i>n</i> , %)	40, 67.8%	28, 45.9%
Country of birth—Australia (<i>n</i> , %)	52, 85.3%	56, 91.8%
Usual physical activity (<i>n</i> , % meeting national physical activity guidelines)	27, 44.3%	27, 44.3%
Service characteristics		
Number of services	3	3
Service operates 5 days per week (<i>n</i> , %)	3, 100%	3, 100%
Hours of operation (mean, SD)	9.8, 1.3	10.5, 1.3
Number of 3- to 6-year-old children enrolled (mean, SD)	66.3, 1.5	60.7, 27.5
Type of service (<i>n</i> , %)		
Preschool	2, 66.7%	1, 33.3%
Long day care service	1, 33.3%	2, 66.7%
Service geographical location (<i>n</i> , %)		
Urban	2, 66.7	3, 100
Rural	1, 33.3	0
Service socio-economic area (<i>n</i> , %)		
Top 50% of New South Wales	1, 33.3	1, 33.3
Bottom 50% of New South Wales	2, 66.7	2, 66.7

^aAll children who had valid in care accelerometer data at baseline.^bDenominator is children who had valid in care accelerometer data at baseline and had a parent complete the baseline computer-assisted telephone interview.^cParents (only one) of children who had valid in care accelerometer data at baseline.

change over time between groups at follow-up in the mean minutes children spent in care in vigorous, moderate or light activity, or the time they spent sedentary (Table II). In both groups, however, such measures of physical activity tended to decrease over time while sedentary time increased slightly between baseline and follow-up.

Child cognitive function

Controlling for child age, gender and baseline values of the outcome measure, there were no significant differences between groups at follow-up in any measure of child cognition including inhibition,

visual-spatial working memory and cognitive flexibility/shifting ($P = 0.45–0.91$) (Table IV).

Service free-play schedule and physical activity policies, practices and environment

Overall, change over time in most measures of childcare physical activity policy, practice and environments were similar across both intervention and control groups during the study period. There were reductions in the mean number of times per day staff prompted to initiate child activity (baseline 7.3; follow-up 3.0), and provided positive statements about physical activity (baseline 8.0;

Table II. *Changes in daily physical activity outcomes between groups from baseline to 3-month follow-up*

	Intervention		Control		Intervention-control complete case		Intervention-control multiple imputation	
	Baseline <i>n</i> = 101	Follow-up <i>n</i> = 89	Baseline <i>n</i> = 105	Follow-up <i>n</i> = 97	Adjusted difference between groups (95% CI)	<i>P</i> -value	Adjusted difference between groups (95% CI)	<i>P</i> -value
Primary trial outcome								
<i>Minutes of physical activity in care (mean, SD)</i>								
Moderate-to-vigorous physical activity	62.23 (22.12)	58.34 (21.69)	53.14 (20.71)	47.32 (18.76)	5.64 (−8.25, 19.52)	0.32	4.85 (−3.96, 13.66)	0.28
Secondary trial outcomes								
<i>Total minutes of physical activity in care (mean, SD)</i>								
Total physical activity in care	123.52 (32.95)	117.87 (33.06)	109.39 (33.35)	99.99 (30.69)	10.16 (−11.98, 32.29)	0.27	8.58 (−5.60, 22.76)	0.24
<i>Percentage of wear time in care spent in moderate-to-vigorous physical activity (% SD)</i>								
% moderate-to-vigorous physical activity	17.19 (5.63)	16.19 (5.59)	15.84 (5.17)	13.62 (4.67)	1.51 (−1.57, 4.60)	0.25	1.52 (−0.50, 3.53)	0.14
<i>Counts per minute in care (mean, SD)</i>								
Counts per minute	208.71 (67.42)	204.41 (68.27)	183.50 (68.46)	165.53 (59.82)	26.75 (−16.09, 69.59)	0.16	23.18 (−4.26, 50.61)	0.10
Other measures^a								
Vigorous physical activity	23.96 (11.42)	22.76 (10.94)	19.65 (10.21)	17.62 (9.59)	2.56 (−4.18, 9.29)	0.35	2.30 (−1.94, 6.54)	0.29
Moderate physical activity	38.28 (11.86)	35.59 (11.63)	33.49 (11.65)	29.71 (10.01)	3.49 (−4.11, 11.09)	0.27	2.89 (−2.03, 7.82)	0.25
Light physical activity	61.29 (13.28)	59.52 (13.10)	56.25 (14.78)	52.66 (13.59)	5.01 (−3.84, 13.86)	0.19	4.21 (−1.71, 10.12)	0.16
Sedentary time	237.63 (40.56)	241.23 (40.98)	225.39 (50.18)	243.26 (41.57)	−4.66 (−24.95, 15.63)	0.56	−4.88 (−19.36, 9.59)	0.51

^aIncluded for context only and are not prospectively registered trial outcomes.

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Table III. Changes in physical activity between groups from baseline to 3-month follow-up by subgroup (age, sex and baseline physical activity)

		Intervention		Control		Intervention-control	
		Baseline <i>n</i> = 101	Follow-up <i>n</i> = 87	Baseline <i>n</i> = 105	Follow-up <i>n</i> = 93	Adjusted difference between groups (95% CI)	<i>P</i> -value
<i>Minutes of moderate-to-vigorous physical activity in care (mean, SD)</i>							
Age	3 years	55.87 (19.63)	50.66 (17.23)	44.08 (16.84)	50.59 (15.45)	−14.96 (−29.9, 0.01)	0.05
	4 years	64.30 (23.23)	62.07 (23.84)	54.89 (22.50)	46.33 (19.98)	3.12 (−9.32, 15.56)	0.58
	5 years ^a	64.57 (21.38)	56.02 (16.45)	58.48 (18.79)	46.66 (19.75)		
Sex	Males	70.81 (19.36)	67.27 (19.64)	59.75 (21.30)	51.71 (21.30)	5.93 (−6.82, 18.68)	0.27
	Females ^a	53.13 (21.37)	48.34 (19.56)	43.24 (15.31)	41.07 (12.10)		
Baseline physical activity	Higher	74.96 (15.29)	65.23 (20.02)	70.99 (14.44)	57.65 (21.15)	2.68 (−10.26, 15.61)	0.60
	Lower ^a	37.25 (10.13)	38.17 (12.18)	39.19 (9.40)	43.62 (20.94)		

^aDenotes subgroup level used as a reference for the interaction estimate.

follow-up 2.0) in the intervention group while the control group remained stable on these measures between baseline and follow-up (Table V). Mean minutes of television viewing also increased in the intervention group (baseline 0.30; follow-up 10.56) and increased slightly in the control (baseline 0.17; follow-up 3.47).

Discussion

This is the first randomized trial to examine the impact on child physical activity of childcare service scheduling that allows children unrestricted access to outdoor areas across the day for free-play when structured activities are not taking place. The trial did not find statistically significant changes between groups in child MVPA levels or other secondary trial outcomes following the intervention. The findings suggest that additional intervention strategies may be required to achieve significant improvements in children's physical activity in this setting.

While non-significant, the effect size of the intervention in this study (approximately 5 min of MVPA over 6h) appeared lower than reported in the SPACE randomized trial where child MVPA improved by 1.28 min/h following an 8-week intervention incorporating the provision of four 30 min opportunities for children to engage in outdoor free-

play, portable play equipment and staff training in physical activity promotion [10]. Simply allowing children unrestricted access to either indoor or outdoor areas may not encourage active outdoor play among children who prefer indoor activities. If that is the case, having repeated set periods of outdoor free-play may be more efficacious in supporting MVPA by ensuring all children are regularly exposed to outdoor space for activity play. Nonetheless, more comprehensive interventions in childcare that combine structured interventions with modifications to child opportunities to engage in free-play or that also target other environments influential to child activity, such as the home, may be required to achieve large shifts in population physical activity levels.

An alternative explanation for the findings is that a change in outdoor play opportunities may have adversely modified staff behaviours. Process data, e.g. suggested that there were reductions in educator prompts and positive statements about child physical activity in the intervention group at follow-up compared with baseline, while such staff actions appeared relatively stable in the control group. As childcare service staff consistently report a lack of time and competing service priorities as barriers to engaging children in physical activity [35] such data may suggest that without set periods for outdoor free play programmed throughout the day, staff attention

Table IV. *Changes in child cognitive function between groups from baseline to 3-month follow-up*

	Intervention		Control		Intervention-control	
	Baseline	Follow-up	Baseline	Follow-up	Adjusted difference between groups (95% CI)	P-value
Inhibition (mean, SD)	0.57 (0.20)	0.66 (0.22)	0.53 (0.22)	0.61 (0.21)	−0.02 (−0.22, 0.06)	0.45
Visual-spatial working memory (mean, SD)	1.68 (0.92)	1.82 (0.86)	1.57 (0.85)	1.76 (0.81)	−0.02 (−0.36, 0.33)	0.91
Cognitive flexibility/shifting (mean, SD)	5.95 (3.61)	7.33 (3.25)	6.96 (2.95)	7.43 (3.29)	−0.26 (−1.68, 1.15)	0.63

Table V. *Changes in service free-play schedule and physical activity policies, practices and environment between groups from baseline to 3-month follow-up*

		Intervention		Control	
		Baseline <i>n</i> = 3	Follow-up <i>n</i> = 3	Baseline <i>n</i> = 3	Follow-up <i>n</i> = 3
Staff delivery of structured physical activity	Total occasions (mean, SD)	1.1 (1.6)	0.88 (1.4)	1.2 (1.2)	1.32 (1.3)
	Total minutes (mean, SD)	24.38 (14.4)	23.43 (18.2)	17.36 (14.8)	19.77 (10.1)
	Total occasions (mean, SD)	1.0	0	1.0	0
Staff delivery of fundamental movement skill development activities	Total minutes (mean, SD)	9.0 (1.73)	0	7.3 (2.5)	0
	Number of times staff participated in physical activity (mean, SD)	6.7 (1.2)	5.0 (1.4)	3.0	2.0
	Number of times staff prompted to initiate or increase physical activity (mean, SD)	7.3 (0.6)	3.0	2.7 (2.9)	2.50 (2.1)
Staff role modelling of physical activity and delivery of verbal prompts	Number of times staff provided positive statements about physical activity (mean, SD)	8.0 (1.7)	2.0 (1.4)	2.7 (0.6)	3.0 (2.8)
	Total minutes of television viewing (mean, SD)	0.30 (1.0)	10.56 (15.1)	0.17 (0.7)	3.47 (15.1)
	Services with any observed seated time exceeding 30 min (<i>n</i> , %)	14 (7 3.7)	10 (58.8)	11 (61.1)	17 (89.5)
Physical activity equipment	Number of portable physical activity equipment items indoors (mean, SD)	0.67 (1.2)	1.33 (0.58)	1.67 (1.15)	3.00 (1.00)
	Number of portable physical activity equipment items outdoors (mean, SD)	9.00 (1.0)	9.00 (1.0)	8.67 (0.6)	9.33 (0.6)
Policy	Services with written physical activity policy (<i>n</i> , %)	1 (33.3)	2 (66.7)	2 (66.7)	2 (66.7)
Playground size	Outdoor playground size (metres squared, mean, SD)	522.91 (91.9)	501.58 (193.0)	399.90 (112.6)	398.54 (109.6)
Weather	Minimum temperature (degrees Celsius, mean, SD)	10.33 (3.2)	17.83 (2.7)	8.16 (3.5)	15.32 (2.4)
	Maximum temperature (degrees Celsius, mean, SD)	21.72 (3.1)	29.95 (4.4)	23.53 (1.8)	31.41 (4.9)
	UV index (mean, SD)	4.74 (0.9)	9.82 (0.9)	5.22 (0.9)	9.58 (0.6)

may be drawn from a focus on child physical activity during that time to other roles or responsibilities. As prompts and positive statements have been positively associated with child activity in childcare [36, 37], their relative reduction within interventions services may have reduced the potential impact of the intervention. Future studies should implement strategies such as the use of environmental stimuli and reminders for staff to facilitate child activity to mitigate this risk.

A number of studies have reported an association between child physical activity and cognitive function [3, 38, 39]. The findings of this trial found no meaningful between group differences on measures of child cognition. The intervention, however, did not significantly improve child activity, the hypothesized mechanism by which cognitive improvements would be facilitated. The brevity of the intervention period in the current study is also unlikely to have provided sufficient latency for physical activity mediated changes in child cognition. On measures of MVPA, the primary trial outcome, the study found some indication that the intervention may have a differential impact by subgroups including child age and sex. Previous research [40] suggests that opportunity for outdoor play is particularly influential on the physical activity of boys [41–43], and on older children [37, 44, 45], and effect, which is suggested (although not significant for sex) by the magnitude of the non-significant subgroup interactions reported in this study. Future research to identify strategies that do not exacerbate physical activity differences between these groups in childcare are required.

The trial methods employed were rigorous, and included random assignment, the use of objective measures of physical activity outcomes in care, the inclusion of measures of physical activity outside of care to enable an assessment of any potential compensatory changes in physical activity occurring during this period, as well as prospective trial registration. Nonetheless, the trial findings need to be considered in the context of a number of limitations. Most importantly, the trial was an exploratory study and was not adequately powered to detect clinically meaningful

changes in the primary trial outcome. *Post hoc* power analysis suggests that, with the same intra-class correlation (0.069), a standard deviation of 21 min/day, and an average of 34.33 children per service, a sample size of 22 services per group (1510 children in total) would have been required for the effect size found in this study (5.6 min) to reach statistical significance, with 80% power and alpha of 0.05. The study effect sizes, intra-class correlation and retention rates provide important information for trialists to use to adequately power future trials examining similar interventions. The low participation rate also suggests that future studies employ more rigorous recruitment strategies to improve study participation and external validity of trial findings. The study was also conducted over a short time period in one region of Australia, which introduced seasonal differences in the baseline, and follow-up periods. The within group reductions in physical activity and the small increases in sedentary time observed in both groups over time is likely the result of follow-up data collection occurring during the summer months where hotter ambient temperatures may hinder physically active play. Future studies conducted in different jurisdictions, with different climates and operational contexts, and which track child activity over extended periods of follow-up to assess longer-term effects would also address important evidence gaps not dealt with in this study.

Conclusion

Improving child physical activity through childcare setting-based interventions has proven a considerable challenge to-date. Changing the childcare operational procedures and scheduling to allow children unrestricted access to outdoor areas to engage in free-play did not significantly improve child physical activity during care in this trial. Comprehensive interventions that address multiple aspects of the childcare and home environment may provide the greatest potential to improve child physical activity in this setting.

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Conflict of interest statement

This study formed part of Lubna Abdul Razak's doctoral programme of research.

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**Chapter 6: Barriers to and facilitators of the implementation of
environmental recommendations to encourage physical activity in centre-
based childcare services: a systematic review**

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Abstract

Background: Identifying factors influencing the implementation of evidence-based environmental recommendations to promote physical activity in childcare services is required to develop effective implementation strategies. This systematic review aimed to: (1) identify barriers and facilitators reported by center-based childcare services impacting the implementation of environmental recommendations to increase physical activity among children, (2) synthesize these factors according to the 14 domains of the “Theoretical Domains Framework”, and (3) report any associations between service or provider characteristics and the reported implementation of such recommendations.

Methods: Electronic searches were conducted in 6 scientific databases (e.g. MEDLINE) and Google Scholar to identify studies reporting data from childcare staff or other stakeholders responsible for childcare operations. Included studies were based on childcare settings and published in English. From 2164 identified citations, 19 articles met the inclusion criteria (11 qualitative, 4 quantitative, and 4 mixed methods).

Results: Across all articles, the majority of factors impacting implementation fell into the “environmental context and resources” domain (e.g. time, equipment, and space) (n=19) and the “social influences” domain (e.g. support from parents, colleagues, supervisors, n=11).

Conclusion: The current review provides guidance to improve the implementation of environmental recommendations in childcare services by addressing environmental, resource and social barriers.

Introduction

Ensuring adequate physical activity throughout the life course is important to reduce the risk of chronic diseases such as cardiovascular disease, cancer, and type 2 diabetes (1). Evidence suggests that physical activity behaviours begin to develop in early childhood and track into adulthood (2, 3). In addition, physical activity is associated with improved psychosocial wellbeing (4), motor skill (5) and neurocognitive development in early childhood (6). Therefore, early intervention is recommended to support lifelong participation in adequate physical activity (7, 8).

Centre-based childcare services have been identified as a promising setting in which to intervene to support adequate physical activity participation amongst attending children (9, 10). This is particularly so in high-income countries as: (1) the use of centre-based childcare services is highly prevalent, for example attended by 84% of children aged 3-5 years in Organization for Economic Cooperation and Development (OECD) countries (11), 61% of children aged 0-5 years in the United States (US) (12) and over 50% of children aged 0-5 years in Australia (13), (2) children spend ample time in centre-based childcare, with a weekly average of about 20 hours in Australia (14) and 33 hours in the US (12); (3) most childcare services have both space for outdoor play and portable equipment to encourage physically active play (15, 16); and (4) educators generally support recommendations to increase physical activity (17, 18).

Interventions targeting children attending childcare have mostly been effective at improving children's physical activity. Although, there has been mixed findings for nonenvironmental types of interventions (19) (individual [e.g. child], social [e.g. educator]), research suggests that environmental interventions (organizational factors

(e.g. policy and environment) (20, 21) have been shown to be particularly effective in increasing child physical activity in care. In a synthesis of systematic reviews (8 physical activity and 8 combined physical activity and dietary behaviors), interventions which focused on: rearrangement of play spaces, having structured active lessons, additional playground markings, outdoor play time, creating opportunities for physical activity, and physical activity practices and policies were found to be generally effective (19).

Best practice guidelines regarding the implementation of environmental recommendations have been developed by governments and public health organizations. In the United States (US), childcare services are recommended to provide environments that encourage children to be active indoors and outdoors; have active outdoor play scheduled more than 2 times a day, totaling 90 - 120 minutes; and have a variety of play materials indoors and outdoors (22). Similarly, state-based guidelines in New South Wales, Australia recommend that childcare services allocate $\geq 25\%$ of the day for active play (23), which for services open 8 hours, equating to more than 180 minutes. Despite the existence of such guidelines, many childcare services do not implement environmental modifications consistent with their recommendations. For example, the Childcare Rules for childcare facilities in North Carolina, US, require childcare services to provide opportunities for children to engage in active play outdoors for at least 60 minutes (24). Yet, a recent study reported that only 38% of such services met this requirement (25). Likewise, in a longitudinal study of >350 centre-based childcare services over the period 2006-2013 in New South Wales, it was found that only 63-77% of services scheduled free playtime outdoors for $\geq 25\%$ of their opening hours (26).

Given the reported variability of implementation of recommended environmental interventions, it is crucial to identify factors that may impede or facilitate service implementation of such recommendations (27). We are aware of only one review that has focused on factors which impact the implementation of physical activity practices and policies in center-based childcare (28). However, this review did not focus on environmental recommendations, nor did it systematically synthesize reported barriers and facilitators according to a comprehensive theoretical framework, a recommended process to enable intervention development guided by theory (29). Therefore, the aim of this systematic review was (1) to identify reported barriers to and facilitators of the implementation of environmental recommendations to increase children's physical activity at childcare services; and (2) to map these factors according to the constructs of the Theoretical Domains Framework (TDF) (30). The TDF includes 14 theoretical domains categorised from 33 behavior change theories and 84 theoretical constructs in a single framework. For example, one of the TDF constructs is "professional role and identity", if an individual perceives that a required change in their work practice aligns positively with their beliefs about their professional identity, or the role of their organization, then building upon this belief would act as a potential way to facilitate behavior change. However, if the required change in work practice is in conflict with an individual's belief about their role by the organization, it may act as a barrier to the implementation. Using the TDF to categorize and delineate barriers and facilitators helps to inform the types of implementation strategies that might be needed to achieve sustained practice changes within a setting. In addition, a secondary aim was to identify any reported associations between service or provider characteristics, and

barriers to and facilitators of the implementation of environmental recommendations to increase attending children's physical activity.

Methods

Registration

The review was prospectively registered with PROSPERO (CRD42017072259) on 17 July 2017 and was undertaken in accordance to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (31) (Supplementary Material 1).

Types of articles

Articles were eligible for inclusion if they reported barriers or facilitators to the implementation of environmental recommendations to increase children's physical activity in center-based childcare services. This included qualitative and quantitative articles with no limitations on study design or year of publication. Inclusion of mixed approaches in reviews allows for greater understanding of factors affecting implementation (32). Data regarding barriers and facilitators could be reported by the staff responsible for center-based childcare operations, or any government or civil service organizations influencing recommendations to increase physical activities in those settings.

Articles were excluded if they were: (1) duplicates; (2) not reported in English; (3) reviews, conference proceedings, letters, or case studies; (4) targeting children not attending center-based childcare services; (5) focused solely on home-based childcare

or occasional care; and (6) not describing barriers to or facilitators of the implementation of environmental recommendations to increase children's physical activity.

Literature search and study selection

A comprehensive literature search was conducted across 6 electronic databases (MEDLINE, Embase, PsycINFO, ERIC, CINAHL, and Scopus) in June 2017 to identify publications describing barriers to and facilitators of the implementation of physical activity environmental recommendations in centre-based childcare services. These databases were selected as they index journals from the field of physical activity, implementation science, and early childhood and provided extensive coverage of research conducted in childcare services. The search strategy comprised of keywords, search strategies and combinations as was used in previous reviews (33, 34) and included filters for: "implementation", "childcare", "physical activity", "barriers", "facilitators" and "interventions/ policies/guidelines". The keyword search strategy was developed for MEDLINE and adapted for the other five databases (see Supplementary Material 2). An experienced librarian assisted with developing the search strategies and mapping across electronic databases.

To identify published government reports and other grey literature, a web search of the phrase "implementation physical activity interventions policies guidelines centre-based childcare services" was conducted in Google Scholar. The first 200 citations in order of relevance were examined (35). In addition, a systematic scan of articles in the journals *International Journal of Behavioral Nutrition and Physical Activity*, *International Journal of Environmental Research and Public Health*, and

Early Child Development and Care was conducted for any relevant studies that had been published in the past 2 years (2016-2017). These journals were selected based on frequently published implementation articles of physical activity in early childhood. Finally, the reference lists of all included articles were reviewed for relevant citations by one review author (L.A.R.), and potentially eligible publications were retrieved.

Data collection

Selection of articles

Two review authors (L.A.R. and J.J.) independently screened titles and abstracts identified in the electronic database search according to the inclusion and exclusion criteria. The authors were not blinded to author and journal information. Full texts of potentially eligible studies were retrieved and independently assessed by two reviewers (L.A.R. and J.J.) for inclusion. Any discrepancies regarding study eligibility between reviewers were resolved by consensus and if needed by a third review author (T.C.M.).

Extraction of data from eligible publications

A data extraction form, previously used for a systematic review of factors influencing dietary guidelines implementation in childcare services was adapted for the current review (36). Three review authors (L.A.R./B.E. and L.A.R./A.G.) (in pairs) independently extracted data from all included studies. For quantitative articles, any reported associations between service or provider characteristics, and barriers to/facilitators of the implementation of environmental recommendations to increase children's physical activity in center.-based childcare services were extracted. Any discrepancies regarding data extraction were resolved by consensus and if needed by a third reviewer (T.C.M.).

Syntheses of results

Five review authors (L.A.R./B.E., L.A.R./A.G., and K.S./M.F., in pairs) independently classified barriers to and facilitators of implementation according to the domains and constructs contained within the TDF. These domains include: (1) knowledge; (2) skills; (3) social/professional role and identity; (4) beliefs about capabilities; (5) optimism; (6) beliefs about consequences; (7) reinforcement; (8) intentions; (9) goals; (10) memory, attention and decision processes; (11) environmental context and resources; (12) social influences; (13) emotion; and (14) behavioural regulation (30). A coding manual was developed and used as a guide to classify the identified barriers and facilitators under relevant TDF domains and constructs (see Supplementary Material 3). Discrepancies in the factor classification between review authors were resolved by a third reviewer (T.C.M.).

For syntheses, reported factors were grouped according to whether they resulted from qualitative or quantitative data collection approaches (i.e. qualitative and quantitative data from a study using a mixed methodology were synthesized separately). It was also possible for multiple barriers or facilitators to be reported in each study, and all fall within the one TDF domain. For all included studies, we reported the number of studies reporting factors assigned to each of the TDF domains and constructs. In addition, for quantitative studies, the frequency in which factors reported in individual studies was counted. The frequency of barriers and facilitators assigned to each of the TDF domains/ constructs was tallied, and then divided by the total number of articles to provide a proportion of reported domains/ constructs across

identified studies. A median score was then calculated for the barriers and facilitators (as reported in similar, previously conducted reviews) (33, 36).

Results

Study selection

The inclusion process for articles in the review can be seen in Figure 1.

Study characteristics

Overall characteristics of included articles

Characteristics of the included studies are described in Table 1. Of the 19 included articles, 11 used a qualitative approach (37-47), 4 used a quantitative approach (48-51) and 4 used mixed methods' approaches(52-55). Most of the studies were conducted in the US (n=13), with the remaining in Canada (n=3), Australia (n=2), and multiple European countries (n=1). Barriers and facilitators were reported from the perspective of educators working within center-based childcare services (n=13), directors (n=1) and mixed types of staff (n= 6). Staff numbers ranged from 8 to 87 (qualitative studies), 48 to 428 (quantitative studies), and 6 to 174 (mixed methods studies). One article employed a longitudinal design (44) whereas all others were cross-sectional. Articles were published between the years 2007-2017, with 13 conducted since 2013. No articles used a validated tool, or a survey designed for data collection that was guided by the TDF domains. Rather, tools were based on the findings of published research and experts' views.

Outcomes

Factors were synthesized as barriers or facilitators (see Tables 2 and 3). Most of the barriers identified were classified within the “environment context and resources” domain, comprising of: insufficient resources/ material resources (e.g. lack of time, space, equipment) (n=17), interaction between person and environment - weather concerns (e.g. cold or rain, high Ultra-Violet rating days) (n=7), and unsupportive organisational culture/climate (e.g. competing priorities) (n=6). Additionally, within the “social influences” domain, factors were classified to: social pressure (e.g. parent opinion) (n=3); social support (e.g. other childcare workers disapproval) (n=2), social norms (e.g. children’s interest influenced by other children in care, parents and siblings) (n=1), power (e.g. childcare provider) (n=1), and conflict (e.g. community complaints) (n=1) (Table 2). Regarding facilitators, the highest number of articles identified were classified within the domain of the “environment context and resources” domain: resources/material resources (n=13) (e.g. equipment, facilities, stimulating material); the organisational culture/climate (n=4) (e.g. less loaded schedule, already involved in efforts to increase children’s physical activity); and interaction between person and environment (n=1). The next prevalent domain was “social influences” which included social support (n= 4) (e.g. enthusiastic parent, other childcare worker support), power (n=3), social norms (n=2) and social pressure (n=1) (Table 3). No barriers or facilitators were classified as belonging to the TDF domains for “memory, attention and decision processes”, “optimism”, “reinforcement” or “behavioral regulation”.

Qualitative articles

Barriers

From the 15 articles reporting qualitative approaches, barriers to the implementation of environmental recommendations to increase physical activity were classified under 7 out of the 14 TDF domains. Across articles, the domains which barriers were most frequently classified under were “environmental context and resources” (n=12, e.g. time, funds to purchase equipment, sufficient space) followed by “social influences” (n=4, e.g. parental support, other childcare staff support) (Supplementary Material 4).

Facilitators

Within the 15 qualitative studies, facilitators that enabled the implementation of environmental recommendations were mapped under six TDF domains. Across articles “environment context and resources” (n=8, e.g. access to resources, different curriculum), followed by the “social influences” domain (n=4, e.g. other children, parents & siblings’ interests) were those that most facilitators were mapped to (Supplementary Material 4).

Quantitative articles

Barriers

From the 7 articles reporting quantitative approaches, barriers were mapped under 5 TDF domains. The most frequently identified domain was the “environmental context and resources” domain (n=6), followed by the “social influences” domain (n=2). The proportion of participants who reported barriers was highest for the “social influences”

domain (median = 39%, range: 8 - 58%), followed by the “environmental context and resources” domain (n=4; median = 32%, range: 4-73%) (Supplementary Material 4).

Facilitators

From the 7 quantitative articles, facilitators were mapped under 3 TDF domains. The most frequently identified domain was the “environmental context and resources” domain (n=4), followed by the “social influences” domain (n=3). One study identified the flexibility of the program and easily implementable in homes and classrooms as contributing to their implementation success (52). These facilitators could not be classified under any of the TDF domains and were therefore coded as “Other”. The most prevalent facilitator was the “social influences” domain (median = 42.3%, range: 31-100% participants), followed by the “environmental context and resources” domain (median = 40.5%, range: 0.4-100%) (Supplementary Material 4).

Association between barriers/facilitators and implementation of environmental recommendations

Only one of the included articles reported an association between barriers and facilitators and implementation of environmental recommendations (50). This study found a significant association between factors such as leadership (TDF domain – “environmental context and resources”) and educators being aware of their role (TDF domain – “beliefs about consequences”), and the implementation of physical activity practices.

Discussion

This review found that the most prevalent barriers and facilitators belonged to the “environmental context and resources” domain. All 19 included articles reported factors in this domain, with 14 out of 15 articles employing qualitative approaches (12 barriers and 8 facilitators) and all 7 articles employing quantitative approaches (6 barriers and 4 facilitators). No differences were found between the frequency of factors synthesized from qualitative and quantitative approaches.

Another key finding was the differences between barriers and facilitators in identified TDF domains. Unique to barriers were the TDF domains of “skills”, “professional role and identity”, “beliefs about capability”, “intentions” and “emotions”, whereas there were no TDF domains unique to facilitators. None of the TDF domains of “optimism”, “reinforcement”, “memory, attention and decision processes”, and “behavioural regulation” was identified. This may reflect the stage at which factors which hinder/enable implementation of recommendations were examined. For example, having the necessary skills, and educators believing they have the capability, may change over time with more practice and familiarity of what needs to be implemented.

Of note, most environmental physical activity recommendations to be implemented in the included articles were multicomponent (including things, such as education). This complexity could have affected the difference in the number of barriers and facilitators that were reported to impact implementation. For example, previous research has found that studies that test complex interventions often report poor fidelity

to the multiple intervention components, suggesting barriers to the implementation (56). A study involving 20 services tested a multicomponent intervention consisting of: fundamental movement skill sessions; structured activities; staff role modeling; limiting small screen recreation and sedentary time; and an activity promoting physical environment. The study failed to increase physical activity in children attending the services, and reported that only one out of the 13 practices and policies measured (daily structured activity provision) was successfully improved (56).

A secondary aim of this review was to identify any reported associations between service or provider characteristics, and barriers to/facilitators of the implementation of environmental recommendations to increase children's physical activity in center-based childcare services. One article in this review identified 2 TDF domains that were positively associated with implementation, specifically "leadership" and "role awareness by the educators" (50).

Our findings add further evidence to a previous review which found time, competing priorities and task effort hindered implementation of physical activity recommendations in center-based childcare settings (28). Reviews of physical activity promoting studies conducted in other educational settings, such as schools, generally support the findings of the current study. For example, in a review of 17 studies from school settings, ~2820 staff also reported that factors within the TDF domain of "environmental context and resources" (e.g. availability of equipment, time or staff) were barriers to the implementation of physical activity interventions (33). A second review including 10 articles synthesizing factors impacting school-based daily physical activity policies implementation identified "environmental context and resources" (e.g.

lack of training, time and resources) (37%), “beliefs about consequences”(e.g. burden on teacher, classroom influences) (18%) and “social influences” (e.g. lack of student/parent interest) (16%) to be the most prevalent domains, with “social influences” being associated with implementation success in this setting (57). The studies cited that a lack of equipment, time, staff and facilities or unsupportive parents, students, school administrators or school-board members hampered the implementation of physical activity policies.

Likewise, a review synthesizing factors that influence the implementation of nutrition guidelines in center-based childcare services also concluded that the most prevalent domain identified was environmental context and resources (36). From the 12 articles included, the authors found that extra costs due to new foods, cooking equipment, recipes and staff training requirements negatively impacted guideline implementation. This combination of findings suggests that additional resourcing may be needed to support the implementation of environmental recommendations in center-based childcare settings.

Strengths and limitations

The findings from this review need to be interpreted carefully as no attempt was made to retrieve the raw data collected in qualitative studies; thus the findings were dependent on the included authors’ perspective and may not have necessarily been exhaustive. There were also limited numbers of grey literature identified, comprising of government or civil service organizations commissioned reports. Thus, this review was not able to assess factors which influence the implementation of intervention components mandated from legislation or regulations. Finally, by limiting the language

of included articles to English, the review may have inadvertently excluded articles from different socioeconomic regions and from countries with early childhood care structure that differs from that found in high-income countries. Nevertheless, the systematic/ high-quality approach taken in the review and the comprehensive coverage of peer-reviewed articles assures the applicability of the findings to the childcare setting.

Clearly, the varied challenges faced by childcare services and their staff in implementing physical activity environmental recommendations require researchers and interventionists to consider tailoring of strategies to ensure implementation success and sustainability (58). Using the TDF domains to categorize factors which are reported to impact on the implementation of physical activity recommendations, and identifying whether those domains are acting as barriers or facilitators to behavior change, can assist in the selection of evidence-based implementation strategies that are known to help address such factors. Identified constructs within organizational climate and culture are modifiable, presenting opportunities for interventions to be incorporated in local adaption of recommendations.

Conclusion

This review identified important factors influencing the implementation of environmental physical activity recommendations in center-based childcare services by utilizing a theoretical framework. This information may support the development of approaches to improve the translation of physical activity recommendations into practice in the early childhood setting. Future research could consider designing interventions which avoid environmental constraints (e.g. the need for additional

resourcing) and build upon facilitators of implementation (e.g. training to modulate beliefs and knowledge of child physical activity promotion).

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Tables

Table 1. Characteristics of included studies (n=19) that explored facilitators and barriers to implementation of environmental recommendations in center-based childcare services.

Author (year)	Location	Method	Participants (profession, sample size, sex)	Recommendations	Barriers/facilitators by TDF domains
Alhassan and Whitt-Glover (2014)	Massachusetts, US	Qualitative Open-ended questionnaire	Teachers (n=19) Unknown sex	Tutti-Frutti Instant Recess (changes in routine, e.g., to plug in a DVD/CD or rearrange furniture)	ECR (n=3)
Bellows et al (2008)	Colorado, US	Qualitative Semi-structured telephone interviews	Teachers (n=31) Unknown sex	Mighty Moves – Food Friends Program (increased opportunities, written program activity binder, musical CD, various sized balls, beanbags, rope, scarves)	Knowledge (n=1) ECR (n=5) Skills (n=1) Social Influences (n=1)
Brewer and Rieg (2013)	North Eastern, US	Qualitative Phenomenological approach Focus groups (n=3) and semi-structured individual interviews (n=3)	Total staff (n=8) Daycare teacher (n=4) Teaching assistants (n=4) Food service workers (n=3) Group supervisor (n=1) All female	Grant funded obesity prevention program (additional certified health and physical education teacher and equipment)	Bco (n=1) ECR (n=4) Social Influences (n=1) Emotions (n=1)
Cashmore and Jones (2008)	Inner Sydney, Australia	Qualitative Focus group interviews (n=5)	Childcare workers (n=20) All female	NASPE physical activity guidelines (physical activity opportunities – 60 minutes of structured and 60 minutes of free-play, access to indoor /outdoor areas)	Bco (n=1) ECR (n=5) Social influences (n=2)
Coleman and Dymont (2013)	Tasmania, Australia	Qualitative Semi-structured telephone interview	Educators/ managers (n=16) Unknown sex	Opportunities for physical activity (playground size and design)	Skills (n=1) PRI (n=1) Bco (n=1) ECR (n=4)

Author (year)	Location	Method	Participants (profession, sample size, sex)	Recommendations	Barriers/facilitators by TDF domains
De Craemer et al. (2013)	Belgium, Bulgaria, Germany, Greece, Poland, Spain	Qualitative Focus groups (n=18)	Teachers (n=87) Unknown sex	European Toy Box study (rearrangements of the classroom/kindergarten to create some free space to assist children's movement, performing two physical education sessions per week with a duration of 45 min each)	ECR (n=8)
Gabor et al. (2010)	New Castle, Kent, and Sussex, Delaware, US	Qualitative Focus groups	Childcare providers (n=32) Unknown sex	Child and Adult Care Food Program (CACFP) guidelines and Delaware's Office of Child Care Licensing (OCCL) standards minimum of 20 minutes of moderate to vigorous physical activity indoors or outdoors for every 3 hours the child is in attendance (equal to 60 minutes daily for a full 8- to 9-hour day, equipment includes scarves, hockey sticks, baseballs, jump ropes, hula hoops, and parachutes).	Knowledge (n=1) PRI (n=1) Intentions (n=1) ECR (n=2)
Howie et al., (2014)	South Carolina, US	Qualitative Self-reports, discussion post workshops Quantitative Workshop evaluations, surveys twice per year	Qualitative Teachers (n=24) Unknown sex Quantitative Teachers (n=24) Unknown sex	SHAPES-I (Move outside- two 20-min recesses and Move to Learn – conduct two 5-min active lessons per day for a total of 10 min; physical activity equipment and materials)	ECR (n=4) Social Influences (n=1)

Author (year)	Location	Method	Participants (profession, sample size, sex)	Recommendations	Barriers/facilitators by TDF domains
Lyn et al. (2014)	Georgia, US	Qualitative Semi-structured interviews completed face to face (n=15), and via phone (n=5)	Centre directors (n=20) Unknown sex	Wellness policies (NASPE guidelines – scheduled unstructured and planned movement experiences, appropriate equipment)	ECR (n=4) Social Influences (n=1)
McClintic and Petty (2015)	Texas, US	Qualitative Case studies, interview, journal writing	Total staff (n=11) Teachers (n=10) Centre director (n=1) Females (n=10) Males (n=1)	Outdoor play environment	PRI (n=1) Intentions (n=1) ECR (n=5) Social Influences (n=1)
van Zandvoort et al. (2010)	Ontario, Canada	Qualitative Semi-structured focus groups	Childcare providers (n=54) All female	Large group (time dedicated to gross motor activities – 15 minutes) and outdoor (minimum of two one-hour periods) curriculum	ECR (n=7) Social Influences (n=1)
Finkelstein et al. (2007)	US	Quantitative Mail survey	Total staff (n=48) Directors (n=16) Education coordinators/ managers (n=9) Health coordinator (n=8) Education specialists (n=5) Early child development specialists (n=4) Others (n=6) Unknown sex	I Am Moving, I Am Learning (IM/IL) – use of new play equipment, instructional materials	ECR (n=9) Social Influences (n=4)
Gagné and Harnois (2014)	Quebec, Canada	Quantitative Self-administered questionnaire Qualitative Open-ended questionnaire	Quantitative Childcare workers (n=174) Female 97% Qualitative Childcare workers (n=30) Female 97%	Engage preschoolers in physical activity at least 2 hours per day in the next 30 days	ECR (n=4) Social Influences (n=3)

Author (year)	Location	Method	Participants (profession, sample size, sex)	Recommendations	Barriers/facilitators by TDF domains
Lanigan (2014)	Washington State, US	Quantitative Pen and paper survey	Childcare providers (n=72) Unknown sex	Encouraging Healthy Activity and Eating in Childcare Environments (ENHANCE) (indoors/outdoors- space – various surface types, equipment, varying setup)	Bco (n=3) ECR (n=1) Social Influences (n=1)
Nanney et al. (2017)	Minnesota & Wisconsin, US	Quantitative Mail survey	Providers (n=428) Female 96%	Minnesota and Wisconsin ECEC practices (limit inactive time, provide PA lessons to children at least three times a year, encourage PA and provider/staff role modeling)	ECR (n=5)
Fox et al., (2010)	US	Qualitative Separate interviews and focus groups	26 (stage 2) + 13 (stage 3) Managers (n=40) Teachers (n=54) Unknown sex	I Am Moving, I Am Learning (IM/IL) – increase the quantity of time children spend in MVPA) each day, new play equipment	Knowledge (n=1) Bca (n=1) ECR (n=15) Social influences (n=9) Other (n=2)
Howie et al. (2016)	South Carolina, US	Quantitative Surveys Qualitative Interviews	Quantitative Teachers (n=10) Unknown sex Qualitative Directors (n=11) Teachers (n=6) Unknown sex	SHAPES-D (outdoor recess, movement integrated into classroom curriculum)	Bca (n=1) Bco (n=2) ECR (n=6)
Kennedy et al. (2017)	US	Mixed-methods Survey at post-test In-depth interviews	Quantitative Teachers (n=37) Unknown sex Qualitative Teachers (n=12) Unknown sex	SHAPES-D (online training and guidebook detailing the information presented in each module, sample activities, and activity cards to facilitate activity implementation)	Knowledge (n=1) Bco (n=1) ECR (n=3)

Author (year)	Location	Method	Participants (profession, sample size, sex)	Recommendations	Barriers/facilitators by TDF domains
Tucker et al. (2011)	Ontario, Canada	Quantitative Questionnaire Qualitative Semi-structured focus groups	Quantitative Directors (n=9), Teachers (n=54) All female Qualitative Directors (n=9), Teachers (n=54) All female	NASPE guidelines (60 minutes daily of structured physical activity and 60 minutes unstructured physical activity)	ECR (n=7) Skills (n=1)

Acronyms – NASPE – National Association of Sports and Physical Education; NAPSACC – Nutrition and Physical activity self-assessment in Child Care; SHAPES – Study of Health and Activity in Preschool Environments; TOT – training of trainers; Bca – beliefs about capability, Bco – beliefs about consequences, ECR – environment, context and resources, PRI – Professional role & Identity.

Table 2 Barriers coded by Theoretical Domains Framework constructs

	Knowledge	Skills	Professional role and identity	Belief about capabilities	Beliefs about consequences		Intentions	Environmental context and resources			Social influences				
1 st Author, year	Knowledge	Skills development	Professional role	Perceived competence	Beliefs	Outcome expectancies	Stages of change	Organisational culture/ climate	Interaction between person & environment	Resources/ material resources	Social pressure	Social norms	Social support	Power	Conflict
Alhassan, 2014								✓		✓					
Bellows, 2008	✓							✓		✓					
Brewer, 2013										✓			✓		
Cashmore, 2008									✓	✓	✓				
Coleman, 2013					✓					✓					
De Craemer, 2013										✓					
Gabor, 2010	✓		✓				✓			✓					
Howie, 2014										✓					
Lyn, 2014													✓		

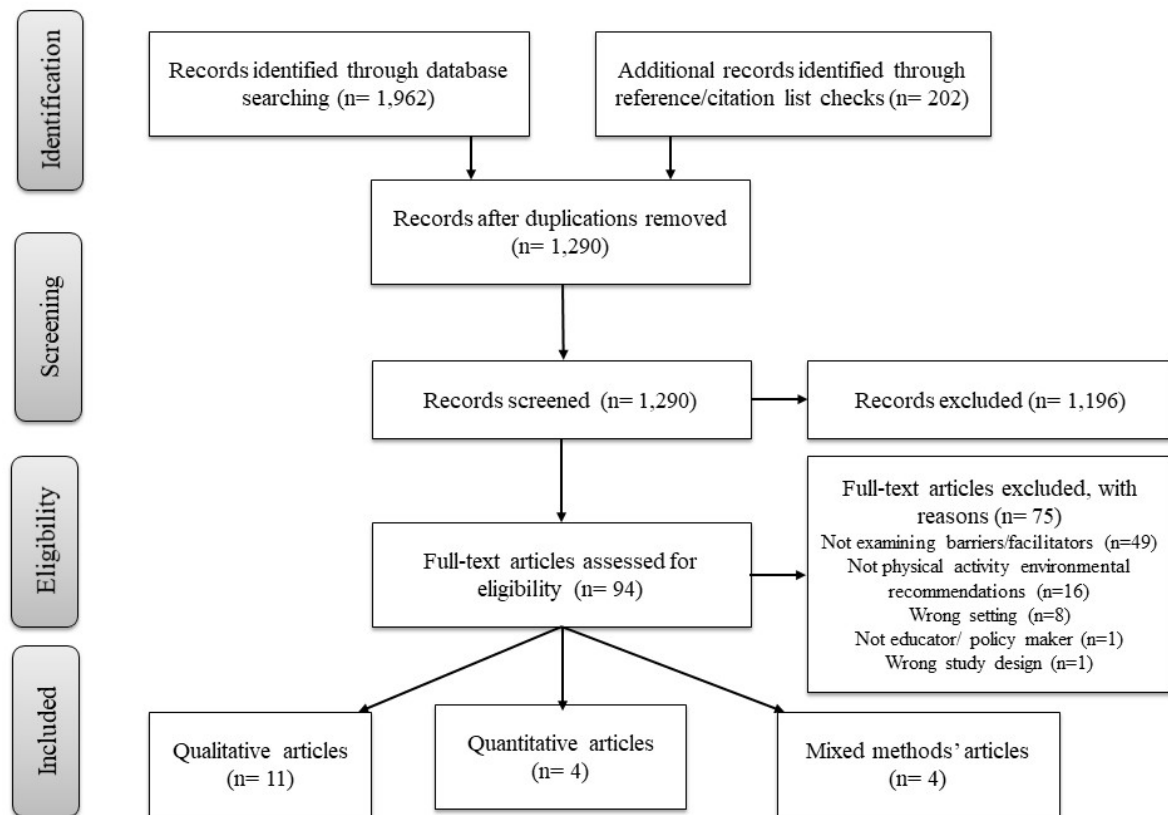
McClintic, 2015			✓				✓		✓	✓	✓				✓
Van Zandvoort, 2010								✓	✓	✓					
Finkelstein, 2007								✓		✓					
Gagne, 2014									✓	✓					
Lanigan, 2014						✓					✓				
Nanney, 2017									✓	✓					
Fox, 2010				✓					✓	✓			✓	✓	
Howie, 2016				✓	✓			✓	✓	✓					
Kennedy, 2017	✓					✓		✓		✓					
Tucker, 2011										✓					
Total number of articles reporting each Factor	3	0	2	2	2	2	2	6	7	17	3	0	3	1	1
Total number of articles reporting each Domain	3	0	2	2	4		2	17			6				

Table 3 Facilitators coded by Theoretical Domains Framework constructs

	Knowledge	Skills	Professional role and identity	Beliefs about consequences		Environmental context and resources			Social influences					Emotions	Others
1 st Author, year	Knowledge	Skills development	Professional role	Beliefs	Outcome expectancies	Organisational culture/ climate	Interaction between person & environment	Resources/ material resources	Social pressure	Social norms	Social support	Power	Conflict	Positive/negative affect	
Bellows, 2008		✓						✓	✓						
Brewer, 2013					✓			✓						✓	
Cashmore, 2008					✓			✓		✓					
Coleman, 2013		✓	✓												
De Craemer, 2013								✓							
Howie, 2014						✓		✓		✓					
Lyn, 2014								✓							
Van Zandvoort, 2010								✓				✓			
Finkelstein, 2007						✓		✓			✓	✓			
Gagne, 2014						✓		✓			✓				

Lanigan, 2014								✓							
Fox, 2010	✓					✓		✓			✓	✓			✓
Howie, 2016					✓			✓							
Tucker, 2011								✓							
Total number of articles reporting each Factor	1	2	1	0	3	4	0	13	1	2	3	3	0	1	1
Total number of articles reporting each Domain	1	2	1	3	13				7					1	1

Figure 1 Flow diagram of the literature and review process



Supplementary Material 1 PRISMA Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	Title page
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	21
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2-5
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4-5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	5
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5-6
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	6-7
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Supplementary Material 2

Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	7
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	7-8
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	7-8
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	n/a
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	8
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	8-9
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	n/a
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	n/a
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Figure 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	9-10, Table 1
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	n/a
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	9-10, Table 1
Synthesis of results	21	<i>Present the main results of the review. If meta-analyses are done, include for each,</i>	10-13

		<i>confidence intervals and measures of consistency.</i>	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	n/a
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	n/a
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	13-15
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	16
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	17
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	17

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097.

Supplementary Material 2: Search strategy applied to MEDLINE database

#	Searches
1	Child, Preschool/
2	(pre-school* or preschool*).mp.
3	Child Day Care Centers/
4	childcare*.mp.
5	(daycare* or day care*).mp.
6	(nursery or nurseries).mp.
7	Kinder*.mp.
8	1 or 2 or 3 or 4 or 5 or 6 or 7
9	Motor Activity/
10	(physical adj (activit* or inactivit*)).tw.
11	Dance/
12	Dancing.mp
13	9 or 10 or 11 or 12
14	(recommend* or guideline* or protocol* or polic* or procedure* or adopt* or implement* or intervention* or trial* or best practice* or guidance* or strateg* or fidelity).mp.
15	(barrier* or impeded* or impediment* or facilitat* or challenge* or adher* or opportunit or success*).mp.
16	8 and 13 and 14 and 15
17	limit 16 to (english language)

Supplementary Material 3: Childcare physical activity TDF coding manual		
TDF Domains/ Constructs	Application to the childcare setting	Examples/ Rules
1. Knowledge An awareness of the existence of something Constructs (3) <ul style="list-style-type: none"> • Knowledge (including knowledge of condition /scientific rationale), • Procedural knowledge, • Knowledge of task environment 	Educators/ supervisors awareness and familiarity with implementing the recommendations	
2. Skills An ability or proficiency acquired through practice Constructs (8) <ul style="list-style-type: none"> • Skills, • Skills development, • Competence, • Ability, • Interpersonal skills, • Practice, • Skill assessment, • Coping strategies 	Training, skills and practice in implementing the physical activity policies	

<p>3. Professional role and identity A coherent set of behaviors and displayed personal qualities of an individual in a social or work setting Constructs (9)</p> <ul style="list-style-type: none"> • Professional identity, • Professional role, • Social identity, • Identity, • Professional boundaries, • Professional confidence, • Group identity, • Leadership, • Organisational commitment 	<p>The extent that implementation of physical activity policies is perceived as part of the educators/ supervisors role</p>	
<p>4. Beliefs about capabilities Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use Constructs (8)</p> <ul style="list-style-type: none"> • Self-confidence, • Perceived competence, • Self-efficacy, • Perceived behavioural control, • Beliefs, • Self-esteem, • Empowerment, • Professional confidence 	<p>The educators/ supervisors' confidence in implementing the physical activity policies</p>	<p>If it is the educators/ supervisors' perception of another person or group (i.e. parents) regarding their skills, confidence, knowledge, ability, commitment then code as "Domain 12- Social influences (social pressure) NB: If they are referring to their own "group" i.e. teachers talking about teachers then code as "Domain 4- Beliefs about capabilities".</p>

<p>5. Optimism The confidence that things will happen for the best or that desired goals will be attained Constructs (4)</p> <ul style="list-style-type: none"> • Optimism, • Pessimism, • Unrealistic optimism, • Identity 	<p>The educators/ supervisors' confidence that the implementation of the physical activity policies will be attained</p>	
<p>6. Beliefs about consequences Acceptance of the truth, reality, or validity about outcomes of a behavior in a given situation. Constructs (4)</p> <ul style="list-style-type: none"> • Beliefs, • Outcome expectancies, Characteristics of outcome expectancies, • Anticipated regret, • Consequents 	<p>The educators/ supervisors' belief about benefits/disadvantages of implementing the physical activity policies</p>	<p>Where the factor results in a negative consequence code as "Domain 6 – Beliefs about consequences (Outcome expectancies)"</p>

<p>7. Reinforcement Increasing the probability of a response by arranging a dependent relationship or contingency between the response and given stimuli Constructs (7)</p> <ul style="list-style-type: none"> • Rewards (proximal/distal, valued/not valued, probable/improbable), • Incentives, • Punishment, • Consequents, • Reinforcement, • Contingencies, • Sanctions 	<p>The extent of recognition and reward the educators/ supervisors expect to receive when implementing the physical activity policies</p>	
<p>8. Intentions A conscious decision to perform a behaviour or a resolve to act in a certain way. Constructs (3)</p> <ul style="list-style-type: none"> • Stability of intentions, • Stages of change model, • Trans-theoretical model and stages of change 	<p>The educators/ supervisors' intention to implement the physical activity policies</p>	<p>Where the factor refers to the educators' own motivation code as Domain 8 – Intentions (stages of change)</p>

<p>9. Goals Mental representations of outcomes or end states that an individual wants to achieve Constructs (6)</p> <ul style="list-style-type: none"> • Goals (distal/proximal), • Goal priority, • Goal / target setting, • Goals (autonomous/controlled), • Action planning, • Implementation intention 	<p>The relative importance to educators/supervisors of implementing the physical activity policies</p>	<p>Where the factor refers to a lack of priority of PA in the service, code as “Domain 9-Goals (Goal Priority)”</p> <p>If factor refers to a crowded curriculum, code as Domain 9 Goals (goal priority)</p> <p>Where the factor refers to scheduling, code as Domain 9 – Goals (implementation intention)</p>
<p>10. Memory attention and decision processes The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives Constructs (5)</p> <ul style="list-style-type: none"> • Memory, • Attention, • Attention control, • Decision making, • Cognitive overload/tiredness 	<p>The extent to which implementing the physical activity policies is part of regular practice</p>	

<p>11. Environmental context and resources Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour</p> <p>Constructs (6)</p> <ul style="list-style-type: none"> • Environmental stressors, • Resources / material resources, • Organisational culture/climate • Salient events / critical incidents, • Interaction between person and environment • Barriers and facilitators 	<p>The environmental context/situation that may encourage/discourage implementation of the physical activity policies</p>	<p>Where the factor refers to the service already implementing the practice prior to the policy being mandated then code as "Domain 11- Environmental context and resources (Organisational Climate/ Culture)"</p> <p>If factor refers to time, code as "Domain 11 Environmental context and resources (resources)"</p>
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<p>12. Social influences Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviors. Constructs (11)</p> <ul style="list-style-type: none"> • Social pressure, • Social norms, • Group conformity, • Social comparisons, • Group norms, • Social support, • Power, • Intergroup conflict, • Alienation, • Group identity, • Modelling 	<p>The interpersonal relationships/process that may influence implementation of the physical activity policies</p>	<p>Where the factor refers to the service having a supportive administration or organisational/institutional influence as “Domain 12 – Social Influences (power)”</p> <p>Where the factors refer to monitoring/accountability of implementing PA code as “Domain 12 – Social Influences (power)”</p>
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<p>13. Emotions A complex positive or negative reaction pattern, involving experiential, behavioral, and physiological elements, by which the individual attempts to deal with a personally significant matter or event. Constructs (7)</p> <ul style="list-style-type: none"> • Fear, • Anxiety, • Affect, • Stress, • Depression, • Positive / negative affect, • Burn-out 	<p>Educators/ supervisors emotions when implementing the physical activity policies</p>	
<p>14. Behavioral regulation Anything aimed at managing or changing objectively observed or measured actions. Constructs (3)</p> <ul style="list-style-type: none"> • Self-monitoring, • Breaking habit, • Action planning 	<p>Educators/ supervisors ability to self-monitor and action plan to implement the physical activity policies</p>	

Note. All domain definitions were based on definitions from Cane et al (2012), who derived their definitions from the American Psychological Associations' Dictionary of Psychology

Supplementary Material 4 Summary of identified factors domains (barriers and facilitators) and the domain prevalence across all included articles (n=19).

	Number of Articles that reported the domain as either a barrier or facilitator									
	Knowledge	Skills	Professional role and identity	Belief about capabilities	Beliefs about consequences	Intentions	Environmental context and resources	Social influences	Emotions	Other
Qualitative (n=15 articles)										
Barrier	2	0	2	1	3	2	12	4	0	0
Facilitator	0	2	2	0	3	0	8	4	1	0
Total no of articles reporting TDF domain	2 (13.3%)	2 (13.3%)	3 (20%)	1 (6.7%)	5 (33.3%)	2 (13.3%)	14 (93.3%)	7 (46.7%)	1 (6.7%)	0 (0.0%)
Quantitative (n=7 articles)										
Barriers	1	0	0	1	1	0	6	2	0	0
% of domains within article Median % (range)	10.7 (9.1-11.5)	n/a	n/a	15	n/a	n/a	32.0 (4.0-73.0)	38.5 (8.0-58.0)	n/a	n/a
Facilitators	1	0	0	0	0	0	4	3	0	1
% of domain within articles Median % (range)	0.4	n/a	n/a	n/a	n/a	n/a	40.5 (0.4-100.0)	42.3 (31.0-100.0)	n/a	38.7 (0.4-76.9)
Total no of articles reporting TDF domain	2 (28.6%)	0 (0.0%)	0 (0.0%)	1 (14.3%)	1 (14.3%)	0 (0.0%)	7 (100.0%)	4 (57.1%)	0 (0.0%)	1 (14.3%)

Chapter 7: Discussion and directions for future research

Overview

The primary aim of this thesis was to explore the impact of simple childcare-based environmental interventions on increasing child physical activity levels. The thesis comprised of an introduction, and five data chapters including:

- an introduction outlining the burden of disease from physical activity and the rationale for designing simple, childcare-based environmental physical activity interventions (Chapter 1)

- the current prevalence of implementation of recommended practices for encouraging physical activity in children attending centre-based childcare services (Chapter 2)

- the potential impact of simple environmental interventions on increasing the time children spend participating in moderate to vigorous physical activity (MVPA) while attending childcare (Chapters 3 to 5), and;

- a review of barriers to and facilitators of the implementation of environmental recommendations to promote physical activity in the childcare setting (Chapter 6)

This discussion chapter seeks to provide a summary of the key findings of these individual studies; the significance of these findings and study strengths are then presented and considered in relation to the wider literature, and the chapter concludes with some specific considerations for future studies.

Thesis findings

Summary of Chapter 1

This chapter provided an overview of the burden of disease associated with inadequate physical activity both in Australia and internationally. Recommendations from international and national guidelines for overall physical activity are outlined and describes the low population prevalence of meeting these guidelines among adults and children. This chapter outlines the rationale for delivering physical activity interventions within the childcare setting due to its broad reach and alignment with the sector priorities. The introduction also outlines the implementation challenges of recommended policies and practices within the childcare settings and justifies the need for simpler, environmental interventions in order to achieve improvements in child physical activity. The chapter then concluded with thesis aims and overview of the thesis structure.

Summary of Chapter 2

This study sought to examine the prevalence of implementation of physical activity policies and practices in centre-based childcare services within the Hunter New England Local Health District (HNELHD) of NSW Australia. Associations between these implementation outcomes and service characteristics (service type; service size; socioeconomic disadvantage; and remoteness of location) were also assessed. Current data regarding the prevalence of practices and policies to support physical activity in children attending such services was lacking, with the most recent Australian data published five years ago in 2013.

A cross-sectional survey with 309 centre-based childcare services located in the Hunter New England region of NSW was conducted using a computer-assisted

telephone interview (CATI). The telephone survey investigated whether services were implementing seven recommended physical activity promoting policies and practices. The questions asked whether the service: 1) scheduled 25% or more of their opening hours for physically active play (including indoor and outdoor free-play and educator-led activities); 2) provided accessible portable play equipment indoors and outdoors; 3) provided sufficient quantities and types of portable play equipment for all children who regularly use them; 4) scheduled time for daily fundamental movement skills (FMS) activities for 3 to 5 year-olds; 5) had a written physical activity policy with required elements included; 6) had a written small screen recreation policy with required elements included; and 7) employed staff (at least 50%) who had received training in the past five years (by an external agency or other trained staff) in how to promote child physical activity.

The study found that a high proportion of services reported providing active play opportunities for children (98%) and having portable play equipment available both indoors and outdoors (95%). Sixty-four per cent of services also reported implementing daily FMS activities and 69% of services reported having at least 50% of their staff trained in physical activity promotion. However, only 26% reported having a policy on restricting small screen recreation. While the implementation of some practices was high, only 8% of services could fully implement all seven of the recommended practices and policies examined. When examining the results by service characteristics, it was found that long day care centres had twice the odds of having a written policy encouraging physical activity compared to preschools. Neither service size, geographical location nor relative socioeconomic disadvantage of services was associated with the implementation of any practices or policies. The potential impact

of higher implementation of practices and policies on actual child physical activity cannot be determined in this study.

The study acknowledges existence of legislation around childcare accreditation licencing, however PA policies are not regulated like sun protection, healthy eating and sleep policies are (33). This may have explained the low implementation of such policies in this study. It is also important to situate the findings of this study to the particular region of Australia as the sample could be considered as biased. All centres were located in NSW, a state that had significant investment in educator training in relation to physical activity in the last five years courtesy of the Healthy Child Initiative Implementation of supportive measures to prevent weight gain in children (Good for Kids and Munch and Move initiatives). Also, relevant to note is the simplistic nature of the questionnaires posed such as portable play and teaching of fundamental movement skills, whereby their presence may not consider the educators' understanding of age appropriateness of equipment or movements.

This chapter identified that implementation of recommended practices and policies known to increase child physical activity in childcare services are still suboptimal. It appears that practices that were not reliant on staff training/skills were better implemented including providing free-play opportunities and having portable equipment. These findings support the need for environmental interventions that could be easily implemented as tested in chapters 3 to 5.

Summary of Chapters 3 and 4

Chapters 3 and 4 reported the methodology and evaluation of a cluster randomised controlled trial of an outdoor free-play scheduling intervention in centre-based childcare services. The study sought to assess the impact of the intervention primarily

on increasing the average daily moderate-to-vigorous physical activity (MVPA) levels in children aged 3 to 6 years old attending the services.

The trial involved 316 children from 10 childcare services (5 intervention services, 5 control services) located within the Hunter New England Local Health District in NSW, Australia. To be eligible for the study, services needed to be currently scheduling only one period of outdoor free-play between the core hours of operation of 9 am to 3 pm. Where there were multiple rooms separated by age (i.e. 2-3-year-old room, 3-5-year-old room), the intervention was implemented in rooms where most of the children were aged 3 to 6 years, as it was delivered by room leaders/educators. The intervention required services to break the existing single period of outdoor play into three separate periods of outdoor free-play without increasing the overall duration of the original one period. The specific scheduling of the three periods differed between services as some preferred all morning periods and others had two morning and one afternoon period. Fidelity assessments indicated that all the intervention services implemented the intervention (when observed for three days in a week) and did not increase their overall time of outdoor free-play. Control services did not make any changes (in terms of outdoor play frequency and/or total time) to their scheduling of outdoor free-play. Child physical activity was objectively measured at baseline and three months after baseline using gold standard hip-worn accelerometers. Data were collected for one week (5 days) at baseline and at follow-up. Ongoing accelerometer process data were collected to ensure that any faulty accelerometers were removed from the device pool. To provide contextual information to support the interpretation of primary outcomes, observations of staff physical activity practices and service environment and policies audits were conducted. Daily temperatures (minimum and maximum) and average UV Index obtained from weather websites provided context

to the data collected. Parental and home characteristic information regarding opportunities for child physical activity at home were also collected via a CATI conducted with the parents of children taking part in the study.

This study found a significant between-group difference (between intervention and control services) for the primary outcome of average daily MVPA while in care (adjusted for age, sex, and outdoor free-play duration at follow-up). When all available data were analysed by generalised linear mixed models (GLMM) a 6.11 minute (95% CI 0.54, 11.68, $p=0.04$) daily increase in MVPA was observed for children attending intervention services. These results were also found to be significant when missing accelerometer data were imputed (5.21 minutes, 95% CI 0.59, 9.83, $p=0.03$). There was no increase in the total time that children spent participating in physical activity in the care setting, only in the intensity of the physical activity during that time. This suggests that it is possible to increase the benefit obtained from time spent in high-intensity physical activity, without increasing duration.

The Environment and Policy assessment and observation instrument (EPAO) include the presence of fixed play equipment, portable play equipment, outdoor running space, indoor play space and whether the centre has a written policy and documented curriculum on physical activity. The measurement of the physical activity environment of this study at follow-up did not differ between the intervention (mean 12.13 sd. 2.04) and control (mean 12.78 sd. 2.73) services. The average score was comparable to that of another Australian study of 12.35 (sd. 1.74) (82) and higher than that of an older American study of 8.33 (sd. 1.13) (83). In this main trial, children attending the participating services achieved an average daily MVPA of 51.72 - 58.70 minutes, just short of the 60 minutes of active play recommended guidelines.

Subgroup analyses also indicated no differential effects by age, sex and baseline physical activity suggesting that the intervention may have similar effectiveness across different groups of children. Such findings are welcomed given that other studies conducted in schools and childcare services (84-87) have reported differences by these types of demographic characteristics suggesting inequity in intervention benefits for some children.

Data on any adverse events (e.g. children hurt because of physical activity) were also collected and showed no difference between the number of injuries reported in the period prior to baseline data collection and during the intervention period. This is reassuring to educators and parents alike who have been known to restrict children's opportunities for outdoor play for fear of the increased risk of injuries (88). Similarly, the intervention had no effect on the child's level of out of care physical activity (i.e. it was not reduced) compared to the control services. This suggests that increasing children's physical activity in care is unlikely to adversely affect child activity out of care.

Summary of Chapter 5

This study pilot tested the impact of another environmental childcare-based intervention on child MVPA. The intervention involved childcare centres allowing children unrestricted access to outdoor play areas all day while at the childcare service. The study was developed in response to a large number of services that were classified as 'ineligible' when recruiting service for the main intervention trial (Chapters 3 and 4). More than two-thirds of the services approached were ineligible as they had a model of operation that allowed children to move freely between indoor and outdoor areas all day, and thus had no fixed scheduling of outdoor free-play periods. This policy of

allowing all-day indoor/outdoor free-play was consistent with centre-based childcare physical activity policy recommendations and service accreditation standards at the time of recruitment. The effectiveness of this physical activity policy had not been previously evaluated to our knowledge.

The study design was a pilot cluster RCT involving six services (3 intervention services, 3 control services) in the Hunter region of NSW. To be eligible for the study, services needed to not currently offer an indoor/outdoor free-play schedule; and be scheduling only one period of outdoor free-play between the core hours of operation of 9 am to 3 pm per day. As in the main RCT, the intervention was implemented in rooms where most children were aged 3 to 6 years. The control services maintained their one outdoor play period without changing the original total time allocated to outdoor physical activity. The three intervention services amended their scheduling to allow indoor/outdoor free-play for their children (i.e. children had access to play outside whenever they chose to when structured play is not taking place throughout the day). Participants in this trial were 231 children, aged three to six years. Of the three services allocated to implement the indoor/outdoor free-play intervention, two accepted the offer of assistance from an early childhood specialist or dedicated research assistance, while one service declined the offer of support.

The primary aim of the study was the same as in Chapter 4, to test the effectiveness of the intervention on increasing average daily MVPA levels in children. Individual child MVPA data were collected via a hip-worn accelerometer, from the time the child attended care in the morning until the time the child left for the day in the afternoon or 3 pm, whichever was earlier. The secondary aim of the study was to assess whether allowing children to leave the indoor area to go outdoors whenever they chose to would have an impact on their cognitive functioning. Cognitive

functioning was assessed using a suite of three games on an iPad. These five-minute games were ‘played’ by the participating children before they started their day whenever possible; to avoid inadvertently reducing potential outdoor time or increasing seated time. The games could be either played in one sitting or spread over the different days the child attended in the week.

The results of the multivariate regression analysis using all available data (adjusted for child age and sex) showed no significant difference in the number of minutes of average daily MVPA between baseline and follow-up, relative to the control group on multiple imputations and complete case analysis. Similarly, the difference of total physical activity while in care (counts per minutes) for children attending an intervention compared to a control service at follow-up was not significant. However, as the trial was only a pilot study it was not fully powered to detect small changes in MVPA. In order to reach the sample size proposed for a larger sufficiently powered study i.e. 22 services and 1520 children would mean extending the study sampling to the entire state of NSW. Although non-significant, the effect sizes of five minutes were promising and suggest the intervention should be tested again in a fully powered trial. Differences in scores on the cognitive function tests between intervention and control services were also found to be non-significant. However, since the study also found a non-significant primary outcome, the inclusion of these tests again in future trials is warranted. Given the many other health and developmental benefits of increases in outdoor time and PA levels, including the impact of other secondary outcomes may also be beneficial.

An important process evaluation finding from this study was that in the intervention services there was a lower frequency of staff prompting children to initiate physical activity, and staff provision of positive statements about physical activity to

children reduced, compared to the control services. This could suggest that additional implementation support strategies, such as staff reminders or environmental stimuli, might be needed to improve the indoor/outdoor free-play intervention. Furthermore, in contrast to the main RCT, subgroup analyses found that there was a moderator effect for 'age' for the primary outcome of average daily MVPA. Children aged 3 years spent fifteen minutes less time on average daily MVPA compared to those aged 5 years. A possible hypothesis is that younger children have a greater need for adult interaction to facilitate physical activity. Although the findings are exploratory, this highlights the importance of implementing a range of strategies to support child physical activity. In addition, future physical activity trials to consider assessing intervention impact by child age and include other developmental outcomes such as socio-emotional development or FMS.

Summary of Chapter 6

Both trials conducted as part of this thesis highlighted the promising effect of simple, environmental based interventions on child MVPA. However, in trial 2 (described in Chapter 5), a few anecdotal barriers to the implementation of indoor/outdoor free-play were documented. This included for example staff ratios to enable supervision when some children are outdoors and some indoors, and the time needed for multiple transitions (putting on hats and sunscreen). While we were aware of such anecdotal barriers to the implementation of environment-only interventions, these barriers had not been systematically reviewed in the literature to our knowledge. Therefore, the aim of Chapter 6 was to conduct a systematic review to identify reported barriers to, and facilitators of, the implementation of environmental recommendations to encourage physical activity in children attending centre-based childcare.

Six electronic databases (PubMed, Embase, PsycINFO, ERC, CINAHL, and Scopus) and Google Scholar were searched for research studies written in English, of any study design, published before July 2017. Eligibility criteria for the review were studies (quantitative or qualitative) that identified barriers and facilitators to the implementation of recommendations to increase physical activity that had been reported by centre-based childcare educators or supervisors. The barriers/facilitators identified were synthesised using the Theoretical Domains Framework (TDF). The TDF comprises of 14 domains, derived from 33 psychological theories that identify factors influencing behaviours.

The review identified 18 eligible studies from three countries (United States, Canada and Australia) and one from multiple European countries. Reported factors affecting implementation were categorised according to whether a qualitative and/or quantitative approach had been used to collect the data. For barriers, the highest prevalent domain reported across quantitative articles, was the ‘social influences’ domain (median = 38%, range: 8-58), followed by the ‘environmental context and resources’ domain (median = 32%, range: 4-73). Similarly, for facilitators, the highest prevalent domain reported across quantitative articles, was the ‘social influences’ domain (median = 42%, range: 31-100) followed by the ‘environmental context and resources’ domain (median = 41%, range: 0.4-100).

The factors influencing the implementation of environmental physical activity recommendations in centre-based childcare services appear to be mostly due to resources such as time, money, and space, and to social influences e.g. support from parents and other childcare staff. Strategies that address these barriers to implementation are needed to ensure that effective environmental interventions are delivered and can achieve their intended impact of increasing MVPA in children in the

childcare setting. Strategies to address the barriers identified in the review could include training, goal setting, incentives, modelling, monitoring of behaviour and rehearsal of behaviour (89).

Significance and strengths of the thesis

The five comprehensive bodies of work outlined above are built upon a decade of physical activity research in childcare in the region where the research was undertaken (90-92). At the time of the conception of the studies in this thesis, multi-component efforts have only been moderately effective (71, 93), as have trials conducted to support implementation of PA practices and policies in childcare settings (73). This is consistent with wider literature which has been the experience internationally and locally that multi-component, complex strategies that have been evaluated has had little impact on child PA (48, 94). This thesis builds on the learnings and evidence-base and significant contributions to the existing international literature and the local context in the following ways:

- a) Chapter 2 describes the implementation of policies and practices that had been recommended be implemented to promote child PA in all childcare services in NSW. Locally Hunter New England Population Health had invested in support for childcare services to implement these practices for over 5 years. In this context, findings from chapter 2 supports the timeliness of testing more simple intervention approaches for improving children's PA instead of more complex interventions given past studies and chapter 2 findings had demonstrated their implementation was difficult, despite the accreditation process childcare services are subjected to (95). Policies and practices that are effective, simple and more easily implemented may have a greater impact on child physical

activity in this setting. Research to identify such interventions, therefore is warranted.

- b) The results from Chapters 3 & 4 (scheduling three short periods' vs one long period of outdoor play) showed that the average daily MVPA while in care could be significantly increased by a simple intervention. These findings make a valuable addition to the existing literature on environmental interventions to support physical activity in childcare (96-98). Of particular importance, previously trialled interventions that were complex and included multiple components were implemented with low fidelity and thus failed to achieve positive MVPA outcomes (48).
- c) The indoor / outdoor free-play policy intervention described in Chapter 5, while underpowered, resulted in effect sizes that warrant testing the intervention in a fully powered trial. This is particularly important given that the policy already exists as part of a national accreditation process. No other trials had investigated children's free flow access to indoor/outdoor areas while in childcare to the best of our knowledge. However, our findings are consistent with observational studies which suggest that increased outdoor time in care is associated with increased child physical activity (99-101). More research into indoor/outdoor free-play interventions is therefore needed to determine the efficacy of this type of intervention in the childcare setting.
- d) The simple intervention achieved a significant increase in child MVPA without creating subgroup differences that could adversely affect the equity impacts of the intervention. For example, there were no differences in outcomes for children who had higher or lower physical activity levels different sex or age at baseline. It is important with any trial to assess whether or not an efficacious intervention

exacerbates existing differences in attainment of physical activity for optimal health and development between groups. For example, there is evidence that some interventions, while effective, lead to a greater increase in MVPA for boys compared to girls (102).

- e) The systematic review (Chapter 6) is the first review to look at barriers and facilitators to the implementation of environmental recommendations specifically within the childcare setting. The consolidated findings revealed that resources and social influences were the key areas to consider. Leadership and the role of educators were identified as being positively associated with intervention implementation, suggesting pedagogical practice should be embedded in trial designs in this setting. The review also mapped barriers to a theoretical framework that could be used to inform the design of future implementation strategies to address such known barriers.

Future directions and recommendations from this program of work

The findings from this thesis highlight future opportunities to contribute to developing a program of research to support childcare services with improving child physical activity. There is a need to test the effects of environmental interventions in different populations, as well as to test whether the effects of the interventions are sustained after the initial implementation. In order for a greater understanding as to why an intervention worked or did not work, data collection measures including feasibility and acceptability of the intervention has to be incorporated in the study design. Likewise, to widen translation and produce beneficial impact at a population level, a consideration of strategies to support implementation that addresses identified barriers to implementation (in Chapter 6) is needed. Lastly, cost-effectiveness data has to be

considered to convince stakeholders of the intervention translatability due to economic prioritisation. The following sections aim to further discuss these five topics.

Diversifying the sample and reducing sampling bias

To overcome of the limitations of previous trials, future trials testing the impact of environmental interventions should include a broader population of childcare services located in different geographical/socioeconomic regions to reduce sampling bias and increase generalisability of findings.

The studies conducted as part of this thesis found that consenting families and services were those located in higher socioeconomic regions. To increase the generalisability of trial findings and reduce selective sampling, recruitment of services should be undertaken in a larger region and with probability sampling approaches used where possible. For example, a randomisation method that is recommended to improve generalisation is stratified recruitment where each strata are grouped based on theory or as pragmatic as possible and then samples are chosen from a proportionate allocation (103). All studies from Chapters 2 to 5 focused on a sample of childcare services from only one region in NSW Australia, which could limit the representativeness of the study results. Further, several factors are likely to affect sample generalisability including consent and attrition rates. To maximise consent from parents, it is important to plan recruitment and study procedures by increasing engagement between the service, the researchers and the community (104). We used face-to-face recruitment methods and achieved a consent rate of 61-71 % and an attrition rate of under 10%. Previous studies have used multiple strategies for recruiting parents of children in childcare including incentives for completion of data collection processes, holding dedicated sessions to clarify concerns, collecting

addresses as well as phone numbers and having a site champion (a room leader, or a parent) who could be trained to be a spokesperson on the perceived benefits of the trial for their children to maximise consent rates (105).

Increasing the follow-up time to evaluate long-term outcomes

The studies conducted as part of this thesis only collected data immediately post-intervention, at 3-months. Ideally, a longer follow-up assessment of 12 to 24 months would be undertaken to provide an understanding of the long-term impact of the tested interventions. Adding a longer follow-up could allow for controlling of seasonal effects and potentially avoid one-off significant events such as attendance at primary school transition programs or excursions, and having the opportunity for catch-up data collection in case of illness. Sustainment effects can then be evaluated to see if other barriers or facilitators are elicited with a longer follow-up or if effectiveness is maintained. Previous studies in Canada which have examined the longer-term impact of similar interventions document low sustainability largely due to a lack of ongoing implementation of the recommended changes (56). Further, given the short follow up period in the trials conducted as part of this thesis, data collection occurred in different seasons, which could also affect the outcomes given the potential impact on seasonality on physical activity. The follow-up data collection period towards the end of the year meant follow-up data collection took place during the warmer seasons (average temperatures of 30-35 Celsius), where the Ultra-Violet index (above UV index of 3) may have affected areas available for play outdoors (e.g. play takes place in shaded areas). The UV Index which measures UV levels on a scale from 0 (low) to 11+ (extreme) serves as an indicator when sun protection is required (UV index >3). Although the Education and Care Services National Regulations 113 and 114 prescribe

shady and natural play spaces, some childcare services may choose to keep children indoors when trees shed their leaves, resulting in less outdoor play than usual due to the less coverage. As such, future studies should consider undertaking data collection at other periods in the year to account for this effect.

Collection of process measures

The collection of process measures related to recruitment, retention, adherence and satisfaction assessed to determine program feasibility and acceptability is likely to provide important information to support implementation and scale up (106). For example, the Study of Health and Activity in Preschool Environments (SHAPES) childcare study published a process evaluation, which collected information on attendance, adherence, dose delivered, context feasibility, perceived effectiveness, enjoyment, researcher-childcare staff communication, and likelihood of future implementation which could be embedded in future studies examining the impact of such studies (107). Such measures, when collected prospectively, would provide context to the level of implementation achieved and provide suggestions as to where improvement efforts could be targeted. Future studies should consider integrating such assessments, where possible (108).

Economic evaluation

In addition to effectiveness, policymakers also need evidence of cost-effectiveness to support decisions to scale up/adopt programs but economic evaluations of public health interventions are rarely conducted (94, 109, 110). Public health funding are limited and policymakers need to make decisions on how best to allocate funds for optimal return on investment (111). Simply providing evidence of effectiveness may

not be sufficient for grantors and policymakers to support prioritisation decisions. To enable economic evaluation, planning data collection regarding the cost of implementing intervention (costs of resources - staff, training, materials, and administrative cost utilisation) would need to be incorporated early in the intervention planning processes.

A recent systematic review (searches conducted up to November 2017) found twelve economic evaluations of public health implementation-interventions (112). A recommendation from this review includes a short checklist to guide the conduct and reporting of economic evaluations of implementation interventions, which could be employed to strengthen readily available economic evaluation checklists and thus inform future data collection for future trials with greater utility (113, 114). This includes considering, indirect costs such as future costs from the health care and productivity costs due to ill health and modelling on the impact of the intervention on morbidity and mortality that would have been avoided/ delayed. (115, 116).

Further consideration of implementation barriers and examining approaches for environmental interventions in childcare services

While it is important to further confirm findings from the environmental interventions above, the benefits of such interventions are unlikely to result in improvements to children's health if they are not broadly implemented. As highlighted in Chapter 2, childcare service staff report low implementation of a number of physical activity promoting policies and practices. Further, Chapter 6 identified a number of barriers to the implementation of environmental interventions to improve child's physical activity in childcare services, which included both organisational and individual level barriers, including lack of resources such as time, money, space and social influences e.g.

support from parents and other childcare staff. In Chapters 4-5, similar barriers were anecdotally described by childcare staff including having the confidence to rearrange curricula around outdoor play periods and handling multiple transitions to put on sunscreen and hats, resulting in reduced staff attention in verbalising encouragement of children's play.

In the context of such findings, implementation strategies that target these known barriers are needed to facilitate translation of the proposed environmental intervention if shown to be effective. A Cochrane systematic review (94) identified six controlled trials, two that examined implementation of evidence-base physical activity policies and practices and four that targeted both physical activity and nutrition practices in childcare services. The review identified the limited impact of the implementation interventions, which include a combination of strategies such as training, resources, ongoing support, audit feedback, opinion leaders, incentives, and educational outreach visits, on childcare centre implementation of physical activity policies and practice. While some studies reported improvements in a small number of practices, all six studies were unable to change all targeted physical activity practices and outcomes (70, 71, 91, 93, 117, 118).

Since the review have been conducted, eight additional studies (two focusing on implementation of physical activity policies and practices in isolation and six focusing on both physical activity and nutrition practice) have been identified, which are described in detail below. Six studies were RCTs, two used a quasi-experimental design, and all were conducted in high-income countries including Australia, Canada and the US.

The first study tested the impact of a 10-week professional learning development intervention for educators in a randomised controlled trial design (119) Twenty-six

childcare services were randomly allocated to an intervention group or a wait-list control group. The intervention group were provided with two in-person workshops and expected to modify one class activity and one educator practice for two weeks, followed by three other class activities and practice pairs. The intervention did not result in a significant difference between groups on child physical activity behaviours but the educators in the intervention groups were found to be more encouraging of children to be active compared to the control group (Follow-up mean 4.7 vs 3.9, respectively, $p=0.02$). The second study (120) used a quasi-experimental design to compare 34 services in South Carolina with 30 services in North Carolina. The study aimed to assess the impact of a new physical activity policy on childcare practices. The ABC Grow Healthy eight standards include: '(a) Encourage children to be physically active indoors and outdoors; (b) Create and consistently implement a written physical activity policy; (c) Require teachers to attend physical activity training at least once per year; (d) Do not use or withhold physical activity as punishment; (e) Implement 5 to 10 minutes of teacher planned physical activity 2 or more times per day; (f) Provide active outdoor play, weather permitting, 2 to 3 times per day, totalling 90 to 120 minutes; (g). Provide a variety of play materials that promote physical activity indoors and (h). Provide a variety of play materials that promote physical activity outdoors'. The investigators found that adopting the mandatory physical activity standards was associated with improving the services practices using the Environment and Policy Assessment and Observation (EPAO) tool. However, the policy only significantly influenced the subscale score for 'fixed play environment' and 'physical activity training and education'.

Six randomised controlled trials (two Australian, one Canadian and three American) assessed the impact of implementation strategies on both nutrition and

physical activity practices and policies. The first Australian trial by Jones and colleagues used comprehensive implementation strategies such as implementation support staff, executive support, consensus processes, staff training, academic detailing visits, performance monitoring and feedback, provision of tools and resources and a communication strategy (73). They found the intervention significantly increased the proportion of intervention services (n=62) implementing two out of the five physical activity policies and practices compared to the control services (n=60) (presence of written physical activity policy and provision of adult guided daily fundamental movement skills development activities). The second Australian trial assessed the effect of performance reviews and facilitated feedback on increasing the implementation of evidenced based policies and practices in 108 childcare services (121). When the intervention services were compared to the control services at 12 months, significant between group differences were found for implementing just one of the four physical activity promoting policies and practices (providing information to families on physical activity, OR 3.14 (95%CI 1.09, 9.06), p=0.03).

The Canadian Healthy Start trial aimed to improve physical activity and healthy eating among 69 young children attending 6 licenced early childcare centres in rural communities (122). The implementation strategies included intersectoral partnerships, the Healthy Start guide for educators, customised training, role modelling and monitoring, evidence-based resources for families and educators, knowledge development and exchange and a communication strategy. Though the researchers found no significant between group differences for environmental scan scores or FMS scores at baseline and post intervention (48 weeks), the intervention group had significantly more MVPA than the comparison group.

Of the three American trials, the first studied the impact of a 7-month teacher wellness-policy intervention (123, 124). This multicomponent intervention included training and technical assistance and employee wellness activities matched to classroom resources (e.g. benefits of physical activity with walk-a-mile maps around their centres and the classroom activity included a read and dance poem about the heart and being active). The sample of 46 teachers from 23 Head Start classrooms (18 centres) reported a Health Behavior Indicator (HBI) score from a monthly survey, which assessed their health status and behaviours. This trial found that in classrooms which teachers reported improvements in their own health behaviours had a greater intervention effect on EPAO-physical activity scores.

Another American trial adapted NAP SACC program as described by Alkon and colleagues (125). By integrating the annual ‘healthy apple’ quality improvement program in participating childcare services with existing public health nursing services (in-kind annual BMI screening), the investigators were able to show a significant increase in children exposed to best practices (Use of a physical activity curriculum and Staff usually join in physically active play with children). The trial also demonstrated a significantly more negative mean change in child BMI percentile (-5.6, $p=0.03$) in 2014-15 compared to 2011-2012. Apart from the NAP SACC resources, implementation strategies include nurses working one-on-one with providers, paid incentives for participation (\$25 for completion of self -assessment) and workshops on structured physical activity.

Lastly, the third American trial examined the effect of a 2-year implementation of the Coordinated Approach to Child Health Early Childhood (CATCH EC), a pre-school-based healthy nutrition and physical activity program (126). The CATCH EC comprises of three components: ‘(a) It’s fun to be healthy! A nutrition and gardening

based curriculum; (b) developmentally appropriate structured indoor and outdoor physical activities and (c) parent tip sheets'. Implementation strategies included trainings and technical support (booster trainings, monthly messages, and email reminders). This study did not detect significant between group differences in activity, nor nutrition behaviours. Overall, there were higher implementation scores across both years in the 12 intervention services (mean score: 74.7% in year 1; 72.0% in year 2) compared with the 13 comparison services (mean score: 45.5% in year 1; 44.2% in year 2, $p < 0.01$).

Collectively these findings suggest that it is challenging to change implementation of a broad range of physical activity policies and practice in childcare. While training and technical assistance may be acceptable to childcare staff, it appears to have limited capacity to address all barriers to implementation. As such, a variety of different implementation strategies that target broader organisational level barriers and include intersectoral partnerships may be needed to support comprehensive implementation of physical activity policies and practice. One way to do this may be to integrate the interventions trialled in this thesis into the existing regulatory frameworks of the Australian early childhood sector.

Nationally, the simple interventions examined in this thesis broadly align with Australian Children's Education and Care Quality Authority (ACECQA) recommendations and the early years learning framework (EYLF) (127). The role of ACECQA specifically is to support the implementation of the National Quality Framework (NQF). The NQF consists of the National Law and National Regulations, the National Quality Standard (NQS) and nationally approved learning frameworks. The NQS comprises of seven quality areas categorised into 15 quality standards and 40 quality elements. These standards are enforced via state-based regulatory officers

who conduct a compliance assessment and rating of services. It is an operational requirement for services to show evidence for how they have met each of the National Quality Standards outlined in the framework. For the simple scheduling intervention tested in this thesis, an opportunity exists to incorporate the study findings into the National Quality Standard Area 2.2 as well the learning outcome 3 that ‘children have a strong sense of wellbeing – through promoting physical activity’.

A network of compliance officers who undertake quality assessments and ratings could potentially be offered training to support the implementation of physical activity promoting policies nationally. As services often report organisational barriers to prioritising the implementation of physical activity practices, this type of strategy may potentially be useful to overcome these barriers. Such an approach has been trialled in the US, as part of the Healthy Child Care Makes a Healthy Start pilot intervention in Colorado, US (128). Their academic-community partnership allowed university researchers to collaborate with local health departments tasked with enforcement of the licencing of over 550 childcare services. Inspectors received topic specific education and integrated healthy eating and active living talking points to facilitate dialogue with childcare services. The study resulted in an average of five policy, system and environment changes in the six participating services. The study findings suggest there is significant potential for similar strategies to be applied in Australia, leveraging on existing infrastructure and the reputation of such regulatory organisations.

Conclusions

The findings from this thesis suggest several courses of actions which could make future contributions to the field of increasing physical activity in early childhood. This

includes undertaking further trials to confirm that changing the scheduling practices of childcare services can positively influence child physical activity and cognitive outcomes, which is likely to positively influence health outcomes for thousands of children attending care. A number of recommendations to increase the generalisability of findings and overcome the limitations of the existing research (by collecting cost and process related data) were made. Further, this chapter describes the potential evidence for implementation strategies that could support the translation of these interventions if shown to be effective. The identified strategies focused on targeting barriers to implementation as well as leveraging on existing infrastructure to support broad dissemination. Overall, this body of work advances the field in demonstrating the potential of simple scheduling outdoor free-play interventions in increasing physical activity in the early years.

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Appendices

THESIS SUBMISSION CHECKLIST



Use this checklist to ensure you have met all the requirements to submit your thesis for examination.

Note that your thesis is submitted electronically, via [Blackboard](#). You may also refer to the [Thesis Submission Step-by-Step Guide](#) and the FAQs available on the HDR Thesis Examination Blackboard page.

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Check title page details are correct

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For a Traditional Thesis containing published work – Statements 1 & 3 and

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24 March 2017

Dr L Wolfenden
Population Health
Wallsend Campus

Dear Dr Wolfenden,

Re: HNE Kids Healthy Eating and Physical Activity Program (06/07/26/4.04)

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 determined the variation meets the requirements of the National Statement on Ethical Conduct in Human Research and has granted ethical approval for the following amendment requests:

Document	Version	Date
Early Childhood Education and Care Health Survey Information for Nominated Supervisors	6	1 March 2017
Nominated Supervisor CATI Questions	1	1 March 2017
Information Statement for Nominated Supervisors	3	1 March 2017
Nominated Supervisor Survey 2017	1	1 March 2017
Nominated Supervisor Lunchbox Survey Items	1	1 March 2017
Early Childhood Education and Care Lunchbox Survey Information for Nominated Supervisors and Educators	7	1 March 2017
Educators Lunchbox Survey Items	1	1 March 2017
Cooks Survey	1	1 March 2017

- To conduct a new telephone survey with Nominated Supervisors of Early Childhood Education and Care services in the Hunter Local Health District;
- To conduct additional online surveys with a subsample of Nominated Supervisors and educators from Early Childhood Education and Care Services across the Hunter New England Local Health District (n=50) where parents pack food in children's lunchboxes; and
- To conduct 12 month follow-up data collection with Nominated Supervisors and cooks in an existing subsample of menu-based Early Childhood Education and Care services in the Hunter New England Local Health District (n=72) involved in a menu support intervention in 2016 including to:
 - o a) collect service menu information through a site visit

Hunter New England Research Ethics & Governance Office

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- b) conduct a written survey of Nominated Supervisors and cooks (previously approved)

Approval has been granted for this study to take place at the following site:

- **Hunter New England Local Health District**

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. Ethics Approval will be ongoing subject to the following conditions:

- A report on the progress of the above protocol is to be submitted at 12 monthly intervals. A proforma for the annual report will be sent at the beginning of the month of the anniversary of approval. Your review date is **November 2017**.
- All variations or amendments to this protocol must be forwarded to and approved by the Hunter New England Human Research Ethics Committee prior to their implementation.
- A final report must be submitted at the completion of the above protocol, that is, after data analysis has been completed and a final report compiled.
- The Principal Investigator will immediately report anything which might warrant review of ethical approval of the project in the specified format, including:
 - Notify the reviewing HREC of any adverse events that have a material impact on the conduct of the research in accordance with the NHMRC Position Statement: *Monitoring and reporting of safety for clinical trials involving therapeutic products May 2009*
https://www.nhmrc.gov.au/files/nhmrc/publications/attachments/e112_nhmrc_position_statement_monitoring_reporting_safety_clinical_trials.pdf
 - 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 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 Local Health District. This research may therefore commence.

Should you have any queries about your project please contact Dr Nicole Gerrand as per the 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 Local Health District website.

Please quote **06/07/26/4.04** in all correspondence.

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

Yours faithfully



For: Ms M Hunter
Chair
Hunter New England Human Research Ethics Committee

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Registration of External HREC Approval

To Chief Investigator or Project Supervisor:	Doctor Luke Wolfenden
Cc Co-investigators / Research Students:	Doctor Serene Yoong Miss Emma Thompson Doctor Christopher Williams Doctor Pennie Gibbins Doctor Rebecca Wyse Doctor Tara Clinton-Mcharg Doctor Megan Freund Ms Rachel Sutherland Ms Clare Desmet Miss Kirsty Seward Conjoint Associate Professor Andrew Bell Professor John Wiggers Ms Nicole Nathan Ms Kym Buffett
Re Protocol:	HNE kids healthy eating and physical activity program: School and childcare surveys
Date:	20-Apr-2017
Reference No:	H-2008-0343
External HREC Reference No:	06/07/26/4.04

Thank you for your **Variation** submission to the Research Integrity Unit (RIU) seeking to register an External HREC Approval in relation to the above protocol.

1. Conduct a new telephone survey with Nominated Supervisors of Early Childhood Education and Care services in the Hunter New England Local Health District.
2. Conduct additional online surveys with a subsample of Nominated Supervisors and educators from Early Childhood Education and Care services across the Hunter New England Local Health District (n= 50) where parents pack food in children's lunchboxes.
3. Conduct 12 month follow-up data collection with Nominated Supervisors and cooks in an existing subsample of menu-based Early Childhood Education and Care services in the Hunter New England Local Health District (n=72) involved in a menu support intervention in 2016 including to: a) collect service menu information through a site visit; and b) conduct a written survey of Nominated Supervisors and cooks (previously approved).
4. Amend recruitment information and documentation in line with above.

Your submission was considered under an **Administrative Review** by the Ethics Administrator.

I am pleased to advise that the decision on your submission is **External HREC Approval Noted** effective **20-Apr-2017**.

As the approval of an External HREC has been noted, this registration is valid for the approval period determined by that HREC.

Your reference number is **H-2008-0343**.

PLEASE NOTE:

As the RIU has "noted" the approval of an External HREC, progress reports and reports of adverse events are to be

submitted to the External HREC only. In the case of Variations to the approved protocol, or a Renewal of approval, you will apply to the External HREC for approval in the first instance and then Register that approval with the University's RIU, via RIMS.

Linkage of ethics approval to a new Grant

Registered External HREC approvals cannot be assigned to a new grant or award (ie those that were not identified in the initial registration submission) without confirmation from the RIU.

Best wishes for a successful project.

Mr Alan Hales
Manager, Research Compliance, Integrity and Policy

For communications and enquiries:

Human Research Ethics Administration

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 Callaghan NSW 2308
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RIMS website - <https://RIMS.newcastle.edu.au/login.asp>

Linked University of Newcastle administered funding:

Funding body	Funding project title	First named investigator	Grant Ref
Hunter New England Local Health District/Scholarship(**)	An online consumer intervention in primary school canteens	Wolfenden, Luke	G1500605
NHMRC (National Health & Medical Research Council)/Translating Research into Practice (TRIP) Fellowships(**)	Use of an online canteen ordering system to implement healthy canteen policies in NSW primary schools	Wyse, Rebecca	G1500620
Hunter New England Local Health District/Scholarship(**)	Healthy eating intervention for disadvantaged schools	Wolfenden, Luke	G1500701
Hunter New England Population Health	Salary support Top Up - Sze Yoong: A randomised controlled trial of an intervention to improve implementation of nutrition guidelines in childcare services	Yoong, Serene	G1500778
ARC (Australian Research Council)/Discovery Early Career Researcher Award (DECRA)(**)	Theory-based implementation of nutrition guidelines into childcare settings	Yoong, Serene	G1600359
Hunter New England Population Health/Scholarship(**)	Scheduling frequent opportunities for outdoor play - a simple approach to increasing physical activity in childcare	Yoong, Serene	G1600481
ARC (Australian Research Council)/Linkage Projects(**)	Moving from policy to practice: A randomised trial of an implementation intervention to facilitate the adoption of a statewide healthy canteen policy	Wolfenden, Luke	G1201168
Hunter New England Population Health/Linkage Projects Partner Funding(**)	Moving from policy to practice: A randomised trial of an implementation intervention to facilitate the adoption of a statewide healthy canteen policy	Wolfenden, Luke	G1300710
Hunter New England Population Health/Scholarship(**)	A randomized trial of an implementation intervention to facilitate the adoption of a state-wide healthy canteen policy	Wolfenden, Luke	G1400725
Hunter New England Local Health District/Project Grant(**)	A randomised trial of an implantation intervention to facilitate the adoption of a state-wide health canteen policy	Wyse, Rebecca	G1400906

```

TITL 0          supervis1      CATI          7      NAME      NOLAB
MODULE SUBMODUL
Nominated Supervisors HCI CATI 2017
***** TITLE ITEM *****
TIME 0          t_start 1          LABEL
MODULE SUBMODUL
This records Duration to Current point
Starting Time
***** GET DURATION ITEM *****
LINK 1          address 1          LABEL
MODULE SUBMODUL      8
T_start gt .
Items in external dataset
DATAACATI.CONFID      address
DATAACATI.CONFID      email
DATAACATI.CONFID      SupName
DATAACATI.CONFID      LastSpTx
DATAACATI.CONFID      NamTxt
DATAACATI.ANS2      servicL      D
DATAACATI.ANS2      servic2L      D
DATAACATI.ANS2      CENTNAMF      D
Links to external database
***** LINK TO EXTERNAL DATASET ITEM *****
CHCE 2 2      U service 4          _MAKE_          LABEL
MODULE SUBMODUL
servicL=. and (servic2L gt . or address gt '' or email gt '' or
SupName gt '' or CENTNAMF gt '' or NAMTxt gt '')
Hello, my name is ^_INTVR_^ and I'm from Hunter New England Local
Health District.

Is that ^CENTNAMF^?
1      Yes
2      No
DATAACATI.ANS2      servicL      S
AS available
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 3      U service22          _MAKE_          LABEL
MODULE SUBMODUL
service=2
I'm sorry, I have this number as ^CENTNAMF^?
Has your childcare centre ever been known by that name?
1      Yes
2      No
3      Not a childcare centre
DATAACATI.ANS2      servic2L      S
AS available
***** SINGLE CHOICE - CATI VERSION *****
INFO 1          service610          NOLAB
MODULE SUBMODUL
service2=3
I'm sorry to trouble you, I must have the wrong number

Thanks for your time.

```

```

*** Record on log sheet WN ***
***** INFORMATION SCREEN ITEM *****
OPEN 1 200      U service35          LABEL
MODULE SUBMODUL
service2=2
What's the name of your childcare centre?

And what suburb are you in?

[INTERVIEWER NOTE: Record centre name and suburb]
DATAACATI.ANS2      CENTNAMF      S
Name and suburb

```

```

***** OPEN ENDED ENTRY ITEM *****
INFO 1 service410 NOLAB
MODULE SUBMODUL
service3 gt ''
I was just ringing to speak to your Nominated Supervisor about an
Early Childhood Education an Care health survey, but I'll just check
these details against our list of services to call and ring you back if
you're one of the services we need to speak with.

Thanks for your time.

**PUT IN PROBLEM FILE WITH A NOTE TO THE PROJECT OFFICER**

*** Record on log sheet TO ***
***** INFORMATION SCREEN ITEM *****
OPEN 1 200 U service55 LABEL
MODULE SUBMODUL
service2=1
Ok, What is the NEW name of your centre?

I'll just update our records with that information.

[INTERVIEWER NOTE: Record centre name]
DATACATI.ANS2 CENTNAMEF S
NEW Name
***** OPEN ENDED ENTRY ITEM *****
INFO 2 Introla 2 NOLAB
MODULE SUBMODUL
servicL gt . and (servic2L gt . or address gt '' or email gt '' or
SupName gt '' or CENTNAMEF gt '' or NAMTxt gt '')
Hello, my name is ^_INTVR_^ and I'm from Hunter New England Local
Health District.
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 9 Introl 8 _MAKE_ LABEL
MODULE SUBMODUL
Service = 1 or service5 gt '' or Introla=1
We recently sent the Nominated Supervisor a letter about a health survey
we're conducting in Early Childhood Education and Care services.

Today, I'm just following up on the letter and was hoping to speak to
the Nominated Supervisor.
^LastSpTx^

Are they available?
1 Speaking to Nominated Supervisor/Survey Person
2 NS Person called to phone (record new NAME on L/S)
3 NS Person not avail (record on log sheet)
4 Time not suitable (record on log sheet)
5 Other (record on log sheet)
6 Requests copy of letter before continuing
7 Unlocatable (10 attempts, no contact) [UL]
8 Abandoned (10 attempts+contact) [OP]
.R Refused [DO NOT READ OUT]
AS available
***** SINGLE CHOICE - CATI VERSION *****
INFO 1 Intro2a 5 NOLAB
MODULE SUBMODUL
Introl = 2
Hello, my name is ^_INTVR_^ and I'm from Hunter New England
Local Health District.

We recently sent you a letter advising you that we would be contacting
you soon regarding a health survey in children's services.
***** INFORMATION SCREEN ITEM *****
INFO 1 Intro2b 3 NOLAB
MODULE SUBMODUL
Introl = 1
The letter advised that the survey was about practices around physical
activity and healthy eating in Early Childhood Education and Care
services
***** INFORMATION SCREEN ITEM *****

```

CHCE 1 5 Intro3 3 _MAKE_ LABEL
MODULE SUBMODUL
Intro2b = 1 or intro2a=1
The survey should take about 15-20 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
 - 3 Requests copy of letter before continuing
 - 4 No/Declined survey
- .R Refused [DO NOT READ OUT]

Appropriate time

***** SINGLE CHOICE - CATI VERSION *****

OPEN 1 200 refused 8 LABEL

MODULE SUBMODUL

Intro3 = .R or Intro1 = .R

OK, thank you for your time.

[Do not ask, but record reason if given]

*** Record on log sheet DR ***

Refused Reason

***** OPEN ENDED ENTRY ITEM *****

OPEN 1 200 res_oth 8 LABEL

MODULE SUBMODUL

Intro1 = 5

OK, thank you for your time.

[Do not ask, but record reason if given]

*** Record on log sheet OT ***

Other Reason

***** OPEN ENDED ENTRY ITEM *****

OPEN 1 200 decline 8 LABEL

MODULE SUBMODUL

INTRO3=4

OK, thank you for your time

[If provide reason - record]

*** Record on log sheet DR ***

Decline to participate

***** OPEN ENDED ENTRY ITEM *****

CHCE 1 3 Letter 3 _MAKE_ LABEL

MODULE SUBMODUL

Intro3=3 or intro1=6

Sure, I can send you another copy.

Would you prefer email or fax?

- 1 Email
- 2 Mail (Only use if service does not have Email or fax)
- 3 Fax

Letter

***** SINGLE CHOICE - CATI VERSION *****

TABL 1 20 letE 3 LABEL

MODULE SUBMODUL2

Letter=1

Can I have your email address?

[INTERVIEWER NOTE: - Record Email and First name

NUMC

2

Email

C

```

Name                                     C
EMAIL
*****TABLE ENTRY ITEM - NO BUTTONS *****
TABL 1 10      letP      4                                LABEL
MODULE SUBMOD 5
Letter=2
Can I have your postal address?

[INTERVIEWER NOTE: - Check against address printed on the log-sheet
Record new address - check spelling.]
numc      3
Name                                     C
Street                                          C
Suburb                                          C
State                                          C
Postcode                                       C
Current address
*****TABLE ENTRY ITEM - NO BUTTONS *****
TABL 1 20      letF      3                                LABEL
MODULE SUBMODUL2
Letter=3
Can I have your fax number?

[INTERVIEWER NOTE: - Record fax & First name - double check number]
NUMC      2
Fax number                                     C
Name                                     C
FAX NUMBER
*****TABLE ENTRY ITEM - NO BUTTONS *****
CHCE 1 2      continue4                                _MAKE_ LABEL
MODULE SUBMODUL
LetE gt . or LetP gt . or LetF gt .
I'll send that off as soon as possible.

Would you be willing to continue the survey today, or would you prefer
us to call you back once you've had a chance to read the letter?
1      Yes - continue survey
2      No - arrange callback
Continue survey
***** SINGLE CHOICE - CATI VERSION *****
INFO 1      callback10                                NOLAB
MODULE SUBMODUL
Intro3 = 2 or intro1 in (3,4)
Could you suggest another time that we can call-back?

Great, I'll call back then. Thank you very much for your time.
Goodbye.

*** Record on log sheet CB ***
***** INFORMATION SCREEN ITEM *****
INFO 1      CB      10                                NOLAB
MODULE SUBMODUL
continue=2
Could you suggest another time that we can call-back?

Great, I'll call back then. Thank you very much for your time.
Goodbye.
INTERVIEWER NOTE:
[Make arrangements for a call back and record on Log Sheet
If faxing/emailing - can arrange callback in minimum of 2 days time
If mailing letter - can arrange callback in minimum of 5 days time]

*** Record on log sheet CB ***
***** INFORMATION SCREEN ITEM *****
TABL 1 20      Nam1      8                                NOLAB
MODULE SUBMODUL4
Intro3=1 or continue=1

```

Thanks for agreeing to participate. Before we begin,
^NAMTXT^

IF SAME (NS): Check spelling of (^SupName^)

IF A NEW/OR ANOTHER STAFF MEMBER IS COMPLETING SURVEY: get name

```
** CLICK ON CELL NOT PARALLEL TO ONE JUST USED BEFORE MOVING ON **
NUMC                2
First Name          C
Last Name           C
Same Details NS     B    1
Refused             B    1
*****TABLE ENTRY ITEM - NO BUTTONS *****
MULT 1 10          Q1      3                        8      MLTLB
MODULE SUBMODUL
Nam1 gt .
Firstly, could you please let me know your position?

Please let me know what options apply to you as I read through them.
1      Director
2      Nominated / Authorised Supervisor
3      Room Leader (Preschool room)
4      Room Leader (Toddlers room)
5      Room Leader (Infants room)
6      Committee Member
7      Service owner
8      Other (Please Specify)
-9     Don't Know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]

Position
Director
Nominated Supervisor
Room Leader (Preschool room)
Room Leader (Toddlers room)
Room Leader (Infants room)
Committee Member
Service owner
Other (Please Specify)
Don't Know [DO NOT READ OUT]
Refused [DO NOT READ OUT]
*****MULTIPLE CHOICE - CATI VERSION*****
OPEN 1 200          Q1_open 1                        LABEL
MODULE SUBMODUL
substr(Q1,8,1)='1'
Please Specify Other
Refused Reason
***** OPEN ENDED ENTRY ITEM *****
INFO 2              INFOP 7                        NOLAB
MODULE SUBMODUL
substr(Q1,1,2)='00' and (Q1_open gt '' or substr(Q1,3,5) gt '00000' or
substr(Q1,9,2) gt '00')
To complete the interview on behalf of the NS, you will need to have
an understanding of the policies and practises in place at your service
regarding healthy eating, physical activity, and small screen time
recreation, as well as breast feeding if your service caters for babies.
If your service is eligible, you may also be asked to give consent on
behalf of your service to participate in further data collection as
part of a research study.
***** INFORMATION SCREEN ITEM *****
CHCE 1 2            Permis 1                        _MAKE_      LABEL
MODULE SUBMODUL
INFOP=1
Are you able to complete this survey?
1      Yes
2      No
OTHER PERSON ABLE TO COMPLETE THIS SURVEY
***** SINGLE CHOICE - CATI VERSION *****
INFO 1              CB2      11                        NOLAB
MODULE SUBMODUL
Permis=2
```

Could you suggest another person that would be able to answer the questions on behalf of the NS?

INTERVIEWER NOTE:

Please record the name of new person to call back on log sheet

Thanks what would be a good time that we can call-back to talk to them?

I'll call back then. Thank you very much for your time. Goodbye.

```
*** Record on log sheet CB ***
***** INFORMATION SCREEN ITEM *****
CHCE  2 4      Confadd 2      _MAKE_      LABEL
MODULE  SUBMODUL
Perm=1 or Substr(Q1,1,2) gt '00' and (Q1_open gt '' or
Q1 gt '0000000000' and substr(Q1,8,1)='0')
We have your services postal address recorded as ^address^
Is this correct?
1      Yes
2      No
3      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
Is postal address correct?
***** SINGLE CHOICE - CATI VERSION *****
TABL  1 10      Padd      8      LABEL
MODULE  SUBMOD  3
Confadd=2
Could I please have your services postal address?
```

```
[INTERVIEWER NOTE: Record new address - check spelling.]
numc      3
Street      C
Suburb      C
Postcode    C
New Postal Address
*****TABLE ENTRY ITEM - NO BUTTONS *****
CHCE  1 4      Confeml 2      _MAKE_      LABEL
MODULE  SUBMODUL
Padd gt . or Confadd in (1,3,.R)
And we have your email as ^email^
Is this correct?
1      Yes
2      No
3      Don't know
.R      Refused
Is email correct?
***** SINGLE CHOICE - CATI VERSION *****
OPEN  1 200      Newemail3      LABEL
MODULE  SUBMODUL
Confeml=2
Could you please tell me the email address for your centre?
```

```
[INTERVIEWER NOTE: Record email address]
New email address
***** OPEN ENDED ENTRY ITEM *****
CHCE  1 2      DECschol8      _MAKE_      LABEL
MODULE  SUBMODUL
NEWemail gt '' or Confeml in (1,3,.R)
Is your service part of a DEC primary or central school?
```

[INTERVIEWER NOTE: DEC = 'Department of Environment & Community'
ONLY answer YES if they are located within a DEC facility.
While all childcare centres are licensed by DEC, there are only a few
services attached to DEC schools, and I should have removed them all
from the logsheets]

```

1      Yes - (OS) Out of Scope
2      No
Eligibility: DEC service
***** SINGLE CHOICE - CATI VERSION *****
CHCE  1 2      Specneed1      _MAKE_      LABEL
MODULE  SUBMODUL
DECschol=2
Does your service solely cater for children with special needs?
1      Yes - (OS) Out of Scope
2      No
Eligibility - Solely cater for special needs
***** SINGLE CHOICE - CATI VERSION *****
MULT  1 6      Q2      4      4      MLTLB
MODULE  SUBMODUL
Specneed=2
Which of the following age groups does your service care for?

Please let me know what options apply to your service as I read
through them.
1      Children under 1 year
2      1 year olds
3      2 year olds
4      3 to 5 year olds
-5     Don't Know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
Care for age groups
Under 1 year olds
1 year olds
2 year olds
3 to 5 year olds
Don't Know [DO NOT READ OUT]
Refused [DO NOT READ OUT]
*****MULTIPLE CHOICE - CATI VERSION*****
MULT  1 6      Q5      4      3      MLTLB
MODULE  SUBMODUL
Substr(Q2,1,6) gt '000000'
Which of the following best describes your service?

Please let me know what options apply to your service as I read
through them.
1      Preschool
2      Long day care centre
3      Occasional Care
4      Mobile Services
-5     Don't Know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
Type of Service
Preschool
Long day care centre
Occasional Care
Mobile Services
Don't Know [DO NOT READ OUT]
Refused [DO NOT READ OUT]
*****MULTIPLE CHOICE - CATI VERSION*****
NUM  1      Q3      7      MM QINFORM      QFORMAT      LABEL
MODULE  SUBMODUL
Q5 gt '000000' and (substr(Q5,1,2) gt '00' or substr(Q5,5,2) gt '00')
Overall, how many allocated places per day do you have for children
at your service?

[INTERVIEWER NOTE: - record NUMBER OF PLACES PER DAY

(Code '888' if don't know)
(Code '999' if Refused)
0      400
0      1000
Allocated Places
***** NUMERIC OR DATE ENTRY - CATI VERSION *****
NUM  1      Q3a      8      MM QINFORM      QFORMAT      LABEL
MODULE  SUBMODUL
Q3 gt .

```


Overall, how many children are enrolled at your service?

PROMPT: If services respond with number of families - Some families have multiple children that attend the service, so we are after the total number of children enrolled

INTERVIEWER NOTE:

This refers to the number of children enrolled overall, not per day.

(Code '888' if don't know) (Code '999' if Refused)

0 400

0 1000

Number enrolled

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

NUM 1 Avnum 7 MM QINFORM QFORMAT LABEL

MODULE SUBMODUL

Q3a gt .

On average, what is the number of children that attend your service on a daily basis?

INTERVIEWER NOTE:

This may be the same as number of allocated places per day

(Code '888' if don't know)

(Code '999' if Refused)

0 400

0 1000

Average daily number of children

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

CHCE 1 4 ATSI 4 _MAKE_ LABEL

MODULE SUBMODUL

Avnum gt .

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 atsinum 5 MM QINFORM QFORMAT LABEL

MODULE SUBMODUL

ATSI = 1

How many children of Aboriginal or Torres Strait Islander origin are enrolled at your service?

(Code '888' if don't know)

(Code '999' if Refused)

0 400

0 1000

Number Aboriginal or Torres Strait children

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

NUM 1 Q4open 4 MM QINFORM QFORMAT LABEL

MODULE SUBMODUL

ATSI num gt . or ATSI in (2,3,.R)

How many days a week are you open?

INTERVIEWER NOTE:

If varies from week to week, enter average days/wk

0 7

0 1000

Number of days open

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

NUM 1 Q4OP 7 MM TIME5 TIME5 LABEL

MODULE SUBMODUL

Q4open gt .

What time does your service open?

INTERVIEWER NOTE: PLEASE REMOVE THE (.) before entering time in

Please use 24 Hour time (examples listed below)

- 7:00am = 7:00 10:00am = 10:00

- 8:30am = 8:30 11:45am = 11:45

```

- 9:00am = 9:00      12:00pm = 12:00
05:00      12:00
05:00      15:00
OPEN HOURS FOR SERVICE
***** NUMERIC OR DATE ENTRY - CATI VERSION *****
NUM 1      Q4CL 7      MM TIME5      TIME5      LABEL
MODULE SUBMODUL
Q4OP gt .
What time does your service close?

INTERVIEWER NOTE: PLEASE REMOVE THE (.) before entering time in
Please use 24 Hour time (examples listed below)
- 3:00pm = 15:00      4:00pm = 16:00
- 5:30pm = 17:30      6:45pm = 18:45
- 7:00pm = 19:00      8:00pm = 20:00
12:00      20:00
05:00      24:00
OPEN HOURS FOR SERVICE
***** NUMERIC OR DATE ENTRY - CATI VERSION *****
NUM 1      YearT 5      MM QINFORM      QFORMAT      LABEL
MODULE SUBMODUL
Q4CL gt .
How many years have you been employed in the Early Childhood Education
and Care setting?

(Code '888' if don't know)
(Code '999' if Refused)
0      100
0      1000
Percentage of children participating
***** NUMERIC OR DATE ENTRY - CATI VERSION *****
INFO 1      eliglb 9      NOLAB
MODULE SUBMODUL
DECschol=1 or Specneed=1 or substr(Q5,1,2)='00' and substr(Q5,3,2) gt '00'
Ok, that means that your service isn't one that we need to collect
this information from, so we won't actually proceed with this
survey today.

However, you will still be able to access support
to implement healthy eating and physical activity policies and
practices in your service.

Your Local Health District will have more information about this.
***** INFORMATION SCREEN ITEM *****
INFO 1      eliglc 9      NOLAB
MODULE SUBMODUL
eliglb=1
Thank you so much for your time today

*** Record on log sheet OS ***
***** INFORMATION SCREEN ITEM *****
CALC      tottime 0      NOLAB
MODULE SUBMODUL1
YearT gt .
Tottime = round((Q4CL - Q4OP)/3600,.1);
***** CALCULATION ITEM *****
CHCE 1 5      Q6 4      _MAKE_      LABEL
MODULE SUBMODUL
tottime gt .
The next questions are about meals and snacks.

Do families provide food for any meals or snacks when their child
attends your service?
1      Yes, all meals and snacks
2      Yes, some meals and snacks

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```

3      No, service provides all meals and snacks
4      Don't know [DO NOT READ OUT]
.R     Refused[DO NOT READ OUT]
Provide food for meals and snacks
***** SINGLE CHOICE - CATI VERSION *****
MULT 1 8      t_day    5                                6      MLTLB
MODULE SUBMODUL
Q6 in (2,3,4,.R)
On a typical day, what meals and snacks would your service provide
to children?

Please let me know what options apply to your service as I read
through them.
1      Breakfast
2      morning tea
3      lunch
4      afternoon tea
5      dinner
6      Other (Please specify)
-7     Don't Know [DO NOT READ OUT]
.R     Refusal [DO NOT READ OUT]
Meals and snacks provided
Breakfast
morning tea
lunch
afternoon tea
dinner
Other (Please specify)
Don't know
Refusal
*****MULTIPLE CHOICE - CATI VERSION*****
OPEN 1 200     typ_oth 1                                LABEL
MODULE SUBMODUL
Substr(t_day,6,1) = 'I'
Please specify other type of meal
Other Reason
***** OPEN ENDED ENTRY ITEM *****
CHCE 1 4      CFC1    5                                _MAKE_      LABEL
MODULE SUBMODUL
t_day gt '00000000' and substr(t_day,6,1)='0' or typ_oth gt ' '
In the past 12 months, have you had 2 weeks of your menu assessed for
compliance with the Caring for Children guidelines.
This would determine if the menu provides the recommended serves
of each food group, provides variety and does not contain any
discretionary choices for 2 consecutive weeks.
1      Yes
2      No
3      Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
CFC1 - had menu assessed past 12 months
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 5      CFC2    1                                _MAKE_      LABEL
MODULE SUBMODUL
CFC1=1
Who assessed your menu?
1      A support officer from the Good for Kids team
2      A dietitian
3      Other (please specify)
4      Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
CFC2 - who assessed menu
***** SINGLE CHOICE - CATI VERSION *****
OPEN 1 200     oCFC2  5                                LABEL
MODULE SUBMODUL
CFC2=3
Can you let me know who assessed your menu?

```

CAN YOU LET ME KNOW WHO ASSESSED YOUR MENU

```

***** OPEN ENDED ENTRY ITEM *****
CHCE 1 4 CFC3 2 _MAKE_ LABEL
MODULE SUBMODUL
CFC2 in (1,2,4,.R) or oCFC2 gt ''
Was your menu assessed as overall compliant with the Caring for Children
guidelines?
1 Yes
2 No
3 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]
CFC3 - was menu compliant
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 5 Q29 1 _MAKE_ LABEL
MODULE SUBMODUL
CFC3 gt . or CFC1 in (2,3,.R)
Does your service have an onsite cook?
1 Yes
2 No
3 N/A site has external food service provider
4 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]
Does service have onsite cook
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 4 Q29a 2 _MAKE_ LABEL
MODULE SUBMODUL
Q29=1
Has your site cook completed training in providing nutritious meals
and snacks for children?
1 Yes
2 No
3 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]
Has cook done nutrition training
***** SINGLE CHOICE - CATI VERSION *****
MULT 1 10 Q29b 5 7 MLTLB
MODULE SUBMODUL
Q29a=1
What type of training or qualifications does your site cook have in
providing nutritious meals and snacks for children?

Please let me know what options apply to your service as I read
through them.
1 Good for Kids menu planning workshop
2 TAFE course (menu planning course)
3 A Registered Training Organisation course
4 Commercial cooking qualification
5 A university qualification
6 'On the job' training
7 Other qualifications or training
-8 None
-9 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]
Cook's nutrition qualifications
Good for Kids menu planning workshop
TAFE course (menu planning course)
A Registered Training Organisation course
Commercial cooking qualification
A university qualification
'On the job' training
Other qualifications or training
None
Don't know [DO NOT READ OUT]
Refused [DO NOT READ OUT]
***** MULTIPLE CHOICE - CATI VERSION *****
OPEN 1 200 OT29b 1 LABEL
MODULE SUBMODUL
Q29b gt '0000000000' and substr(Q29b,7,1)='1'
What other training or qualifications do they have?
Site cook - other qualifications/training
***** OPEN ENDED ENTRY ITEM *****
NULL 2 nullb 0 NOLAB

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MODULE SUBMODUL
OT29b gt '' or Q29b gt '0000000000' and substr(Q29b,7,1)='0' or
Q29a in (2,3,.R) or Q29 in (2,3,4,.R)
*****NULL ITEM - DOES NOTHING*****
CHCE 1 5 Faxmenu 5 _MAKE_ LABEL
MODULE SUBMODUL
Nullb=1
We are asking all Early Childhood Education and Care Services that
provide food to children if they could provide us with a copy of their
menu for the past 2 week period.

Would you be willing to fax or email a copy of your menu to HNELHD?
1 Yes
2 No
3 Have already provided menu within last month
4 Don't know
.R Refused
Willing to email/fax menu
***** SINGLE CHOICE - CATI VERSION *****
INFO 1 SMENU 3 NOLAB
Send Menu
Faxmenu=1
That's great, I'll give you our fax and email address details at the
end of the survey.

***** INFORMATION SCREEN ITEM *****
CHCE 1 4 Q10 1 _MAKE_ LABEL
MODULE SUBMODUL
Q6=1 or (Faxmenu in (2,3,4,.R) and Q6=2) or (SMENU=1 and Q6=2)
Does your service monitor or observe children's lunchboxes?
1 Yes
2 No
3 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]
Monitor lunchboxes
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 7 Q10a 2 _MAKE_ LABEL
MODULE SUBMODUL
Q10=1
On average, how often do educators monitor the lunchboxes of all
children to check the foods or drinks packed by families?
1 Once per week or less
2 2 times per week
3 Three times per week
4 Four times per week
5 Every-day or every day service is open (eg. 3/3 days)
6 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]
Educators monitor / check lunchboxes
***** SINGLE CHOICE - CATI VERSION *****
MULT 1 14 Q10b 8 8 MLTLB
MODULE SUBMODUL
Q10a gt .
What are the primary reasons why staff observe or monitor foods brought
in to the service in children's lunchboxes?

Please let me know what options apply to your service as I read
through them.
INTERVIEWER NOTE: FURTHER INFORMATION for OPTION 7
(Separate written guidelines provided to families which outline
recommended foods and drinks to be packed by families)
1 For allergens such as nuts and seafood
2 For healthiness such as balanced food groups, Fruit/Vege
3 For junk food such as potato chips, lollies, choc/bars
4 For nutritional adequacy such as multiple food groups
5 [CONT] and sufficient quantity
6 Ensure that they are consistent with Australian
7 [CONT] dietary guidelines
8 Ensure that they are consistent with our service
9 [CONT] nutrition policy
10 Ensure that they are consistent with our service's

```

```

11      [CONT] lunchbox or healthy food guidelines/recommendations
12      Other (please specify)
-13     Don't Know [DO NOT READ OUT]
.R      Refusal [DO NOT READ OUT]
PRIMARY REASONS OF MONITORING FOODS
For allergens such as nuts and seafood
For healthiness such as balanced food groups, Fruit/Vege
For junk food such as potato chips, lollies, choc/bars
For nutritional adequacy such as multiple food groups
[CONT] and sufficient quantity
Ensure that they are consistent with Australian
[CONT] dietary guidelines
Ensure that they are consistent with our service
[CONT] nutrition policy
Ensure that they are consistent with our service's
[CONT] lunchbox or healthy food guidelines / recommendations
Other (please specify)
Don't Know [DO NOT READ OUT]
Refusal
*****MULTIPLE CHOICE - CATI VERSION*****
OPEN 1 200      OQ10b      2                                LABEL
MODULE SUBMODUL
substr(Q10b,12,1)='1'
What are the other primary reasons why staff observe or monitor foods
brought in to the service in children's lunchboxes
OTHER PRIMARY REASONS OF MONITORING FOODS
***** OPEN ENDED ENTRY ITEM *****
CHCE 2 4      Q10c      2                                _MAKE_      LABEL
MODULE SUBMODUL
Q10b gt '000000000000000' and substr(Q10b,12,1)='0' or OQ10b gt ''
or Q10 in (2,3,.R)
Does your service have a policy or guidelines on recommended and
non-recommended foods to be packed in lunchboxes by families?
1      Yes
2      No
3      Don't know
.R      Refused
HAVE A POLICY OR GUIDELINES ON RECOMMENDATIONS FOR LUNCHBOXES
***** SINGLE CHOICE - CATI VERSION *****
MULT 1 8      Q10b1      8                                5      MLTLB
MODULE SUBMODUL
Q10c gt .
When foods brought in to the service in children's lunchboxes not in
line with nutrition recommendations in which ways does your service
respond?

Please let me know what options apply to your service as I read
through them.
INTERVIEWER NOTE:
If service does nothing please select option 1
1      Food allowed
2      Foods sent back home in lunchboxes
3      Food allowed but not provided unless the child has
4      [CONT] nothing left in their lunchbox
5      Child encouraged to eat (healthy) foods first
6      Other (please specify)
-7     Don't Know [DO NOT READ OUT]
.R     Refusal [DO NOT READ OUT]
WHICH WAYS DOES YOUR SERVICE RESPOND
Food allowed
Foods sent back home in lunchboxes
Food allowed but not provided unless the child has
[CONT] nothing left in their lunchbox
Child encouraged to eat (healthy) foods first
Other (please specify)
Don't Know [DO NOT READ OUT]
Refusal [DO NOT READ OUT]
*****MULTIPLE CHOICE - CATI VERSION*****
OPEN 1 200      OQ10b1      2                                LABEL
MODULE SUBMODUL
substr(Q10b1,6,1)='1'

```

What are the other ways your service responds to any lunchboxes not in line with nutrition recommendations.

OTHER WAYS DOES YOUR SERVICE RESPOND

***** OPEN ENDED ENTRY ITEM *****

CHCE	1	4	Q26	3	MAKE	LABEL
MODULE	SUBMODUL					
Q10b1 gt '00000000' and substr(Q10b1,6,1)='0' or OQ10b1 gt ''						
Do you communicate with families in relation to ensuring foods brought in to your service are consistent with the Australian Dietary Guidelines?						
1	Yes					
2	No					
3	Don't know [DO NOT READ OUT]					
.R	Refused [DO NOT READ OUT]					
COMMUNICATE WITH FAMILIES ENSURING FOODS BROUGHT IN TO YOUR SERVICE ADG						
***** SINGLE CHOICE - CATI VERSION *****						
MULT	1	9	Q27	8	6	MLTLB
MODULE	SUBMODUL					
Q26=1						
Which of the following best represents the primary method your service uses to communicate with families in relation to ensuring foods brought in to your service are consistent with the Australian Dietary Guidelines?						
INTERVIEWER NOTE						
Comm= communication						
P/Fam= Parent/ Family						
1	Part of existing scheduled or formal P/Fam meetings					
2	Informal discussions or one off meeting as required					
3	Through an agreed or established written comm method					
4	Through electronic comm (e.g. email, app)					
5	Through informal written comm (e.g. post it notes)					
6	Other (please specify)					
-7	No information is provided					
-8	Don't know [DO NOT READ OUT]					
.R	Refused [DO NOT READ OUT]					
PRIMARY METHOD YOU USE TO COMMUNICATE WITH FAMILIES						
Part of existing scheduled or formal P/Fam meetings						
Informal discussions or one off meeting as required						
Through an agreed or established written communication method						
Through electronic communications (e.g. email, software programs)						
Through informal written communication (e.g. post it notes)						
Other (please specify)						
No information is provided						
Don't know [DO NOT READ OUT]						
Refused [DO NOT READ OUT]						
***** MULTIPLE CHOICE - CATI VERSION *****						
OPEN	1	200	Q27	1		LABEL
MODULE	SUBMODUL					
substr(Q27,6,1)='1'						
What is other primary method you use to communicate with families?						
OTHER PRIMARY METHOD YOU USE TO COMMUNICATE WITH FAMILIES						
***** OPEN ENDED ENTRY ITEM *****						
CHCE	2	4	Q10d	5	MAKE	LABEL
MODULE	SUBMODUL					
Q26 in (2,3,.R) or						
Q27 gt '000000000' and substr(Q27,6,1)='0' or OQ27 gt ''						
Does your service use a specific, tool or guideline to support families to pack foods in their child's lunchbox that are consistent with the Australian Dietary Guidelines?						
For example a checklist/ tool provided to inform families of recommended foods and drinks to be packed.						
1	Yes					
2	No					

```

3      Don't know
.R      Refused
Service use a specific, tool or guidelines for ADG
***** SINGLE CHOICE - CATI VERSION *****
MULT 1 10      Q10e      1      6      MLTLB
MODULE SUBMODUL
Q10d=1
Can you recall what is the most commonly use?
1      Munch & Move program recommendations
2      Australian Dietary Guidelines
3      Caring for Children manual
4      Caring for Children lunchbox checklist
5      Good for Kids healthy food guidelines
6      Get up and Grow
7      Nutrition Australia
8      Other (please specify)
-9      Don't know [DO NOT READ OUT]
.R      Refusal [DO NOT READ OUT]
WHAT DOCUMENT - TOOL OR GUIDELINE DO YOU USE
Munch & Move program recommendations
Australian Dietary Guidelines
Caring for Children manual
Caring for Children lunchbox checklist
Good for Kids healthy food guidelines
Get up and Grow
Nutrition Australia
Other (please specify)
Don't know [DO NOT READ OUT]
Refusal [DO NOT READ OUT]
***** MULTIPLE CHOICE - CATI VERSION *****
OPEN 1 200      Q10e      2      LABEL
MODULE SUBMODUL
substr(Q10e,8,1)='1'
What are the other document, tool or guideline you use to ensure
lunchboxes are consistent with the Australian Dietary Guidelines.
WHAT OTHER DOCUMENT - TOOL OR GUIDELINE DO YOU USE
***** OPEN ENDED ENTRY ITEM *****
CHCE 2 4      Q10f      2      _MAKE_      LABEL
MODULE SUBMODUL
Q10e gt '' or Q10e gt '0000000000' and substr(Q10e,8,1)='0' or
Q10d in (2,3,.R)
Do staff members provide feedback to families about whether lunchbox
contents comply with service policy/ guidelines?
1      Yes
2      No
3      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
DO STAFF MEMBERS PROVIDE FEEDBACK TO FAMILIES ABOUT LUNCHBOXES
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 5      Q10g      2      _MAKE_      LABEL
MODULE SUBMODUL
Q10f=1
If the lunchbox is not consistent with the service policy/guidelines,
how often does the service provide feedback to families?
1      Never
2      Rarely
3      Quarterly or more often
4      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
DO STAFF MEMBERS PROVIDE FEEDBACK TO FAMILIES ABOUT LUNCHBOXES
***** SINGLE CHOICE - CATI VERSION *****
MULT 1 8      Q10h      4      5      MLTLB
MODULE SUBMODUL
Q10g in (2,3,4,.R)
When educators provide feedback to families, how is it provided?

Please let me know what options apply to your service as I read
through them.

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1      Verbal, face to face discussion with family
2      Lunchbox notes from Good For Kids
3      Lunchbox notes developed by your service
4      Caring for Children lunchbox food ideas
5      Articles in the newsletters to all families
6      Other (please specify)
-7     Don't Know [DO NOT READ OUT]
.R     Refusal [DO NOT READ OUT]
HOW IS FEEDBACK PROVIDED TO FAMILIES
Verbal, face to face discussion with family
Lunchbox notes from Good For Kids
Lunchbox notes developed by your service
Caring for Children lunchbox food ideas
Articles in the newsletters to all families
Other (please specify)
Don't Know [DO NOT READ OUT]
Refusal
*****MULTIPLE CHOICE - CATI VERSION*****
OPEN 1 200      Q10h      1                                LABEL
MODULE SUBMODUL
substr(Q10h,6,1)='1'
What are the other ways educators provide feedback to families?
OTHER WAYS OF HOW IS FEEDBACK PROVIDED TO FAMILIES
***** OPEN ENDED ENTRY ITEM *****
CHCE 2 4      Faxguid 4      _MAKE_                                LABEL
MODULE SUBMODUL
Q10h gt '00000000' and substr(Q10h,6,1)='0' or Q10h gt '' or
Q10g=1 or Q10f in (2,3,.R)
We are asking all Early Childhood Education and Care Services that
have a service nutrition guideline if they could provide us with a copy.
Would you be willing to fax a copy of your service nutrition guideline
to Hunter New England Local Health District?
1      Yes
2      No
3      Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
FAX A COPY OF YOUR SERVICE NUTRITION GUIDELINE
***** SINGLE CHOICE - CATI VERSION *****
INFO 1      SGUID      3                                NOLAB
Send Menu
Faxguid=1
That's great, I'll give you our fax and email address details at the
end of the survey.

***** INFORMATION SCREEN ITEM *****
NULL 2      nulla      0                                NOLAB
MODULE SUBMODUL
Faxguid in (2,3,.R) or SGUID=1 or
(Faxmenu in (2,3,4,.R) and Q6 in (3,4,.R)) or (SMENU=1 and Q6 in (3,4,.R))
*****NULL ITEM - DOES NOTHING*****
INFO 1      Q13info 3                                NOLAB
Send Menu
nulla=1
The next set of questions focus specifically on healthy eating learning
experiences and healthy eating environments.

***** INFORMATION SCREEN ITEM *****
CHCE 1 8      Q13      6      _MAKE_                                LABEL
MODULE SUBMODUL
Q13info=1
How often are educator- led learning experiences about healthy eating
implemented as part of your curriculum/program (e.g. vegetable gardens,
cooking or tasting sessions, stories or songs.?
This also includes experiential activities about food, such as food
growing, planting seeds, discussion around 'everyday' and 'sometimes'
foods, and puzzles and books about food.
1      Never
2      Rarely
3      Monthly
4      Once per week
5      2-4 times per week

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6      Daily (or every day the service is open)
7      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
Specific Learning Experiences
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 4      HEE1      6                      _MAKE_          LABEL
MODULE SUBMODUL
Q13 gt .
Do staff model, reinforce and implement healthy eating and nutrition
practices with children during mealtimes every day?
for example, sitting with the children during meal times,
eating healthy foods in front of the children,
talking with the children about the foods they are eating,
encouraging children to try foods that are new to them.
1      Yes
2      No
3      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
DO STAFF MODEL, REINFORCE AND IMPLEMENT HEALTHY EATING
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 7      HEE2      2                      _MAKE_          LABEL
MODULE SUBMODUL
HEE1 gt .
How often would educators from your service sit and eat lunch with
the children?
1      Never
2      Less than monthly
3      At least monthly
4      At least weekly
5      Everyday
6      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
HOW OFTEN WOULD EDUCATORS EAT LUNCH WITH THE CHILDREN
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6      HEE3      3                      _MAKE_          LABEL
MODULE SUBMODUL
HEE2 gt .
On a typical day, do staff members consume sweets, salty snacks,
or sugary drinks in front of the children?

1      No, never
2      Some staff members
3      Most staff members
4      All staff members
5      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
STAFF MEMBERS CONSUME SWEETS, SALTY SNACKS IN FRONT OF CHILDREN
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6      HEE4      2                      _MAKE_          LABEL
MODULE SUBMODUL
HEE3 gt .
On a typical day, do staff members consume fruit in front of the
children?
1      No, never
2      Some staff members
3      Most staff members
4      All staff members
5      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
STAFF MEMBERS CONSUME FRUIT IN FRONT OF THE CHILDREN
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6      HEE5      2                      _MAKE_          LABEL
MODULE SUBMODUL
HEE4 gt .
On a typical day, do staff members consume vegetables in front of the
children?
1      No, never
2      Some staff members
3      Most staff members
4      All staff members
5      Don't know [DO NOT READ OUT]

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.R          Refused [DO NOT READ OUT]
STAFF MEMBERS CONSUME VEGETABLES IN FRONT OF THE CHILDREN
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 7      HEE6      3      _MAKE_      LABEL
MODULE SUBMODUL
HEE5 gt .
At meal and snack times, how often would educators from your service
make positive comments about healthy foods? For example:
I like carrots too, they're really crunchy.
1      Never
2      Less than monthly
3      At least monthly
4      At least weekly
5      Everyday
6      Don't know [DO NOT READ OUT]
.R          Refused [DO NOT READ OUT]
STAFF MEMBERS MAKE POSITIVE COMMENTS ABOUT HEALTHY FOODS
***** SINGLE CHOICE - CATI VERSION *****
INFO 1      Q16info 3      NOLAB
MODULE SUBMODUL
HEE6 gt .
The next set of questions focus specifically on active play.
Active play is any time when children are running, jumping, dancing or
engaging in activities that increase their heart rate.
***** INFORMATION SCREEN ITEM *****
TABL 1 20      Q16      4      MM      NOLAB
MODULE SUBMODUL4
Q16info = 1
You mentioned earlier that your service is open for about ^totime^ hours each day.
On AVERAGE how much time each day do children have available to
spend in CHILD-INITIATED, FREE PHYSICALLY ACTIVE play? This includes
both indoor and outdoor free active play.
Nmiss      0
Time in Hours      N      0      12
Time in Minutes      N      0      59
Don't Know      B      1
Refused      B      2
0      100
*****TABLE ENTRY ITEM - NO BUTTONS *****
INFO 1      Q15info 6      NOLAB
MODULE SUBMODUL
Q16 gt .
The next set of questions refer to EDUCATOR-LED ACTIVE PLAY that your
service provides to children aged 1-5 years.
Examples include active circle time, music, dancing or planned
activities to develop movement skills.
The total amount of adult led activity time may include multiple short
activities added up over the course of the day.
***** INFORMATION SCREEN ITEM *****
CHCE 1 8      Q15a      2      _MAKE_      LABEL
MODULE SUBMODUL
Q15info=1
How many days per week do you provide time for children to participate
in EDUCATOR-LED ACTIVE PLAY?
1      Never
2      1 Day
3      2 Days
4      3 Days
5      4 Days
6      Everyday (or every day the service is open)
7      Don't know [DO NOT READ OUT]
.R          Refused [DO NOT READ OUT]
STAFF MEMBERS MAKE POSITIVE COMMENTS ABOUT HEALTHY FOODS
***** SINGLE CHOICE - CATI VERSION *****
TABL 1 20      Q15      3      MM      NOLAB
MODULE SUBMODUL4
Q15a in (2,3,4,5,6,7)

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On days where educators lead active play,

On AVERAGE how much time do children spend participating in EDUCATOR-LED ACTIVE PLAY?

Nmiss	0			
Time in Hours		N	0	12
Time in Minutes		N	0	59
Don't Know		B	1	
Refused		B	2	
0	100			

*****TABLE ENTRY ITEM - NO BUTTONS *****

INFO 1 Q17info 8 NOLAB

MODULE SUBMODUL

Q15a in(1,.R) or Q15 gt .

The next question refers to the development of Fundamental Movement Skills (FMS) of children aged 3-5 years at your service.

FMS are basic gross motor movement skills such as running, catching, jumping, kicking, galloping, leaping, hopping, ball dribbling, side-sliding, striking a ball, underarm rolling and over arm throwing. Development of such skills involves educators explaining, demonstrating and providing feedback to children for each skill.

***** INFORMATION SCREEN ITEM *****

CHCE 1 8 Q17 6 _MAKE_ LABEL

MODULE SUBMODUL

Q17info = 1

On how many days in the last week did your service Educators LEAD STRUCTURED ACTIVITY to develop Fundamental Movement Skills for all children at your service?

This could have been during a transition activity, group or circle time or during outdoor play.

1	Never
2	1 Day
3	2 Days
4	3 Days
5	4 Days
6	Everyday
7	Don't know [DO NOT READ OUT]
.R	Refused [DO NOT READ OUT]

Lead structured activity

***** SINGLE CHOICE - CATI VERSION *****

NUM 1 Q17a 6 MM QINFORM QFORMAT LABEL

MODULE SUBMODUL

Q17 in (2,3,4,5,6,7)

On days where STRUCTURED ACTIVITIES to develop Fundamental Movement Skills occurred what PERCENTAGE of the 3 to 5 year olds at your service would usually participate?

(Code '888' if don't know)

(Code '999' if Refused)

0	100
0	1000

Percentage of children participating

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

CHCE 1 6 Q17b 7 _MAKE_ LABEL

MODULE SUBMODUL

Q17a gt . or Q17 in (1,.R)

How confident do you feel that the Educators at your service have sufficient knowledge of the 12 Fundamental Movement Skills?

INTERVIEWER NOTE:

These are running, hopping, jumping, galloping, leaping, kicking, side-sliding, overarm throwing, catching, stationary dribble, underarm rolling, striking.

1	Very confident
2	Confident
3	A little confident
4	Not at all confident
5	Don't know [DO NOT READ OUT]
.R	Refused [DO NOT READ OUT]

How confident do you feel that the Educators have skills for FMS

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***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6      Q17c      3      _MAKE_      LABEL
MODULE SUBMODUL
Q17b gt .
How confident do you feel that the Educators at your service have the
skills required to teach the 12 Fundamental Movement Skills to children
aged 3-5?
1      Very confident
2      Confident
3      A little confident
4      Not at all confident
5      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
How confident do you feel that the Educators have skills for FMS for 3-5 ages
***** SINGLE CHOICE - CATI VERSION *****
INFO 1      Q30info 8      NOLAB
MODULE SUBMODUL
Q17c gt .
Portable physical activity equipment includes any toys that children
can carry, throw, push, pull, or kick, as well as loose parts that help
children explore and learn about the natural world.
This equipment can be homemade or store bought.
Portable physical activity equipment does not include equipment fixed to
the ground like swings or monkey bars, but does include fabric tunnels,
mats and other larger items that educators can easily move and switch
around.
***** INFORMATION SCREEN ITEM *****
CHCE 1 4      Q30      2      _MAKE_      LABEL
MODULE SUBMODUL
Q30info=1
Does your service provide easy access to portable physical activity
equipment for children to use?
1      Yes
2      No
3      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
ACCESS TO PORTABLE PHYSICAL ACTIVITY EQUIPMENT
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 7      Q30a      3      _MAKE_      LABEL
MODULE SUBMODUL
Q30=1
How would you describe the availability of the portable physical
activity equipment?
This refers to all children who regularly use the equipment.
1      Not available at all times
2      Enough types but not quantities
3      Enough quantities but not types
4      Enough types and quantities
5      Available at all times but not enough types and quantities
6      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
AVAILABILITY OF THE PORTABLE PHYSICAL ACTIVITY EQUIPMENT
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 5      Q30b      2      _MAKE_      LABEL
MODULE SUBMODUL
Q30a gt . or Q30 in (2,3,.R)
In which of the following areas within your service are children
provided opportunities for physically active play?
1      Outdoors
2      Indoors
3      Both indoors and outdoors
4      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
AREAS WITH THE ACTIVITY EQUIPMENT
***** SINGLE CHOICE - CATI VERSION *****
INFO 1      POLinfo 3      NOLAB
MODULE SUBMODUL
Q30b gt .
The next set of questions refer to policies that may be in place at
your service, monitoring and reporting processes, and the methods and

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nature of communication between your service and families.

***** INFORMATION SCREEN ITEM *****

CHCE 1 4 Q20 4 _MAKE_ LABEL

MODULE SUBMODUL

POLinfo=1

Does your service have a written nutrition policy?

INTERVIEWER NOTE:

This can be combined with another policy

1 Yes

2 No

3 Don't know [DO NOT READ OUT]

.R Refused [DO NOT READ OUT]

DOES YOUR SERVICE HAVE A WRITTEN NUTRITION POLICY

***** SINGLE CHOICE - CATI VERSION *****

MULT 1 16 Q20b 8 10 MLTLB

MODULE SUBMODUL

Q20=1

Does your policy specifically refer to any of the following:

Please let me know what options apply to your service as I read through them.

INTERVIEWER NOTE:

H F&D (Healthy Food & Drinks)

comm (Communication)

ADG (Australian Dietary Guidelines)

1 Promoting H F&D

2 Providing a positive eating environment

3 Providing learning experiences about H F&D

4 Comm with families about appropriate H F&D to bring

5 Being inclusive of particular population groups

6 Food provided by the service is consistent with the

7 [CONT] Australian Dietary Guidelines

8 Strategies that are in place to ensure that food

9 [CONT] provided by families in lunchboxes is consistent

10 [CONT] with the ADG

11 Strategies to ensure food isn't used as a reward or

12 [CONT] incentive for children

13 That the policy is to be reviewed every 12 months

-14 None of the above

-15 Don't know [DO NOT READ OUT]

.R Refused [DO NOT READ OUT]

NUT POLICY SPECIFICALLY REFER TO

Promoting H F&D

Providing a positive eating environment

Providing learning experiences about H F&D

Comm with families about appropriate H F&D to bring

Being inclusive of particular population groups

Food provided by the service is consistent with the

[CONT] Australian Dietary Guidelines

Strategies that are in place to ensure that food

[CONT] provided by families in lunchboxes is consistent

[CONT] with the ADG

Strategies to ensure food isn't used as a reward or

[CONT] incentive for children

That the policy is to be reviewed every 12 months

None of the above

Don't know [DO NOT READ OUT]

Refused [DO NOT READ OUT]

***** MULTIPLE CHOICE - CATI VERSION *****

CHCE 1 4 Q21 1 _MAKE_ LABEL

MODULE SUBMODUL

Q20b gt '0000000000000000' or Q20 in (2,3,.R)

Does your service have a written physical activity policy?

1 Yes

2 No

3 Don't know [DO NOT READ OUT]

.R Refused [DO NOT READ OUT]

Written physical activity policy

***** SINGLE CHOICE - CATI VERSION *****

MULT 1 15 Q21b 8 9 MLTLB

MODULE SUBMODUL

Q21=1

Does your policy specifically refer to any of the following:

Please let me know what options apply to your service as I read through them.

INTERVIEWER NOTE:

- PA (Physical Activity)
- FMS (Fundamental Movement Skills)
- SSR(Small Screen Recreation)
- 1 Promoting participation in a range of FMS experiences
- 2 Providing a positive environment for promoting PA
- 3 Communication with families about PA and FMS
- 4 Being inclusive of particular population groups
- 5 Providing Tummy time (where appropriate)
- 6 Reference to the National PA Recommendations
- 7 [CONT] for Children 0-5 Years
- 8 PA opportunities are embedded in the daily curriculum
- 9 [CONT] such as free and educator led play time & FMS
- 10 Addressing injury prevention during active play
- 11 [CONT] activities
- 12 Policy has been reviewed in the last 12 months
- 13 None of the above.
- 14 Don't know [DO NOT READ OUT]
- .R Refused [DO NOT READ OUT]

PA POLICY SPECIFICALLY REFER TO:

Promoting participation in a range of FMS experiences
Providing a positive environment for promoting PA
Communication with families about PA and FMS
Being inclusive of particular population groups
Providing Tummy time (where appropriate)
Reference to the National PA Recommendations
[CONT] for Children 0-5 Years
PA opportunities are embedded in the daily curriculum
[CONT] such as free and educator led play time & FMS
Addressing injury prevention during active play
[CONT] activities
Policy has been reviewed in the last 12 months
None of the above.

Don't know [DO NOT READ OUT]

Refused [DO NOT READ OUT]

*****MULTIPLE CHOICE - CATI VERSION*****

MULT 1 9 SSR2a 5 MLTLB

MODULE SUBMODUL

Q21b gt '0000000000000000' or Q21 in (2,3,.R)

For which of the following purposes do children aged 3 to 5 years at your service spend time watching small screen devices?

Please let me know what options apply to your service as I read through them.

- 1 To gain knowledge/share
- 2 [CONT] INFORMATION ABOUT A specific learning area'
- 3 For child amusement, enjoyment or entertainment
- 4 To facilitate exploration of activity,dance or movement
- 5 For "down time" or "quiet time"
- 6 For another purpose (please specify)
- 7 Screen time not provided
- 8 Don't know [DO NOT READ OUT]
- .R Refused [DO NOT READ OUT]

SCR TIME SPENT 3-5:

To gain knowledge/share
[CONT] INFORMATION ABOUT A specific learning area'
For child amusement, enjoyment or entertainment
To facilitate exploration of activity,dance or movement
For "down time" or "quiet time"
For another purpose (please specify)
Screen time not provided

Don't know [DO NOT READ OUT]
 Refused [DO NOT READ OUT]
 *****MULTIPLE CHOICE - CATI VERSION*****
 OPEN 1 200 OSSR2a 2 LABEL
 MODULE SUBMODUL
 substr(SSR2a,6,1)='1'
 What are the other purposes do children aged 3 to 5 years
 at your service spend time watching small screen devices?
 OTHER PURPOSES DO CHILDREN AGED 3 TO 5 YEARS SSR
 ***** OPEN ENDED ENTRY ITEM *****
 CALC 1 SRr2CALC0 NOLAB
 MODULE SUBMOD 2
 SSR2a gt '000000000' and substr(SSR2a,6,1)='0' or OSSR2a gt ''
 if Substr(Q2,1,2) gt '00' then SRr2CALC=1;
 else SRr2CALC=2;
 ***** CALCULATION ITEM *****
 CHCE 1 5 SSR2b 2 _MAKE_ LABEL
 MODULE SUBMODUL
 SRr2CALC=1
 In your service, is screen time provided to children under 2 years
 of age?
 1 Yes
 2 No
 3 Not applicable (no small screen devices)
 4 Don't know [DO NOT READ OUT]
 .R Refused [DO NOT READ OUT]
 IS SCREEN TIME PROVIDED TO CHILDREN UNDER 2 YEARS
 ***** SINGLE CHOICE - CATI VERSION *****
 CHCE 1 4 Q22 6 _MAKE_ LABEL
 MODULE SUBMODUL
 SSR2b gt . or SRr2CALC=2
 Does your service have a written policy, guideline or procedure
 restricting child viewing of small screen devices? This could include
 TV, DVD, iPad or computer.

INTERVIEWER NOTE:
 This can be combined with another policy
 1 Yes
 2 No
 3 Don't know [DO NOT READ OUT]
 .R Refused [DO NOT READ OUT]
 SSR policy
 ***** SINGLE CHOICE - CATI VERSION *****
 MULT 1 9 Q22b 7 5 MLTLB
 MODULE SUBMODUL
 Q22=1
 Does your policy specifically refer to any of the following?

Please let me know what options apply to your service as I read
 through them.

INTERVIEWER NOTE:
 SBR = Sedentary Behaviour Recommendations
 1 Reference to the National PA Recommendations for
 2 [CONT] Children 0-5 Years (SBR)
 3 Not using screen as a reward or for behaviour management
 4 Policy has been reviewed in the last 12 months
 5 Limiting time children spend watching TV & DVDs
 6 Communication with families about SSR
 -7 None of the above.
 -8 Don't know [DO NOT READ OUT]
 .R Refused [DO NOT READ OUT]
 SSR POLICY SPECIFICALLY REFER TO:
 Reference to the National PA Recommendations for
 [CONT] Children 0-5 Years (SBR)
 Not using screen as a reward or for behaviour management
 Policy has been reviewed in the last 12 months
 Limiting time children spend watching TV & DVDs

Communication with families about SSR
None of the above.
Don't know [DO NOT READ OUT]
Refused [DO NOT READ OUT]
*****MULTIPLE CHOICE - CATI VERSION*****
CHCE 1 5 Q24a 8 _MAKE_ LABEL
MODULE SUBMODUL
Q22b gt '000000000' or Q22 in (2,3,.R)
Each year, does your service monitor and report, internally or
externally, on its achievement of the healthy eating objectives as
stated in written policies, guidelines, or other documents?

PROMPT:
e.g. Annual reports ; Business / Service plans; Quality Improvement
Plan/s; Munch & Move action plan; Service daily diaries (for families
to view), or Reflection of achievements in a Service newsletter.
1 Yes
2 No
3 Service doesn't have HE objectives
4 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]
REPORT ON HE OBJECTIVES IN POLICIES, GUIDELINES OR OTHER DOC's
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 5 Q24b 8 _MAKE_ LABEL
MODULE SUBMODUL
Q24a gt .
Each year, does your service monitor and report, internally or
externally, on its achievement of the physical activity objectives as
stated in written policies, guidelines, or other documents?

PROMPT:
e.g. Annual reports ; Business / Service plans; Quality Improvement
Plan/s; Munch & Move action plan; Service daily diaries
(for families to view), or Reflection of achievements in a
Service newsletter
1 Yes
2 No
3 Service doesn't have PA objectives
4 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]
REPORT ON PA OBJECTIVES IN POLICIES, GUIDELINES OR OTHER DOC's
***** SINGLE CHOICE - CATI VERSION *****
MULT 1 14 QCF1 5 11 MLTLB
MODULE SUBMODUL
Q24b gt .
Through what delivery method does your service communicate with
families?

Please let me know what options apply to your service as I read
through them.
1 Meetings
2 Workshops
3 Newsletters
4 Handouts
5 Bulletin board postings
6 Website
7 Emails
8 Facebook
9 Centre displays
10 Apps (please specify)
11 Other (please specify)
-12 None of the above.
-13 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]
DELIVERY METHODS COMMUNICATE WITH FAMILIES:
Meetings
Workshops
Newsletters
Handouts

Bulletin board postings
Website
Emails
Facebook
Centre displays
Apps (please specify)
Other (please specify)
None of the above.
Don't know [DO NOT READ OUT]
Refused [DO NOT READ OUT]
*****MULTIPLE CHOICE - CATI VERSION*****
OPEN 1 200 OQCF1a 1 LABEL
MODULE SUBMODUL
substr(QCF1,10,1)='1'
What APPS does your service use to communicate with families ?
WHAT APPS YOUR SERVICE COMMUNICATE WITH FAMILIES WITH
***** OPEN ENDED ENTRY ITEM *****
OPEN 1 200 OQCF1b 1 LABEL
MODULE SUBMODUL
substr(QCF1,11,1)='1' or (OQCF1a gt '' and substr(QCF1,11,1)='1')
What are the other ways does your service communicate with families?
OTHER WAYS DOES YOUR SERVICE COMMUNICATE WITH FAMILIES
***** OPEN ENDED ENTRY ITEM *****
CHCE 2 13 QCF2 3 _MAKE_ LABEL
MODULE SUBMODUL
(OQCF1a gt '' and substr(QCF1,11,1)='0') or
QCF1 gt '0000000000000' and substr(QCF1,10,2)='00' or OQCF1b gt ''
What method of communication do you regard as most effective for
families?
Out of those you regard as effective, what would you consider the MOST?
1 Meetings
2 Workshops
3 Newsletters
4 Handouts
5 Bulletin board postings
6 Website
7 Emails
8 Facebook
9 Centre displays
10 Apps
11 Other (please specify)
12 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]
MOST EFFECTIVE METHOD OF COMMUNICATION
***** SINGLE CHOICE - CATI VERSION *****
OPEN 1 200 OQCF2 2 LABEL
MODULE SUBMODUL
QCF2=11
What is other method of communication that is most effective for
families?
OTHER MOST EFFECTIVE METHOD OF COMMUNICATION
***** OPEN ENDED ENTRY ITEM *****
MULT 1 9 Q25 8 6 MLTLB
MODULE SUBMODUL
OQCF2 gt '' or QCF2 in (1,2,3,4,5,6,7,8,9,10,12,.R)
In the last 12 months, have you sent information home to families from
a recognised health authority about any of the following topics?
This would include material handed directly to parents, mailed or
emailed or placed in their child's pigeon hole or bag, or information
included in newsletters or at orientation.

INTERVIEWER NOTE:
Option 2 includes: A list of foods for lunchboxes/lunch ideas)
1 Immunisation
2 Healthy eating for children
3 Physical activity for children
4 Oral hygiene for children

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5      Limiting screen time for children
6      Food hygiene and safety
-7     No information is provided
-8     Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
SENDING HOME INFORMATION TO FAMILIES:
Immunisation
Healthy eating for children
Physical activity for children
Oral hygiene for children
Limiting screen time for children
Food hygiene and safety
No information is provided
Don't know [DO NOT READ OUT]
Refused [DO NOT READ OUT]
*****MULTIPLE CHOICE - CATI VERSION*****
INFO 1      Q25ainf 3      NOLAB
MODULE SUBMODUL
Substr(Q2,1,1)='1' and Q25 gt '000000000'
These next questions refer to processes in place regarding breastfeeding
for babies aged 0-1 years at your service.

***** INFORMATION SCREEN ITEM *****
CHCE 1 4      Q25a      2      _MAKE_      LABEL
MODULE SUBMODUL
Q25ainf=1
In the last 12 months, have you sent information home to families from
a recognised health authority about breastfeeding?
1      Yes
2      No
3      Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
INFO HOME ABOUT BREASTFEEDING
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 4      BF1      2      _MAKE_      LABEL
MODULE SUBMODUL
Q25a gt .
Does your service provide an environment that encourages and supports
breastfeeding?
1      Yes
2      No
3      Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
DOES THE SERVICE HAVE AN ENVIRONMENT THAT ENCOURAGES BREASTFEEDING
***** SINGLE CHOICE - CATI VERSION *****
MULT 1 9      BF1a      7      5      MLTLB
MODULE SUBMODUL
BF1=1
How does your service create an environment that encourages and
supports breastfeeding?

INTERVIEWER NOTE:
BF (Breast Feeding)
info (information)
NL (newsletters)
1      Displaying a (BF welcome here) sticker
2      Provide mothers who want to BF with access to a
3      [CONT] comfortable place to BF or express breastmilk &
4      [CONT]access to a fridge to store expressed breast milk
5      Include BF info for educators in staff orientation info
6      Include BF info for families in orientation info in NL
7      Other (please specify)
-8     Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]

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PRIMARY METHOD YOU USE TO COMMUNICATE WITH FAMILIES
Displaying a (BF welcome here) sticker
Provide mothers who want to BF with access to a
[CONT] comfortable place to BF or express breastmilk
[CONT] and access to a fridge to store expressed breast milk
Include BF info for educators in staff orientation info
Include BF info for families in orientation info in NL
Other (please specify)
Don't know [DO NOT READ OUT]
Refused [DO NOT READ OUT]
*****MULTIPLE CHOICE - CATI VERSION*****
OPEN 1 200      OBF1a  2                                LABEL
MODULE SUBMODUL
substr(BF1a,7,1)='1'
What other ways does the service provide support that encourages and
supports breastfeeding?
OTHER SUPPORT FOR BREASTFEEDING
***** OPEN ENDED ENTRY ITEM *****
CHCE 1 4      BF2      2                                _MAKE_      LABEL
MODULE SUBMODUL
BF1 in (2,3,.R) or BF1a gt '000000000' and substr(BF1a,7,1)='0' or OBF1a gt ''
Does your service have a written policy, guideline or procedure about
breastfeeding?
1      Yes
2      No
3      Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
WRITTEN POLICY, GUIDELINE OR PROCEDURE ABOUT BREASTFEEDING
***** SINGLE CHOICE - CATI VERSION *****
MULT 1 14      BF3      7                                4      MLTLB
MODULE SUBMODUL
BF2=1
Does the policy, guideline or procedure include any of the following
elements?

INTERVIEWER NOTE:
BF (Breast Feeding)
BM (Breast Milk)
EBM (Expressed Breast Milk)
1      Parents are informed that the service provider &
2      [CONT] educators support BF when the parents first
3      [CONT] make contact with the service provider
4      [CONT] (or during orientation)
5      Families are asked about BF at the time of enrolment
6      Educators develop a documented feeding plan for
7      [CONT] breastfed infants
8      Educators provide a supportive physical environment for
9      [CONT] mothers who want to BF (e.g. access to a
10     [CONT] comfortable place for mothers who want to BF or
11     [CONT] express BM, access to a fridge to store EBM)
-12     None of the above
-13     Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
DOES THE BF POLICY, GUIDELINE OR PROCEDURE INCLUDE
Parents are informed that the service provider &
[CONT] educators support BF when the parents first
[CONT] make contact with the service provider
[CONT] (or during orientation)
Families are asked about BF at the time of enrolment
Educators develop a documented feeding plan for
[CONT] breastfed infants
Educators provide a supportive physical environment for
[CONT] mothers who want to BF (e.g. access to a

```

[CONT] comfortable place for mothers who want to BF or
 [CONT] express BM, access to a fridge to store EBM)
 None of the above
 Don't know [DO NOT READ OUT]
 Refused [DO NOT READ OUT]
 *****MULTIPLE CHOICE - CATI VERSION*****
 CALC 1 BFCALC 0 NOLAB
 MODULE SUBMOD 3
 BF2 in (2,3,.R) or BF3 gt '00000000000000'
 if BF2 in (2,3,.R) or
 (BF3 gt '00000000000000' and (BF1 in (2,3) or substr(BF1a,6,1)='1')) then BFCALC=1;
 else BFCALC=2;
 ***** CALCULATION ITEM *****
 MULT 1 9 BF1b 6 5 MLTLB
 MODULE SUBMODUL
 BFCALC=1
 Would you be interested in undertaking any of the following practices
 to create a breastfeeding friendly environment at your service?

INTERVIEWER NOTE:

BF (Breast Feeding)

EBM (Expressed Breast Milk)

- 1 Put up a (Breastfeeding welcome here) sticker
- 2 Having a breastfeeding policy
- 3 Providing a quiet place where mum's can BF or express
- 4 Providing access to a fridge for storage of EBM.
- 5 Providing families on your wait-list with information
- 6 [CONT] about BF when returning to work
- 7 None of these
- 8 Don't know [DO NOT READ OUT]
- .R Refused [DO NOT READ OUT]

INTERESTED IN CREATING A BF ENVIRONMENT

- Put up a (Breastfeeding welcome here) sticker
 Having a breastfeeding policy
 Providing a quiet place where mum's can BF or express
 Providing access to a fridge for storage of EBM.
 Providing families on your wait-list with information
 [CONT] about BF when returning to work
 None of these
 Don't know [DO NOT READ OUT]
 Refused [DO NOT READ OUT]

*****MULTIPLE CHOICE - CATI VERSION*****

OPEN 1 200 BF1c 2 LABEL
 MODULE SUBMODUL
 substr(BF1b,7,2) gt '00'

Is there anything in particular that would prevent your service
 undertaking these practices?

PREVENT YOUR SERVICE UNDERTAKING BF PRACTICES

***** OPEN ENDED ENTRY ITEM *****

INFO 2 Trained 5 NOLAB
 MODULE SUBMODUL

BF1b gt '000000000' and substr(BF1b,7,2)='00' or BF1c gt '' or BFCALC=2 or
 Substr(Q2,1,1)='0' and Q25 gt '000000000'

These questions are about the healthy eating and physical activity
 training opportunities provided to your Primary Contact Educators
 A Primary Contact Educator is someone qualified in early childhood
 education (including Cert III, Diploma and Degree level).
 Cooks and administration staff are not included.

***** INFORMATION SCREEN ITEM *****

NUM 1 Q26a 8 MM QINFORM QFORMAT LABEL
 MODULE SUBMODUL
 Trained=1

How many primary contact educators are working at your service?
This is about the total number of educators at the service and is not
about whether the primary educators are full-time and part time,
and it doesn't matter how many staff are caring for children on
any given day.?

(Code '888' if don't know)

(Code '999' if Refused)

0 20
0 1000

Usual numbers of workers

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

NUM 1 Q28 7 MM QINFORM QFORMAT LABEL

MODULE SUBMODUL

Q26a gt .

How many of your Primary contact Educators have received training in
the past five years regarding promoting child healthy eating?

This could have included training provided by an external agency or
by other trained staff in your service.

(Code '888' if don't know)

(Code '999' if Refused)

0 20
0 1000

Number received training

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

NUM 1 Q28a 7 MM QINFORM QFORMAT LABEL

MODULE SUBMODUL

Q28 gt .

How many of your Primary contact Educators have received training in
the past five years regarding promoting child physical activity?

This could have included training provided by an external agency or
by other trained staff in your service.

(Code '888' if don't know)

(Code '999' if Refused)

0 20
0 1000

Number received training in last 3 years

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

CHCE 1 4 QTech1 3 _MAKE_ LABEL

MODULE SUBMODUL

Q28a gt .

Are educators within your service using any apps or web based
technology to facilitate physical activity or healthy eating programming
or practices?

1 Yes
2 No
3 Don't know [DO NOT READ OUT]

.R Refused [DO NOT READ OUT]

EDUCATORS WITHIN YOUR SERVICE USING ANY APPS OR WEB

***** SINGLE CHOICE - CATI VERSION *****

OPEN 1 200 QTech2 1 LABEL

MODULE SUBMODUL

QTech1=1

Can you please specify what apps or web-based technology is being used?

SPECIFY WHAT APPS OR WEB-BASED TECHNOLOGY IS BEING USED

***** OPEN ENDED ENTRY ITEM *****

INFO 1 ThankU1 4 NOLAB

MODULE SUBMODUL

Q6 in (3,4,.R) and (QTech2 gt ' or QTech1 in (2,3,.R))

Thank you so much for answering those questions.

The information you've provided will be used to help develop, deliver
and evaluate healthy eating and physical activity programs to
children's services.

***** INFORMATION SCREEN ITEM *****

INFO 1 ThankU2 5 NOLAB

MODULE SUBMODUL

Q6 in (1,2) and (QTech2 gt ' or QTech1 in (2,3,.R))

Thank you so much for answering those questions.
The information you've provided will be used to help develop, deliver
and evaluate healthy eating and physical activity programs to
children's services.

We have just a couple more questions before we finish

***** INFORMATION SCREEN ITEM *****

CALC 1 smgclc 0 NOLAB

MODULE SUBMOD 7
(ThankU2=1 or ThankU1=1) and (Faxmenu=1 or Faxguid=1)
length smgtxt \$30.;
if Faxmenu=1 then do;
if Faxguid=1 then smgtxt="menu and nutrition guidelines";
else smgtxt="menu";
end;
else if Faxguid=1 then smgtxt="nutrition guidelines";
smgtxt=lowercase(strip(smgtxt));smgclc=1;

***** CALCULATION ITEM *****

INFO 1 SendD 5 NOLAB

MODULE SUBMODUL
smgclc=1

Thank you for agreeing to send through a copy of your service's
^smgtxt^ to us.

Do you have a pen so I can give you our email or fax number?
The email address is :hnelhd-goodforkids@hnehealth.nsw.gov.au
And the fax number is (02) 4924 6490

***** INFORMATION SCREEN ITEM *****

INFO 2 OnLine 9 NOLAB

MODULE SUBMODUL
ThankU2=1 and (Faxmenu ne 1 and Faxguid ne 1) or
SendD=1 and ThankU2=1

We are inviting services to be part of some new research that we are
undertaking to comprehensively assess the policies and practices that
make it easier or harder for families to pack healthy lunchboxes.
This research will involve both Educators and Nominated supervisors
from services where parents pack lunchboxes for their children, and will
be in the form of an online Nominated Supervisors survey and an online
Educators survey.

The information that we collect will help to inform the support
strategies we offer services in the future.

***** INFORMATION SCREEN ITEM *****

CHCE 1 4 OnLine1 5 _MAKE_ LABEL

MODULE SUBMODUL
OnLine=1

The Nominated Supervisors survey will be very different to the one
you have just participated in and will take approximately 15 minutes
to complete.

Would you be interested in participating in this survey?

1 Yes
2 No
3 Don't know [DO NOT READ OUT]
.R Refused [DO NOT READ OUT]

ONLINE SURVEY

***** SINGLE CHOICE - CATI VERSION *****

CHCE 1 2 OnLine2 6 _MAKE_ LABEL

MODULE SUBMODUL
OnLine1=1

Great thank you
The Educator survey will take approximately 15 minutes to complete.

Do you consent to your Educators completing this survey?
While we would like as many Educators to complete the survey as possible,
it is not mandatory that all/any do so.

1 Yes, consent for Educators to participate
2 No, do not consent to Educators participating

THE EDUCATOR SURVEY

***** SINGLE CHOICE - CATI VERSION *****

INFO 1 OKOnline12 NOLAB

MODULE SUBMODUL
OnLine2=1

That's great, thank you. We will be in contact in the next few weeks regarding these surveys.

INTERVIEWER NOTE: There are two different surveys - an NS survey and an Educator survey. We will make a follow-up phone call and explain the process to completing the survey which is: we will email two links to the service - one link to the NS survey, one link that can be used multiple times by Educators. Each respondent will be provided with a unique log-in so that their answers will remain confidential and they can exit and re-access the survey without losing their data if they cannot complete it in one setting. Services will also receive a step-by-step guide to how to access and complete the survey.

***** INFORMATION SCREEN ITEM *****

INFO 2 info_tnk2 NOLAB

MODULE SUBMODUL

ThankU1=1 and (Faxmenu ne 1 and Faxguid ne 1) or

SendD=1 and ThankU1=1 or OKOnline=1 or OnLine2=2 or OnLine1 in (2,3,.R)

Great, thanks again for giving up your time today to talk to us.

We really appreciate it. Thanks for your help and have a lovely day.

***** INFORMATION SCREEN ITEM *****

TIME 1 T_END 0 LABEL

end time

info_tnk=1

Recording end time

***** GET DURATION ITEM *****

OPEN 1 200 commhere5 LABEL

MODULE SUBMODUL

T_END gt .

INTERVIEWER NOTES:

This is a screen that allows you to record any comments or events that happened during the interview that needs to be recorded.

If you have nothing to enter please type in "nil"

Comments from interview.

***** OPEN ENDED ENTRY ITEM *****

STAT 1 STAT_CQ 1 NOLAB

end stat

commhere gt ''

Completed

CQ

STAT 1 STAT_CB 1 NOLAB

CB stat

(callback = 1 or CB=1 or CB2=1) and T_END=.

Callback

CB

STAT 1 STAT_DR 1 NOLAB

DR stat

(Refused gt ' ' or decline gt ' ') and T_END=.

Refused

DR

STAT 1 STAT_OS 1 NOLAB

OS stat

eliglc=1 and T_END=.

Out of scope

OS

STAT 1 STAT_OT 1 NOLAB

OT stat

res_oth gt ' ' and T_END=.

Other

OT

STAT 1 STAT_WN 1 NOLAB

WN stat

service6=1 and T_END=.

Wrong number

WN

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STAT 1          STAT_OP 1                                NOLAB
Intro
Intro1=8 and T_END=.
10 calls made with contact made
OP
***** INFORMATION SCREEN ITEM *****
STAT 1          STAT_TO 1                                NOLAB
TO      stat
service4=1 and T_END=.
Time out (PO) to check
TO
*****
STAT 1          STAT_UL 1                                NOLAB
Intro
Intro1=7
10 calls made no contact made
UL
***** INFORMATION SCREEN ITEM *****
INFO 2          TERM 2                                    NOLAB
END      Term
STAT_CQ='CQ' or STAT_CB='CB' or STAT_DR='DR' or STAT_OS='OS' or
STAT_OT='OT' or STAT_WN='WN' or STAT_OP='OP' or STAT_TO='TO' or STAT_UL='UL'
INTERVIEWER TERMINATION INSTRUCTION, PRESS STOP
AND RECORD OUTCOME OF INTERVIEW ON LOG
***** INFORMATION SCREEN *****

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9 March 2016

A/Professor Luke Wolfenden
HNE Population Health
Wallsend Campus

Dear A/Professor Wolfenden,

Re: Scheduling frequent opportunities for outdoor play – a simple approach to increasing physical activity in childcare (15/11/18/4.03)

HNEHREC Reference No: 15/11/18/4.03

NSW HREC Reference No: HREC/15/HNE/449

Thank you for submitting the above application for single ethical review. This project was first considered by the Hunter New England Human Research Ethics Committee at its meeting held on **18 November 2015**. 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. The Committee's Terms of Reference are available from the Hunter New England Local Health District website.

I am pleased to advise, the Hunter New England Human Research Ethics Committee has determined that the above protocol meets the requirements of the *National Statement on Ethical Conduct in Human Research* and following acceptance of the requested clarifications and revised Information Statements, Consent Forms, telephone Interview Script, Survey and Activity Monitor Information Sheet and Log Sheet by Dr Nicole Gerrand Manager, Research Support & Development under delegated authority from the Committee, grants ethical approval of the above project.

The following documentation has been reviewed and approved by the Hunter New England Human Research Ethics Committee:

Document	Version	Date
NEAF [Submission Code: Au/1/0A32215]		
Attachment 1 - Information Statement for Nominated Supervisors	Version 3	15 February 2016
Attachment 2 - Parent Information Statement	Version 3	15 February 2016
Attachment 3 - Parent Consent Form	Version 3	15 February 2016
Attachment 4 - Nominated Supervisors Computer Assisted Telephone Interview Script	Version 2	15 February 2016
Attachment 5 - Parent Telephone Survey	Version 3	26 February 2016

Hunter New England Research Support & Development Office

Locked Bag No 1

New Lambton NSW 2305

Telephone: (02) 49214950 Facsimile: (02) 49214818

Email: HNELHD-HREC@hnehealth.nsw.gov.au

<http://www.hnehealth.nsw.gov.au/ethics/Pages/Research-Ethics-and-Governance-Unit.aspx>

Attachment 6 - Environmental Data Collection Audit	Version 1	undated
Attachment 7 - Activity Monitor Information Sheet	Version 2	undated

For the study: **Scheduling frequent opportunities for outdoor play – a simple approach to increasing physical activity in childcare**

Approval has been granted for this study to take place at the following sites:

- **Child Care Services, Hunter New England Local Health District**

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 this letter, after which a renewal application will be required if the protocol has not been completed.

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:

- A report of the progress of the above protocol be submitted at 12 monthly intervals. Your review date is **March 2017**. A proforma for the annual report will be sent two weeks prior to the due date.
- A final report must 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. These do not need to be reported to the Hunter New England Human Research Ethics Committee
 - 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 Manager, Research Support & Development Office, of the Hunter New England Human Research Ethics Committee as soon as possible and at the latest within 72 hours.
 - All other safety reporting should be in accordance with the NHMRC's Safety Monitoring Position Statement – May 2009 available at http://www.nhmrc.gov.au/health_ethics/hrecs/reference/files/090609_nhmrc_position_statement.pdf
 - Serious adverse events are defined as:

Hunter New England Research Support & Development Office

Locked Bag No 1

New Lambton NSW 2305

Telephone: (02) 49214950 Facsimile: (02) 49214818

Email: HNELHD-HREC@hnehealth.nsw.gov.au

<http://www.hnehealth.nsw.gov.au/ethics/Pages/Research-Ethics-and-Governance-Unit.aspx>

- 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, as soon as possible.

You are reminded that this letter constitutes ethical approval only. You must not commence this research project at a site until separate authorisation from the Chief Executive or delegate of that site has been obtained.

A copy of this letter must be forwarded to all site investigators for submission to the relevant Research Governance Officer.

Should you have any concerns or questions about your research, please contact Dr Gerrand as per the details at the bottom of the page. The Hunter New England Human Research Ethics Committee wishes you every success in your research.

Please quote **15/11/18/4.03** in all correspondence.

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

Yours faithfully

For: Ms M Hunter
Acting Chair
Hunter New England Human Research Ethics Committee

Hunter New England Research Support & Development Office

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<http://www.hnehealth.nsw.gov.au/ethics/Pages/Research-Ethics-and-Governance-Unit.aspx>

Notification of Expedited Approval

To Chief Investigator or Project Supervisor:	Doctor Luke Wolfenden
Cc Co-investigators / Research Students:	Professor Philip Morgan Professor John Wiggers Doctor Patrick McElduff Mrs Meghan Finch Ms Karen Gillham Ms Sze Yoong Ms Lubna Abdul Razak
Re Protocol:	Scheduling frequent opportunities for outdoor play – a simple approach to increasing physical activity in childcare
Date:	31-Mar-2016
HREC Reference No:	H-2016-0088
External HREC Reference No:	15/11/18/4.03
Date of Initial Approval:	31-Mar-2016

Thank you for your **Initial Application** submission to the Human Research Ethics Committee (HREC) seeking approval in relation to the above protocol.

Your submission was considered under **Expedited Review of External Approval** review by the Chair/Deputy Chair.

I am pleased to advise that the decision on your submission is **External HREC Approval Noted** effective **31-Mar-2016**.

In approving this protocol, the Human Research Ethics Committee (HREC) is of the opinion that the project complies with the provisions contained in the *National Statement on Ethical Conduct in Human Research, 2007*, and the requirements within this University relating to human research.

As the approval of an External HREC has been "noted" the approval period is as determined by that HREC.

The full Committee will be asked to note this decision at its next scheduled meeting. A formal *Certificate of Approval* will be available upon request. Your approval number is **H-2016-0088**.

PLEASE NOTE:

As the HREC has "noted" the approval of an External HREC, progress reports and reports of adverse events are to be submitted to the External HREC only. In the case of Variations to the approved protocol, or a Renewal of approval, you will apply to the External HREC for approval in the first instance and then Register that approval with the University's HREC.

Linkage of ethics approval to a new Grant

HREC approvals cannot be assigned to a new grant or award (ie those that were not identified on the application for ethics approval) without confirmation of the approval from the Human Research Ethics Officer on behalf of the HREC.

Best wishes for a successful project.

Professor Allyson Holbrook
Chair, Human Research Ethics Committee

For communications and enquiries:

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Linked University of Newcastle administered funding:

Funding body	Funding project title	First named investigator	Grant Ref
NHMRC (National Health & Medical Research Council)/Project Grant(**)	Scheduling frequent opportunities for outdoor play – a simple approach to increase physical activity in childcare	Wolfenden, Luke	G1400149

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19 April 2016

**GOOD FOR KIDS STUDY: CREATING OPPORTUNITIES TO PROMOTE PHYSICAL ACTIVITY IN
CHILD CARE
PARTICIPANT INFORMATION STATEMENT – NOMINATED SUPERVISORS**

Version 4, dated 06/04/2016

Dear Nominated Supervisor,

The *Good for Kids, Good for Life* program has been providing support to childcare services to promote physical activity and healthy eating in children over the past 10 years. You are invited to take part in a new *Good for Kids* study that seeks to investigate a simple way for child care services (preschools or long day care centres) to encourage children to be more physically active. The research is being conducted by A/Prof Luke Wolfenden, Prof John Wiggers, Prof Phil Morgan, Prof Patrick McElduff, and Dr Serene Yoong from the University of Newcastle in collaboration with Mrs Meghan Finch and Ms Karen Gillham from Hunter New England Population Health.

Why is the research being done?

Childcare services play an important role in promoting the health and wellbeing of young children. Physical activity is important for children's healthy growth and development, and establishing simple ways to encourage children to be more physically active at child care may also help to reduce their risk of developing chronic diseases in the future. The information collected through this study will be used to plan and evaluate the support provided to childcare services across the region.

Who can participate?

Randomly selected child care services within the Hunter Region can participate if they: i) are open for at least eight hours per day; ii) enrol at least 25 children a day; and iii) offer one routine outdoor free play period across the core operating hours of 9am-3pm. The study will focus on rooms that provide care to children aged 3-6 years. The study is not suitable for services that cater exclusively for special needs populations.

What choice you do have?

Participation in this research is entirely voluntary. Your service will not be disadvantaged in any way if you choose not to participate. If your service does participate, you may withdraw from the research at any time without giving a reason. You will also have the option of withdrawing any information your service may have already provided. Parents will be asked to provide informed consent for their child's participation in the data collection processes (see below for more information).

What will you be asked to do?

A telephone interviewer will ring you within the next two weeks to assess if your service is eligible to participate. The study will occur across April and December 2016. All data collection procedures described below will occur twice (one in the next few weeks and the other approximately 6 months later). The research team will also provide you and the educators within your service additional information regarding all data collection procedures below prior to commencing the study. If you agree to participate, you will be asked to:

- **Complete two telephone surveys**

The survey will ask you a few brief questions related to your service's operations and current practices, policies, routines and governance relating to physical activity. The telephone surveys should take approximately 20 minutes each to complete.

- **Allow members of the *Good for Kids* team to approach parents to invite participation in the trial**

The telephone interviewer will ask you to provide suitable dates for members of the *Good for Kids* team to visit your service in the next few weeks. The team members will be present at your service every day for one week from service opening time. Prior to our visit, we will ask you to distribute an information package outlining study information to parents within your service. The research team will also distribute information statements and consent forms to parents of children aged 3-6 years attending your service during child drop-off and pick-up times in the 2- 4 weeks prior to the arranged service visit. We will also ask you to provide a space for a collection box where parents can return completed consent forms.

On the visit day, two members of the *Good for Kids* team will ask parents' permission to collect physical activity data using an accelerometer. Trained members of the *Good for Kids* team will fit an accelerometer to children who have written parental/guardian consent to participate in the study. The fitting of the accelerometers will occur in the presence of service staff at approximately 9am on the mornings of the service visits. An accelerometer is a small box-shaped instrument that is used to measure physical activity through recording the force of different body movements. It is unobtrusive, lightweight and slightly smaller than a matchbox and has previously been used to measure activity in children aged 3-6 years. The accelerometer will be secured around the outer clothing of children using an elastic belt or clip. The *Good for Kids* team will remove the accelerometer prior to pick up. We will also ask the childcare service educators within those rooms to help encourage children to keep their accelerometers on.

We will also ask parents to consent to having their child's physical activity measured across a period of seven days (removing only for water activities and sleeping). Parents will be given instructions on how to attach and remove the accelerometer. Additional instruction on fitting the accelerometers, what to do for water activities, and how to return the accelerometers will be provided to parents who consent to this component.

- **Participate in an environmental audit to assess the facilities provided for physical activity**

On a randomly selected day during the arranged site visit, two members of the *Good for Kids* team will be present for the full day to undertake an environmental audit. This applies only to your 3- 6 year old rooms. This audit will involve a team member observing and recording physical activities and interactions of participating children during the course of the day, collecting information on features of the indoor and outdoor play areas and information on physical activity training of staff, and some characteristics of the service such as how long the service has been in operation room leader qualifications and if the service has a physical activity policy. The audit will also involve interviewing the Room Leader and team members using a stop watch to record available play times for children. You and your educators will not be asked to do anything different for this audit.

- **You may be asked to change your service's current schedule of outdoor free play sessions for a six month period.**

This will involve endorsing and implementing the change in routine at your service and liaising with room leaders and educators to help implement changes. Should you require additional support, a member of the *Good for Kids* team will provide you with support to make the required changes in outdoor free play scheduling. The services that will be asked to participate in modifying their outdoor free play schedule will be randomly selected using a computerised random number process. If you are *not* asked to change your current outdoor free play schedule, we will ask that you to make *no changes* to your outdoor free play schedule for the six month study period. Should you be unprepared to implement this, please let us know as participation in this trial is voluntary and you are under no obligation to agree to participate. Members of the research team will also be available during this 6 month period to support you with making the change should you require.

What are the risks and benefits of participating?

This physical activity research has the potential to positively influence the health and development of children attending your service through increasing physical activity. There are no anticipated risks to your service through participation in the study.

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

Prior to fitting accelerometers, permission will be asked of each child and they will be told that they can stop being measured at any time. Also if research staff or child care educators notice that participation in the study is concerning the child, a child care educator 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 your privacy be protected?

Any information you and the parents of children at your service provide 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 at Hunter New England Population Health. Access to the information will only be available to the research team involved in this study. An identification number will be assigned to your data and any identifiable information will be stored separately in a locked file in a locked room and will be accessible only by the research team. It will not be possible to identify individuals or services from any publication or presentation arising from the research.

How will the information collected be used?

The data collected from this study will be used to help inform the development and potential rollout of evidence-based strategies that may increase physical activity levels of children attending child care services. Data collected as part of this research may also be presented at scientific conferences, be published within scientific journals or form part of student theses, or provided to the NSW Ministry of Health. At the end of the study, aggregate results relating to service processes and children physical activity data will be made available to your service upon request. Study results will also be made available on the Good for Kids website.

What do you need to do to participate?

Within the next two weeks, we will be contacting you via telephone to invite you to participate in the study. Please read this Information Statement and be sure you understand its contents before you consent to participate.

If there is anything that you do not understand, or if you would like more information, please contact Taya Wedesweiler on (02) 49246327 or email her at taya.wedesweiler@hnehealth.nsw.gov.au.

Thank you for considering this invitation

Yours sincerely

A/Prof Luke Wolfenden
A/Professor of Health
Hunter New England Population Health

Lubna Abdul Razak
PhD Student
Hunter New England Population Health

Complaints about this research

This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference: 15/11/18/4.03.

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 Ethics and Governance Unit, 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

Phone: (02) 4924 6477 Fax: (02) 4924 6490

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www.hnehealth.nsw.gov.au



GOOD FOR KIDS STUDY: CREATING OPPORTUNITIES TO PROMOTE PHYSICAL ACTIVITY IN CHILD CARE

INFORMATION STATEMENT FOR PARENTS/GUARDIANS

Version 4, dated 11/04/2016

Dear Parents,

The Hunter New England Health *Good for Kids. Good for Life* team has been providing support to childcare services to promote physical activity and healthy eating in children over the past 10 years. During this time we have undertaken a number of research studies. The studies have helped us determine how to provide high quality support, guidance and resources to childcare services for healthier outcomes for children.

The purpose of this letter is to let you know about a new research study that the *Good for Kids* Team is undertaking, and to invite you to provide consent for your child to participate. The study is investigating a simple way for child care services to encourage children to be more physically active. The research is being conducted by A/Prof Luke Wolfenden, Prof John Wiggers, Prof Phil Morgan, Prof Patrick McElduff, and Dr Serene Yoong from the University of Newcastle in collaboration with Mrs Meghan Finch and Ms Karen Gillham from Hunter New England Population Health.

Why is the research being done?

Childcare services play an important role in promoting the health and wellbeing of young children. Physical activity is important for children's healthy growth and development, and establishing simple ways to encourage children to be more physically active at child care may also help to reduce their risk of developing chronic diseases in the future. We are looking to assess whether helping childcare service change their scheduling of outdoor play time can help children be more active. The information collected through this study will be used to plan and evaluate the support provided to childcare services across the region.

Who can participate in the research?

Parents of children aged 3 to 6 years from randomly selected child care services in the Hunter region will be invited to give consent for their child to participate in data collection for the study. The research is not suitable for children with an intellectual or physical impairment that may impact on their physical activity capacity or ability to participate in data collection procedures.

The service your child attends has been randomly selected from a list of child care services provided by the NSW Ministry of Health, and has agreed to participate in the research.

What choice do I and my child have?

It is completely up to you whether or not you would like your child to participate in data collection for this study. The final decision to take part on the day is yours and your child's. If you decide that your child is not to participate, or you wish to end your child's participation in the study, your child's placement at the service and the care they receive will not be affected, and, you and your child will not be disadvantaged in any way.

If you and your child agree to participate, you can both withdraw at any time from the study, without providing a reason. If you or your child decides 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 if you agree to participate?

If you choose to participate in the study, childcare service staff will fit an accelerometer to your child to wear for the days they attend the childcare service. An accelerometer is a small box-shaped instrument that is used to measure physical activity through recording the force of different body movements. It is unobtrusive, lightweight and slightly smaller than a matchbox. The accelerometer will be secured under the outer clothing of children using an elastic belt. The fitting of the accelerometers will occur in the presence of a *Good for Kids* team member at approximately 9am on the mornings of the service visits, and will only take a few minutes. The accelerometer will be secured using an elastic belt or clip. The service staff will remove the accelerometers at the end of each day. All *Good for Kids* staff will have appropriate child protection clearance and all research activities will occur at the childcare service in the presence of your child's usual childcare service staff.

We will also be contacting you (or the nominated main carer) at a time convenient for you to participate in a telephone interview. The interview will ask about you and your child's age, your marital status, qualifications, employment status, household income and country of birth, as well as health and physical activity behaviours and what you do at home to help your children be active and sleep better. This interview should take roughly 25 minutes to complete.

We would also like to ask you to consent to having your child's activity level measured for seven days. If you consent to this, we will provide you with additional monitoring instructions on how to fit the accelerometer on your child for seven days, removing only for water activities (including baths/showers, swimming) and sleeping. The accelerometer will be secured under the outer clothing using an elastic belt or clip. The information we provide you will outline how to care for, when to fit and how to remove the accelerometer. The additional data will provide us with important information regarding the impact of the intervention on your child's health.

You can still participate in the trial without consenting to the measurement of activity for seven days.

What are the risks and benefits of participating?

This physical activity research has the potential to positively influence the health and development of children attending your service through increasing physical activity. There are no anticipated risks to you or your child through participation in the study.

When will the information be collected?

The data collection visits will occur roughly one to two weeks before the study starts, and approximately six months at the end of the study. These visits will occur between April and December 2016. Parents will be asked to give consent now for their children to participate in data collection for both time points.

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

Prior to fitting the accelerometers, permission will be asked of each child and they will be told that they can stop being measured at any time. Also if research staff or childcare educators notice that participation in the study is concerning your child, a child care educator 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 your child's privacy be protected?

Any information you and your child provide 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 at Hunter New England Population Health. Access to the information will only be available to the research team involved in this study. An identification number will be assigned to your/your child's data and any identifiable information will be stored separately in a locked file in a locked room and will be accessible only by the research team. It will not be possible to identify individuals or services from any publication or presentation arising from the research. All identifying information will be destroyed five years after completion of the project consistent with the University of Newcastle Research Data and Materials Management Policy.

How will the information collected be used?

The data collected from this study will be used to investigate a simple way for child care services to encourage children to be more physically active. Data collected as part of this research may also be presented at scientific conferences, be published within scientific journals or form part of student theses, or provided to the NSW Ministry of Health. We will be able to provide aggregate child and service data to the childcare service your child attends, upon request. The results from the trial will also be available on the Good for Kids website. As study results are only meaningful when analysed as an aggregate it is not intended that individual child physical activity data be provided to parents.

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 old enough to understand what is being asked of them, please discuss this with your child before making a decision. If you would like to participate, please complete the attached consent form and place it in the return box at your child's child care service within 2 weeks. Alternatively, you can return it to one of our team members who will be at the childcare service.

If there is anything that you do not understand, or if you would like more information, please contact Lubna Razak at 02 4924 6305 or email her at Lubna.abdulrazak@hnehealth.nsw.gov.au.

Thank you for considering this invitation.

Yours sincerely

A/Prof Luke Wolfenden
A/Professor of Health
Hunter New England Population Health

Lubna Abdul Razak
PhD Student
Hunter New England Population Health

Complaints about this research

This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference: 15/11/18/4.03.

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 Ethics and Governance Unit, 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

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Health
Hunter New England
Local Health District

GOOD FOR KIDS STUDY: CREATING OPPORTUNITIES TO PROMOTE PHYSICAL ACTIVITY IN CHILD CARE

PARENT/GUARDIAN CONSENT FORM

Version 3, dated 15/02/2016

Please complete and return to the childcare service or research team.

I have read and understand that the *Good for Kids* data collection service visits will be conducted as described in the Parent Information Statement, a copy of which I have retained.

I have been made aware of the procedures involved in the study, including any known or expected inconvenience, risk, discomfort or potential side effect and of their implications as far as they are currently known by the researchers.

I have had the opportunity to have questions answered to my satisfaction.

I hereby give my consent for my child to have his/her physical activity levels measured using an accelerometer, worn on two separate occasions at the childcare service for the days they are attending care during the week

YES ☐ NO ☐

I consent to measuring my child's activity at home for seven days in line with the activity monitoring sheet

YES ☐ NO ☐

I agree to complete a telephone interview asking about my child and their activity habits, and about me, my household, and my activity habits

YES ☐ NO ☐

I understand that consenting to participate in this study does not obligate me or my child to participate in any future research. I understand that I may withdraw, or withdraw my child from the study at any time. I understand that my child may choose to withdraw from the study at any time and that the information that my child and I provide will be confidential and will be stored safely after the study is completed.

Parent/Guardian Name: _____

Parent/Guardian Signature: _____

Contact phone no: _____

Suburb and postcode _____

Date: _____ / _____ /2016

Good for kids
good for life

**Good For Kids Study:
Creating Opportunities to Promote
Physical Activity in Childcare**

**Baseline Site Visit Protocol
March 2016**



Health
Hunter New England
Local Health District

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 - Parent information statement and consent form
 - Sample consenting children list
 - EPAO tool
 - Accelerometer information sheet and log sheet
 - Parent FAQs
 - Draft schedule for site visits
 - Ethics approval letter

1. Important contacts

Who	Contact details	Availability	Reasons
Lubna Abdul Razak	W: 49246305 Mobile: 0450 743 323 Lubna.AbdulRazak@hnehealth.nsw.gov.au	Mon - Fri	<ul style="list-style-type: none"> - Unable to attend site visit - Running late to service - Lost - Problems with site visit timetable/equipment etc. - Missing documentation
Melinda Phillips Admin Assistant	Phone: 49246022 melinda.phillips@hnehealth.nsw.gov.au	Mon – Wed 9.00am-2.30pm	<ul style="list-style-type: none"> - For all HR and pay enquiries
Project staff:			
Jannah Jones Project Manager	W: 49246601 Jannah.Jones@hnehealth.nsw.gov.au	Mon, Wed, Thurs	
Lubna Abdul Razak PhD Student	W: 49246305 Mobile: 0450 743 323 Lubna.AbdulRazak@hnehealth.nsw.gov.au	Mon - Fri	Room 1103D (1 st Floor, Booth Building)
Ben Parmenter Research Assistant	W: 4924 6454 Ben.Parmenter@hnehealth.nsw.gov.au	Mon - Fri	Room 1103D (1 st Floor, Booth Building)
Milly Licata Project Officer	W: 49246398 milly.licata@hnehealth.nsw.gov.au	Mon – Thurs 8.15am-2.45pm	
Taya Wedesweiler Project Officer	W: 49246327 Taya.Wedesweiler@hnehealth.nsw.gov.au	Mon - Fri	
EXTERNAL			
Emergency	P: 000	24/7	<ul style="list-style-type: none"> - Any emergency
NRMA	P: 131111	24/7	<ul style="list-style-type: none"> - Breakdown, flat tyre, flat battery
Wallsend Health Campus Security	P: 0409 923683 (Advise security if working after 6pm)	24/7	<ul style="list-style-type: none"> - If needing to access Booth Building outside of work hours - Collecting car kits outside work hours

2. Aim of the study and site visits

Aim of the study

To assess the efficacy of scheduling three period of outdoor free play in increasing the time children spend in moderate-to-vigorous physical activity per day while attending childcare.

Aim of the site visits

- To contribute to the evaluation of initiatives to improve the physical activity levels of children attending childcare services.
- To place and remove accelerometers to children who were given consent to take part in the study.
- To observe the routine physical activity practices of childcare services.
- To observe the physical activity policies of childcare services.
- To look for additional opportunities to promote and physical activity within childcare services (i.e. staff practices or service environment).

Methodology

Study design and sample

This trial will employ a cluster randomised controlled trial with 30 childcare services located in the Hunter region of NSW.

Sampling Frame

A sample of eligible long day care services in the study region was randomly selected and approached to participate in the trial. Fifteen services will be randomly allocated to a service-level physical activity intervention, delivered over a 6 month period, and fifteen services will be allocated to a control group.

Recruitment of Participants and timeframe

All 30 services will participate in both the baseline and follow-up data collection points for the intervention and control groups. This will take place in April to December 2016.

Ethics

The study has received approval by the Hunter New England Area Human Research Ethics Committee (approval No.15/11/18/4.03).

3. Preparation for the site visits

When will data collection take place?

Baseline site visits will take place from March-July 2016. Data collection will take 5 days per childcare service.

Staffing

Lubna Razak and Milly Licata will be responsible for co-ordinating arrangements for data collection. Lubna and Milly will develop a data collection travel itinerary and will forward it to RA's as soon as possible. They will also provide the team with the appropriate documents for each school visit including copies of all tools, list of consenting children, and all equipment needed including accelerometers.

1-2 RA's will attend each childcare service and will be responsible for the collection of data.

Role of RA's

- Parent recruitment
- Distributing and collecting accelerometers
- Conducting EPAO – observation of service physical activity policies, practices and environment

On the day

Please bring the following items with you every site visit:

- Photo ID badge
- Working with Children check
- Sunscreen, hat and sunglasses
- Lunch (please exclude nuts and eggs)
- Closed in comfortable shoes
- Charged mobile phone

Before you leave Population Health

Ensure you have picked up the following items from Lubna's office at HNE Population Health:

- Data collection kit including:
 - Nominated Supervisor contact details
 - Map and directions
 - Spare information statements for Nominated Supervisors
 - Spare information statements/consent forms for Parents
 - Site visit protocol
 - 2 copies of EPAO tool
 - Consenting children list
 - Accelerometers, belts and activity logs
 - Clip board, pens
 - Stopwatch
 - Trundle wheel/measuring tape
 - Stickers

If using a HNE car, ensure you have picked up the car keys and pouch from the Security Office.

Confidentiality

All data collected should be treated in a confidential manner. Do not leave notes, names, IDs, or forms unattended. Do not discuss the EPAO measurement tool with the service staff or children. Data will be linked in the computer to childcare service ID only, not name, and upon completion of the study all paperwork linking name to ID will be destroyed.

4. Site visit tasks

1. Arrive 15 minutes before the service opens. Milly will advise you as to the specific time as this will vary across services.
2. Sign in and introduce yourself to the Nominated Supervisor and any other staff.
3. Briefly remind the Nominated Supervisor of what you'll be doing throughout the day
 - recruiting parents as they arrive
 - placing the accelerometers on the children with parental consent
 - observing the room for preschool children
 - standing out of the way, observing the daily goings on in the service - the physical environment, what the kids do, what the staff members do etc
 - following around as the kids move around the service
4. Check return box for any additional consent forms and add these children to the consenting children list.
5. As children and parents arrive, determine whether they have consent to participate and if not, provide information statement and opportunity to provide consent.
6. Observe the childcare service staff to fit accelerometers x2 (both "in care" and "at home") to children prior to 9am (ideally as soon as they arrive).
7. Conduct EPAO from 9am-3pm.
8. Observe the childcare staff to remove "in care" accelerometers after 3pm.
9. Provide accelerometer information sheet and log sheet to parents at pick up (for those who provide consent to wear at home).
10. Ensure all paperwork is completed and return all documentation and equipment to Lubna's office at HNE Population Health.

5. Documents to collect at the site visit

Speak with the Nominated Supervisor in the morning after you arrive for data collection and arrange a suitable time to collect documents (explain that you can take a photocopy / photograph, or that they can fax the documents through later).

Ask if the Nominated Supervisor can locate:

- Physical activity policy
- QIP Information related to physical activity

It may be easiest to view / copy these documents during children's nap time.

Take copies of all relevant documentation if possible. If photocopying is not available – ask the Nominated Supervisor to email to lubna.abdulrazak@hnehealth.nsw.gov.au or fax to 49246215.

If the Nominated Supervisor will be emailing/ faxing – ensure you flag with Lubna to follow this up.

You can also flag with the Nominated Supervisor that we would like to know the total number of children enrolled at the service aged 3-6 years and the total number attending each day of data collection (record these numbers on the consenting children list).

6. Parent recruitment protocol

Parent recruitment will occur during the 2 weeks prior to the commencement of the site visits at each service. The protocol will be as follows:

2 weeks prior to site visit

Taya Wedesweiler will arrange for the delivery of parent recruitment packs to the service. The parent recruitment pack includes the parent information statement and consent form. Taya will also provide a return box for the service to display for the return of consent forms. The recruitment packs will be distributed to parents according to the preferences of the Nominated Supervisor. Examples include in pigeon holes, parent pockets etc.

1 week prior to site visit

1 RA will be rostered to attend the service at drop off and pick up times every day in the week leading up to data collection. The exact times will differ for each service (Milly will advise during rostering) but will typically be from 7:30-9:30am and 3:30-5:30pm. The RA will actively recruit parents during these time periods.

Equipment needed:

- Parent information statements and consent forms
- Example accelerometer

Tasks will include:

- Asking the Nominated Supervisor where the best place is to stand (e.g. in the foyer, in the preschool room, where children are signed in and out etc).
- Greeting parents and assessing if they are eligible and interested in participating in the study.
- Providing parents with the information statement and consent form – encouraging them to complete it there and then if able to. If not, directing them to the return box for consent forms for parents who wish to take the information statement and consent form with them and return it at a later date.
- Leave a spare pile of information statements and consent forms next to the return box before you leave.
- At the end of each day of recruitment, please collect all consent forms from the return box and give to Lubna at HNE Population Health as soon as you return.

Script for recruiting parents

Hi, my name is xx and I'm from the Good for Kids team. How are you today? I'm here to let parents know about a new research study that we are running at this service. We are looking at new ways to help childcare services encourage children to be physically active. Would you be interested in taking a look at the information pack? Basically we are asking for parents of children aged 3-6 to provide permission for their child to wear an accelerometer for 5 days while they're at childcare (show parent the accelerometer). The accelerometer is a small device that measures physical activity. We are also interested in physical activity at home so there's an option for you to take it home for the week. We'll be collecting this data now and again in 6 months' time. If you're interested you can fill out this consent form and pop it in the return box located here (point to box). Did you have any questions?

It is essential that RA's familiarise themselves with the parent information statement and consent form (see appendices) and be prepared to answer any questions that may arise. We

are aiming to recruit at least 600 children aged 3-6 years into the study – so the more parents that we can recruit the better!

7. Accelerometer protocol

Accelerometry will be used to objectively assess children's physical activity. The accelerometer used for this project is the Actigraph GT3X+. This is a small, lightweight, triaxial device worn on an elasticised belt around the waist. The monitors capture physical activity by recording time varying accelerations. We are asking consenting children to wear the accelerometer for 5 days while attending childcare (from 9am-3pm). Some children will have been given consent to have their physical activity monitored at home in addition to in care. For these children, 2 accelerometers will be fitted simultaneously. The "in care" accelerometer will be removed at 3pm each day while the "at home" accelerometer will be left on. These children will be identified in the list of consenting children. For those wearing the accelerometer at home, it should be removed for water activities (including baths/showers, swimming) and sleeping.

The monitor will be placed on the child on the first day they attend the service for that week and as soon as he/she arrives (before 9am). The monitor will then be removed at the 3pm (for those not taking them home).

Equipment

- Actigraph GT3X+ accelerometers
- Elasticised belts
- Serial number labels
- Clear lock bags
- Accelerometer information sheet and logsheet (to give to parents)
- Stickers for children



Before fitting the accelerometers on the children:

- Check that the child has consent to participate – listed on the consenting children list. Parents can still provide consent for participation on the actual day of data collection.

When fitting the accelerometers to the children:

1. The monitor will be fitted as soon as the child arrives at the service, before 9am where possible.
2. Offer the monitors to them to let them touch and hold the monitors if they seem a bit hesitant, or just to get familiar with how it feels.
3. Discuss with the child how the accelerometer needs to be worn in simple language) they can understand (e.g. call it an activity monitor or an activity counter). Explain to the child that the monitor:

- needs to be worn all day at the service and for those who have parental consent to be worn at home
- needs to be taken off when they go in water
- can be worn underneath their clothes
- tell an adult if it falls off

It is critical that you ensure that the child experience with the accelerometer is a positive one. Make sure you are warm, friendly and engaging with the children and use appropriate language. Give children a choice of sticker when they first put the accelerometer on. Give them another sticker at 3pm when the accelerometer is removed.

4. The monitor will already be on an elastic belt. To fit the monitor, put the belt around the child's waist and fasten. Make sure the belt is snug against the child's body but not digging in to the child's skin. **The monitor should be positioned over the right hip with the button facing upwards.** The monitor should be directly in contact with the child's skin (not on top of clothes).
5. Use the consenting children list to document the serial number of the monitor (using the sticker provided), the date and time the monitors were fitted to the children and taken off the children, if a second monitor is given to the child due to the child forgetting to wear the monitor to service on any given day, record the serial number of the second monitor.
6. If a second "at home" monitor is given to a child, document the serial number of the monitor (using the sticker provided), and the date and time the monitors were fitted to the children.
7. Remove the "in care" accelerometers from the children at 3pm.

For those bringing the accelerometer home:

8. When the child is picked up from childcare on the first day, give the "activity monitor instruction sheet" to the parent (see appendices).
9. Remove the "in home" accelerometers from the children after 7 days of wearing.

Strategies to increase compliance:

RA's should be present in the service during the data collection and check the children are wearing the monitors.

- If the child is not wearing the monitors correctly (e.g. monitor is upside down, wearing on the wrong side of the body), correct the monitor's position and explain how to wear the monitors again to the child in easy to understand language.
- If the child has left the monitor at home, provide the child with a new monitor and document the details on the consenting children list.
- Stickers are available and should be given to children as a reward for wearing the accelerometer. Stickers can also be given to non-consenting children.
- Childcare staff and RA's can wear accelerometers and role model these to the children.

8. Environmental and policy assessment and observation (EPAO) protocol

The purpose of the Environmental and Policy Assessment and Observation (EPAO) is to objectively and effectively describe the physical activity policies practices and environment of childcare services.

Equipment

- Pen
- Stopwatch
- Trundle wheel/measuring tape
- EPAO form

Sampling

Only one 3-6 year old classroom will be observed from 9am-3pm. In the case where there is more than one 3-6 year old classroom, the room with the most consenting children wearing accelerometers will be observed.

Important: Prior to observation, the EPAO document should be thoroughly reviewed by the observer to become familiar with the key constructs – there are likely to be situations where multiple constructs will be observed at once, so familiarity with the tool is essential.

Attempt to minimize conversation and contact with all children. The children will be aware of the observer's presence and will be told that a visitor is at the service all week to watch the children play and participate in service activities. The children will undoubtedly be curious at first and will try to interact with the observer. Discourage interaction by avoiding eye contact and minimizing conversation in a curt but pleasant manner. Observers should not interject themselves into the interactions between children.

EPAO procedures

Complete the EPAO tool between 9am and 3pm based on what you observe. The answers to these questions are based solely on what is observed, not what staff tell you are "usual" occurrences. While some questions may require confirmation or clarification from staff, most are able to be observed during a full day at the service.

Active opportunities

Question 1: Active play time

- Total number of minutes of active play. This includes, indoor, outdoor, structured and unstructured play.
- The write in box is provided for you to detail all physical activity occasions.

Eg:

9:15-10:30 outdoor play → 5 min structured activity while outside (75 min) 11:00-11:08 circle time active songs (8 min) 3:15-5:00 outdoor play (105 min)
--

Question 2: Structured Physical Activity time

- Refers to an activity that is structured such as a video, music, or teacher led activity.
- Record the total number of minutes and occasions as well as if the majority of occasions were optional or not.

Eg:

9:15-10:30 outdoor play → 5 min structured activity while outside (75 min)
11:00-11:08 circle time active songs (8 min)
3:15-5:00 outdoor play (105 min)
Total structured play time: 13 minutes

Question 3: Structured, adult guided Fundamental Movement Skills

- Refers to specific gross motor movements that involve different body parts such as feet, legs, trunk, hands, arms and head. Fundamental movement skills are categorised either as stability, locomotor and manipulative.

Stability skills – moving or standing still with one body part making contact with the ground or equipment, and moving around on a vertical or horizontal axis of the body i.e. balancing, stretching, twisting, bending.

Locomotor skills – moving the body from one location to another i.e. walking, running, jumping, leaping, galloping, hopping, side sliding.

Manipulative skills – imparting or receiving force from or to an object i.e. throwing, catching, striking, bouncing, kicking, underarm rolling or bowling.

- Record the total number of minutes and occasions as well as if the majority of occasions were optional or not and what specific sections of fundamental movement skill were observed.

Eg:

11:45-12:30 of leap frog game → (35 min)
1:00-1:08 bean bag balancing (8 min)
3:15-3:34 T-ball game (19min)
Total fundamental movement skill time: 62 minutes
All sessions were optional

Question 4: Outdoor active play occasions

- Record total number of outdoor activity occasions observed.
- If none were observed, assess whether or not you think it was due to unfavorable weather conditions. This would include dangerous temperatures (hot or cold), dangerous UV index, and precipitation. This does not include wet outdoor play equipment or improperly dressed children.

Question 5: Outdoor active play minutes

- Record the total number of outdoor play minutes.

Eg:

9:15-10:30 outdoor play → 5 min structured activity while outside (75 min)
11:00-11:08 circle time active songs (8 min)
3:15-5:00 outdoor play (105 min)

Sedentary Activities - Child

Question 6: Children seated

- Include all times that a majority of the children are seated, but not meal time or nap time. Eg: if teacher puts table toys on table and children are only allowed to sit at table and play, circle time on carpet, TV viewing. etc.
- Record the number of times seated activity lasted 30 minutes or longer and also record the total minutes of seated activity time during the entire day. A write in box has been provided to tally activities.

Eg:

8:00-8:15 circle time (15 min) 10:45- 11:30 table top activities (45 min) 4:00-4:20 TV time (20 min)
--

Questions 7-8: TV

- Please note presence of TV in the observation room.
- Record the total TV viewing time, if it was on during meals, and if programs were only educational.
- Be sure to use your best judgment. Make sure there is an underlying suitable theme and message in the program. Eg:

Programs	Theme/Message
Dora the Explorer	Learning colours/colours, shapes and letters
Sesame Street	Manners & being respectful of others
Abckids Play school	Arts and craft
Bob the Builder	Working together & solving problems
Barney	Family & relationships

Question 9-10: VCR/DVD or Computer presence

- Is a VCR/DVD or computer present observed in the classroom?

Question 11-12: Electronic games

- Record presence of computer (for use by children) and video game system.
- Record the total number of minutes game playing is observed as well as the total number of children playing. We will then be able to ascertain game playing time per child.
- Use your best judgment if all games are educational. If they are learning numbers and colours then it is educational. If they are just doing paint brush type activities, then it is not educational.
- Eg:

Child 1, 2, 3, (20 min) Child 4, 5, 3 (10 min) Child 1 (10 min) Child 6, 7, 8, 9 (30 min) Total time: 70 min # of children playing: 9 # of children in the classroom: 14 Total time per child: 5 min

Physical Activity – Staff Practices

Question 13: Active play and punishment

- This question refers to a teacher disciplining a child and putting them in timeout for a significant period of time (more than 1 min per age of the child) while the rest of class has free active play or the loss of active play time or outdoor time for the whole class due to misbehavior.

Question 14: Staff and active play

- This question refers to a teacher joining in active play with children. This means the teacher is not leading the activity but playing with the children. If a teacher plays ball with a child and then stops to talk to another teacher and then a few minutes later begins to chase the children then this would count as 2 times of joining in active play.
- Pushing a child on a swing while talking to another teacher does not count. The teacher must engage the child in some way.

Question 15-16: Prompts

- Prompts to increase activity include: “Go Play”, “Run Hard”, “Good Throw, can you do it again”, etc
- Prompts to decrease activity include: “Get off of that”, “Get down from there”, “Don’t climb up that”, etc.

Question 17: Positive statements about Physical Activity

- Positive Statements may include: “Running is fun”, “Good throw”, “Exercise is good for your body”, etc.

Question 18: Extra-curricular Physical activities

- These include things that are provided by the facility for an extra fee by parents and do not utilize core facility staff.
- If provided, do they provide alternative “active” activities for the children that don’t participate? May have to ask staff about this if it doesn’t occur on the day of observation. “I see you have the Tumble Bus on Tuesdays. What do the other kids in the classroom do during that time if they don’t participate?”
Eg: Tumble Bus, Tumbling Tots, etc.

Centre Environment

Question 19: Fixed play equipment

- These questions refer to fixed playground equipment.

Question 20: Portable play equipment

- These questions refer to moveable equipment located indoors and/or outdoors.

Question 21: Outdoor play equipment

- This question assessed if the space is restricted and therefore the possible use of the space available.

Question 22: Outdoor running space

- Assess the outdoor play space. Is it large with unobstructed areas for running and playing of group games? Is it large, but equipment is situated such that there is room for individual running only? Is space completely obstructed?

Question 23: Indoor play space

- This question refers to an indoor space for active play. Some services will have a gym or big indoor play room for inclement weather.
 - Quiet play only - no room for movement
 - Limited movement/some active play - ability to translocate by walking, skipping, hopping, etc.
 - All activities - gym or big open room with the ability to run freely

Question 24: Space limitations

- This assesses a reduction in outdoor play space (> than 1/3 area) due to understaffing, flooding, hazard, etc.

Question 25: Physical Activity displays

- This refers to posters, pictures, or display books in eye sight of children in the observation room. The pictures or posters must be showing some sort of action not just holding a ball. This also includes the physical activity pyramid.

Question 26: Room Leader (RL) Qualifications

This question asks the highest qualification related to their post. If unknown, then ask for their years of experience.

EPAO Document Review Procedures

At the beginning of the day, make a time for the document review to take place. Only one of the RA's needs to conduct this review, the other RA is to remain observing the classroom and recording the relevant information. For ease, nap time is the ideal time in the day to complete this section of the instrument.

Document Review Checklist

- _____ Physical activity Policies
- _____ Training materials for staff on physical activity
- _____ Educational materials for parents on physical activity
- _____ Curriculum materials for children on physical activity

Question 27: Physical activity policy

Ask the Nominated Supervisor has a written policy on physical activity. If yes, then view this policy while answering these questions.

- Active play and inactive time – Policy must address that active free play time is provided to all children for at least 45 minutes each day, that structured Physical Activity is provided to children, that outdoor time is provided to children (must go beyond the law), that staff do not punish children by taking away outdoor time or active play time, or that children will not be seated for more than 30 minutes at a time.
- TV use and TV viewing – Policy must address that the use of tv, videos, video/computer games.

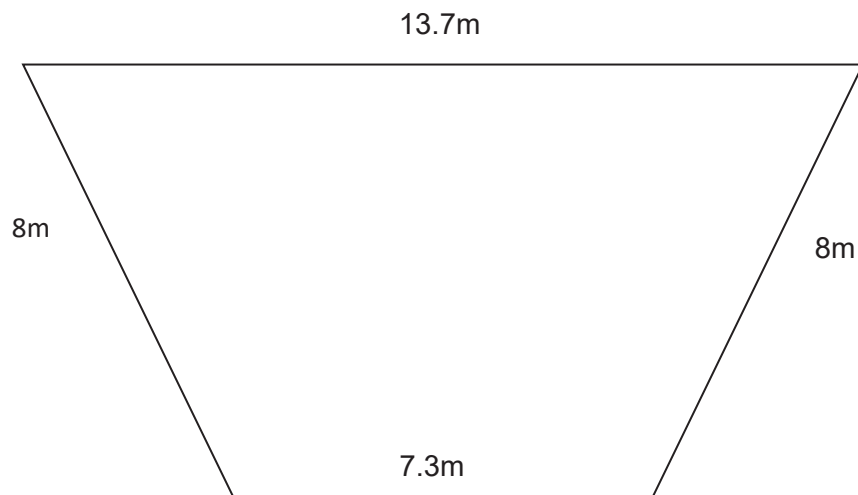
- Play environment – Policy must address the provision of fixed or portable play equipment, that safety checks occur on equipment at least monthly, or the provision of indoor play space for when the weather does not permit going outside.
- Supporting physical activity – Policy must address that staff join in active play time, that staff verbally encourage Physical Activity, or that staff encourage Physical Activity through the use of posters and books.
- Physical Activity education – Policy must address that Physical Activity training is provided for staff that Physical Activity training is provided by a professional, that Physical Activity education is provided to the children, or that Physical Activity education opportunities will be provided to the parents.

Questions 28-31:

Based on the information provided by the services, you will answer the following questions. You will find these answers on training certificates, curriculum books, and handouts. Having physical activities (throwing, etc.) written into the lesson plans is not the same thing as using a Physical Activity curriculum.

9. Measuring play area instructions

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 trundle wheel, measure each side of the play area and mark that on the drawing.



10. Definitions

Term	What we mean...
Physically active	When we talk about children being “active”, we mean where children are moving their body from one location to another, engaging in fundamental movement skills, or if standing, are at least moving their limbs and trunk.
Child initiated / free play time	Where children (while supervised) are given time to play. There is no structure to this period, or no formal instruction. Children decide which activities they take part in, what and who they play with. Educators may provide suggestions or join in, but this is not a requirement.
Structured, educator led physical activity	<p>Structured physical activity must be initiated and <u>led by a teacher</u>. 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.</p> <p>E.g. structured active games, dancing, exercises, gross motor development activities.</p>
Circle time	<p>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.</p> <p>E.g. story time, group learning, school readiness activities, singing a song on the floor.</p>
Fundamental Movement Skills (FMS)	<p>Fundamental movement skills are basic gross motor movement skills.</p> <p>They include running, catching, jumping, kicking, galloping, leaping, hopping, ball dribbling, side-sliding, striking a ball, underarm rolling and over arm throwing.</p> <p>Development of such skills involves educators explaining, demonstrating and providing feedback to children for each skill.</p>
Educator led, structured activity to develop fundamental movement skills (FMS)	<p>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.</p> <p>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.</p>
Staff joining in active play	<p>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.</p> <p>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.</p>

	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.
Participating alongside	This means that the educators as well as the children are being physically active (see above definition) and are participating in the same type of activity. Nb. Note the intensity of the educator can be less than the child, so long as it meets the above definition.
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 services 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 about physical activity	Staff member provides positive comments 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”
Nap time	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).

11. 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 accelerometers). If just 1 classroom - write the total number in that class – including children not participating in the study (those without consent to wear accelerometers).
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 Physical Activity and what is not?	Structured Physical Activity by external physical activity providers (e.g. fitness Kids) is not counted. Count as structured Physical Activity 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	Make observations based on what the majority of children are doing.

counted as sedentary?	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.

Activity Monitor Information Sheet for Parents

Please do not hesitate to call Lubna Razak on (02) 49246305, please leave a message at this number if you have any questions or concerns about the child's activity monitor.

What does the monitor do?

The monitor records all movement, so that when the child watches television, play outside, or eat dinner, it records how much and how often they move their body.



Does the monitor hurt?

No. The monitor is attached to a soft elastic belt and worn under their outer clothing. The child may be aware of the monitor when they first start to wear it, but it will not hurt.

When do you put the monitor ON the child?

- The monitor will be placed on the child on the first day they attend the service for that week as soon as he/she arrives. The accelerometer will be secured around the outer clothing of children using an elastic belt or clip.
- He/she is to wear the monitor under her/his outer clothes over the right hip (not in the middle near their belly-button), making sure that it is the correct way up (the sticker on the top of the monitor should be facing upwards i.e. pointing towards the sky). The monitor should fit firmly so that the elastic belt cannot bounce, but should not be uncomfortably tight (see picture)
- Please record the times that your child is awake or sleeping during the 7 days using the attached activity monitor log sheet.
- The monitors are not water-proof, so please remember that the monitor is not to be worn in the shower, bath or when swimming or playing in aquatic areas.



When do you take the monitor OFF the child?

- The monitor should be taken off if there is a chance that the monitor could get wet (e.g. playing near water).
- The monitor should be removed before bedtime
- The monitor will be removed 7 days later when the child attends the childcare service at the end of the day.

A tip to help you remember to wear the monitor

When the monitor is taken off, it is a good idea to put it on the clothes that your child will wear next so that you remember to put it on her/him again.

What do I do at the end of the 8 days?

Please ensure the child wears the monitor for 7 days in a row. On day 8 please return the attached log sheet to the service.

What if my child damages or loses the monitor?

You will NOT have to pay for the monitor if the child damage or lose it.

The monitors are expensive, so please take care of them. It is quite a sturdy piece of equipment, but will be damaged if thrown or forcefully dropped. The child should not lose the monitor because it is securely fitted to a belt, and should not be removed except for during aquatic activities.

Activity Monitor Log Sheet

Child's Name:

Monitor ID Number:

INSTRUCTIONS:

1. Please **shade in** the times that the activity monitor was ON
2. During the times the monitor was OFF please indicate what the child was doing and the time the monitor was OFF.
3. Please indicate any time spent swimming, riding a bike, or playing on a trampoline.
4. See the example on the left hand side of the page for how to complete the log.

EXAMPLE:

	Time/Date	Monday 20/5
AM	12-1	Sleep
	1-2	Sleep
	2-3	Sleep
	3-4	Sleep
	4-5	Sleep
	5-6	Sleep
	6-7	Sleep
	7-8	ON
	8-9	BIKE RIDING
	9-10	
	10-11	
	11-12	
PM	12-1	
	1-2	
	2-3	
	3-4	SWIMMING OFF
	4-5	SHOWER OFF
	5-6	ON
	6-7	
	7-8	
	8-9	
	9-10	BED - OFF
	10-11	Sleep
	11-12	Sleep
Total time swimming for the day:		1 hr
Total time riding a bike for the day:		1 hr
Total time using a trampoline for the day:		

	Time/Date			
AM	12-1			
	1-2			
	2-3			
	3-4			
	4-5			
	5-6			
	6-7			
	7-8			
	8-9			
	9-10			
	10-11			
	11-12			
PM	12-1			
	1-2			
	2-3			
	3-4			
	4-5			
	5-6			
	6-7			
	7-8			
	8-9			
	9-10			
	10-11			
	11-12			
Total time swimming for the day:				
Total time riding a bike for the day:				
Total time using a trampoline for the day:				

Child's Name:

Monitor ID Number:

	Time/Date					DAY 8
AM	12-1					
	1-2					
	2-3					
	3-4					
	4-5					
	5-6					
	6-7					
	7-8					
	8-9					
	9-10					
	10-11					
	11-12					
PM	12-1					
	1-2					
	2-3					
	3-4					
	4-5					
	5-6					
	6-7					
	7-8					
	8-9					
	9-10					
	10-11					
	11-12					
Total time swimming for the day:						
Total time riding a bike for the day:						
Total time using a trampoline for the day:						

Tips for encouraging children to wear the accelerometers

It is very important to ensure that each child has a positive experience with the accelerometers.

Remember to adjust your language to an appropriate level for a 3-5 year-old. **Be more animated, positive and warm and kneel down to the child's level and make sure you make eye contact. Your tone of voice must be warm, friendly and engaging at all times.**

Some tips:

- Ask the child what super-hero they'd like to be for the day – they can wear a “magic belt” just like superman/supergirl/ batman/batgirls etc does
- Start with a general ‘warm-up’ conversation with the child – introduce yourself, ask what their name is, ask about something that they like to do, what they got up to on the weekend etc
- Explain what the activity monitor is or how cool it is to wear one and that they and all the other kids in their class get to wear one for the week AND they get to choose a cool sticker to put on it
- Give the accelerometer to the child to touch and hold so that they become familiar with them
- When children first put the accelerometer on – offer them a choice of very cool stickers. They can wear this on the actual accelerometer or elsewhere (e.g. on their hand or shirt). They get one sticker for the accelerometer and another one to wear at the end of the day
- When the accelerometer is removed at 3pm – give children a choice of another cool sticker as a reward for wearing the accelerometer all day
- We don't want non-consenting children to miss out – so you can offer these children stickers also
- You **must** role model the accelerometer while you're at the service – and show this to children so that they can see what it looks like to wear one and reassure them that it doesn't hurt etc. Childcare service staff can also wear a spare accelerometer to role model
- Let the children know that you'll be there for the day – so if they are worried about it or it falls off etc they can come and find you or a teacher
- If a child is hesitant and they have a friend who is already wearing an accelerometer you can encourage the friend to show the child their accelerometer and reassure them that it doesn't hurt etc



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Good For Kids Study: Creating Opportunities to Promote Physical Activity in Childcare

Research Assistant Top Up Training
28th September 2016

Jannah Jones and Lubna Razak

NSW Health
Hunter New England Local Health District

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Acknowledgement of Country

I would like to acknowledge the original custodians of this land and pay my respects to the Elders both past, present and future for they hold the memories, the traditions, the culture and hopes of Aboriginal Australia

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LIVE LIFE WELL

NSW HEALTH
HUNTER NEW ENGLAND LOCAL HEALTH DISTRICT

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Agenda

Time	Agenda Item	Who
14:00	Acknowledgement of country	Lubna
14:05	Welcome and agenda	Lubna
14:10	Overview of Study 1 and Study 2	Lubna
14:20	Overview of data collection site visits	Jannah
14:30	Amendments to site visit protocols: - Hip accelerometers	Jannah
14:40	- Cognitive assessments	Lubna
14:50	Questions and close	Lubna

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Overview of Study 1

NSW Health
Hunter New England Local Health District

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Background

- Changing the scheduling of existing programs in childcare may represent an effective strategy which is suitable to 'scale-up' for population-wide implementation
- Outdoor free play is one potential target – is usually scheduled for one long period of time (e.g. 1.5 hours)
- Research suggests that most moderate-to-vigorous physical activity occurs during the first 3-15 minutes of outdoor play




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Aim

- To assess the efficacy of scheduling three periods of outdoor free play in increasing the time children spend in moderate-to-vigorous physical activity per day at childcare




NSW Health
Hunter New England Local Health District

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Intervention

- Tailored support for intervention services to implement scheduling of three periods of outdoor **free** play
- Targeting preschool age children only (3-6 years)
- Control services maintain their one continuous outdoor play within the core hours of 9am-3pm



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Hunter New England Local Health District

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Outcome measures

- Assessed at baseline and 3-month follow up
- Physical activity (measured by accelerometer) worn in care for 5 days from 9am-3pm
- Physical activity (measured by accelerometer) worn all day for 7 days
- Service physical activity policies, practices and environment (measured using observational tool – EPAO)



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Hunter New England Local Health District

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Service progression through the trial

```

graph TD
    A[Services recruited at baseline  
N=14] --> B[Ineligible  
N=4]
    A --> C[Intervention  
N=5]
    A --> D[Control  
N=5]
  
```

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Overview of Study 2

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New South Wales
Department of Health

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Background

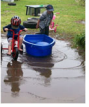
- Advice received from early childhood professional training organisations and partners on the trial have indicated that 'best practice' in the sector is now in fact for services to allow continuous (rather than scheduled) periods of outdoor play

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Aim

- To assess the efficacy of supporting services to provide continuous indoor/outdoor free play in increasing the time children spend in moderate-to-vigorous physical activity per day at childcare




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Department of Health

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Intervention

- Tailored support for intervention services to implement scheduling of continuous indoor/outdoor play
- Targeting preschool age children only (3-6 years)
- Control services maintain separate indoor and outdoor play within the core hours of 9am-3pm



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Outcome measures

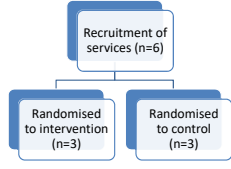
- Assessed at baseline and 3-month follow up
- Physical activity (measured by accelerometer) worn in care for 5 days from 9am-3pm
- Physical activity (measured by accelerometer) worn out of care for 7 days
- Service physical activity policies, practices and environment (measured using observational tool – EPAO)
- Child cognitive assessments



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Service progression through the trial



```

graph TD
    A[Recruitment of services (n=6)] --> B[Randomised to intervention (n=3)]
    A --> C[Randomised to control (n=3)]
  
```

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Overview of data collection site visits

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RA responsibilities during the site visits

Study 1:

- Follow-up data collection
 - Accelerometers
 - EPAO

Study 2:

- Parent recruitment
- Baseline data collection
 - Accelerometers
 - EPAO
 - Child cognitive assessments

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Parent recruitment protocol

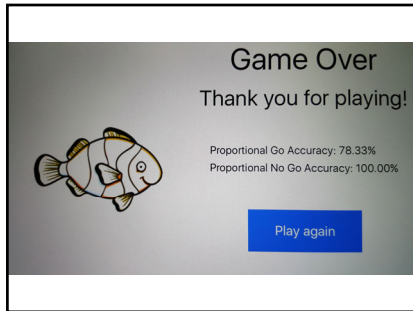
Study 1

- No further parent recruitment
- Following up same children from baseline
- In 3 services – only one accelerometer fitted for in care/home

Study 2

- As per protocol for Study 1
- Additions – also conducting brief child cognitive assessment


Health
New South Wales
Department of Health

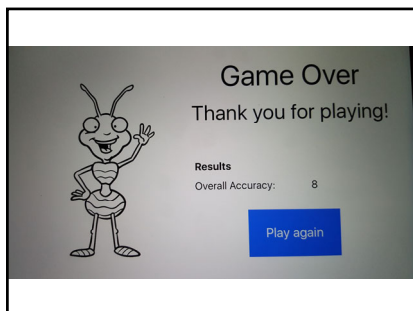
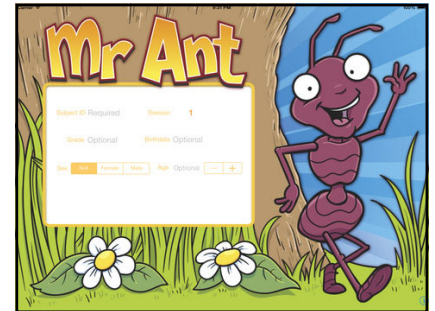


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'Mr Ant'

- Tests 'visual-spatial working memory' (i.e., the amount of visual information that concurrently can be coordinated in mind).
- In this game, children are presented with an image of a cartoon character – Mr. Ant – who has a number of coloured stickers placed in different parts of his body. After a predetermined amount of time, these dots disappear and the child is then asked to recall the locations of the dots by tapping the spatial locations on Mr. Ant that they believe previously held stickers.

 Health
New South Wales
Prevention, Protection & Promotion




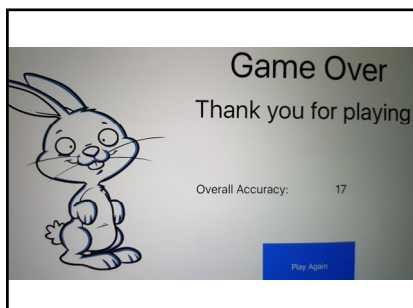
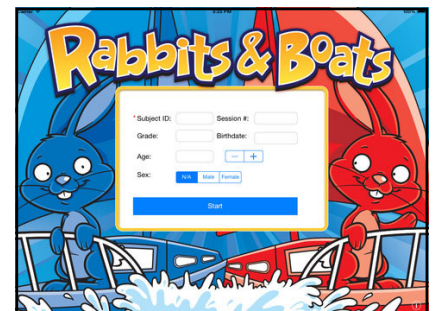
Good for kids

good for life

Card sorting task

- Tests 'shifting' (an executive function that involves the ability to control and redirect attention).
- In this game, children are presented with cards that vary along two dimensions (i.e., shape and colour) and are asked to sort each card (i.e., red rabbits and blue boats) first by one dimension (e.g., colour) and then, after a number of trials, by another dimension (e.g., shape). Their ability to flexibly shift from one sorting rule to another corresponds to their cognitive flexibility (or 'shifting').


 **Health**
Improving lives

[illegible]

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Practical

- Get into groups and practice using each of the 3 apps on the iPad

 **Health**
Improving your health

Thank you and questions

```

TITL  0          TITLE  1          CATI  NOADD          15          NOLAB

Good for Kids HCI Child Care Physical Activity - CATI Survey
***** TITLE ITEM *****
SCAL  0 C          Ltoy  0          NOLAB
MODULE SUBMODUL          6
A television
A computer (laptop or desktop)
A tablet (eg iPad) or smartphone (eg Iphone or android)
A cell phone (not a smartphone) or landline phone
Video games
An MP3 or other music player and/or radio
*****
TIME  1          T_START 1          LABEL
MODULE SUBMODUL
Ltoy1 gt ''
Record starting time
STARTING TIME
***** GET DURATION ITEM *****
LINK  1          FULLNAME1          QINFORM          QFORMAT          LABEL
MODULE SUBMODUL          12
T_START gt .
Items in external dataset
DATACATI.CONFID          fullname
DATACATI.CONFID          stdphone
DATACATI.CONFID          Eligkids
DATACATI.CONFID          Cnam1
DATACATI.CONFID          Cgender1
DATACATI.CONFID          Cnam2
DATACATI.CONFID          Cgender2
DATACATI.CONFID          Cnam3
DATACATI.CONFID          Cgender3
DATACATI.CONFID          HISHER
DATACATI.CONFID          HESHE
DATACATI.CONFID          sleepsrv
Links to external database
***** LINK TO EXTERNAL DATASET ITEM *****
CHCE  1  14          INTRO1  8          _MAKE_          NOLAB
Intro
FULLNAME gt ''
Hello, my name is ^_INTVR_^ and I am calling from Hunter New England
Local Health District. We recently sent a letter about a Good for Kids
Good for Life study we're conducting in children's services.

Today, I'm just following up on the letter and was hoping to speak with
^fullname^.

Is ^fullname^ available?
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)
6      Requests copy of letter before continuing
7      Wrong number (only after all options investigated)
8      Abandoned (10 attempts+contact) record as OP
9      Unlocatable (10 attempts, no contact) record as UL
10     Person deceased
11     Child deceased
12     Person physically or mentally incapable (record on L/S)
13     Non English speaking & no help available (record on L/S)

```

.R Refused
***** SINGLE CHOICE - CATI VERSION *****
OPEN 1 200 INTROTH 8 LABEL
Intro
INTRO1=5
OK, thank you for your time.

*** RECORD AS OT ON LOGSHEET ***
[Do not ask, but record reason if given]
Other Reason
***** OPEN ENDED ENTRY ITEM *****
INFO 1 wrongnum8 NOLAB
Intro
INTRO1=7
I'm sorry, we must have the wrong number. Goodbye

*** RECORD AS WN LOGSHEET ***
***** INFORMATION SCREEN ITEM *****
INFO 1 Qloss1 4 NOLAB
Intro
INTRO1=10
I'm sorry for your loss, please accept my apology for calling you at
such a difficult time. We were ringing because we are conducting a
parent survey about healthy eating and physical activity.
Once again, I am sorry to have bothered you.
***** INFORMATION SCREEN ITEM *****
INFO 1 INTR9c 8 NOLAB
Intro
qloss1=1
Thanks for your time

*** Record as RD on log sheet ***
***** INFORMATION SCREEN ITEM *****
CHCE 1 2 INTRO2 8 _MAKE_ NOLAB
Intro
Intro1=1
Hi ^fullname^.

We recently sent you a letter advising you that we would be contacting you
soon about an upcoming *Good for Kids* study in children's services.

[INTERVIEWER NOTE: Do NOT read out options, select CONTINUE unless they
did not receive the letter, or enquire about it]

1 CONTINUE
2 More information about letter
***** INFORMATION SCREEN ITEM *****

CHCE 1 2 INTRO3 8 _MAKE_ NOLAB
Intro
INTRO1=2
Hello, my name is ^_INTVR_^ and I'm from the Hunter New England
Local Health District.

We recently sent you a letter advising you that we would be contacting you
soon about an upcoming *Good for Kids* study in children's services.

[INTERVIEWER NOTE: Do NOT read out options, select CONTINUE unless they
did not receive the letter, or enquire about it]

1 CONTINUE
2 More information about letter
***** INFORMATION SCREEN ITEM *****

CHCE 1 2 Resend 6 _MAKE_ NOLAB
Intro
INTRO2=2 or INTRO3=2

The letter was to explain that we'd be giving you a call to ask you some
questions about healthy eating in children. You don't need to have the
letter to do the survey, but if you would like to read through it before
proceeding, we can re-send it to you, either by mail or email.

Would you like to have the letter re-sent, or are you happy to
continue anyway?

1 Re-send please
2 Continue
***** SINGLE CHOICE - CATI VERSION *****

CHCE 1 4 TAKEPART3 _MAKE_ LABEL
MODULE SUBMODUL
INTRO2=1 or INTRO3=1 or Resend=2
The call will take about approximately 20 minutes.

Would you be willing to take part in the survey?

1 Yes (now)
2 Yes (but not now)
3 No
.R Refused

Will you take part in the survey

***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 3 CALLBKOP8 _MAKE_ NOLAB
MODULE SUBMODUL
intro1=3

Could you suggest a convenient time for me to call back to catch him/her?

[INTERVIEWER NOTE: If yes, record details on Log Sheet]

[INTERVIEWER NOTE: Allow at least 5 working days if letter is being posted]

1 Yes
2 No
.R Refused - D3
***** SINGLE CHOICE - CATI VERSION *****

OPEN 1 200 StatusD38 NOLAB
MODULE SUBMODUL
Callbkop=.R
That's ok. Thank you for your time today.
Have a nice day

```

*** RECORD AS D3 ON LOGSHEET ***
[Do not ask, but record reason- if no reason given, record as no reason]
***** INFORMATION SCREEN ITEM *****
CHCE 1 5          INTRO5 1          _MAKE_          LABEL
MODULE SUBMODUL
Takepart=1
Is now a good time for you, or would you like me to call back later?
1      Yes / appropriate
2      No / call back later
3      Requests copy of letter before continuing
4      No / declines to participate
.R      Refused
Appropriate time
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 2          Emlpost 1          _MAKE_          NOLAB
MODULE SUBMODUL
Resend=1 or Intro1=6 or Intro5=3
Would you like that re-sent by email, mail or fax?
1      Email
2      Post
***** SINGLE CHOICE - CATI VERSION *****
TABL 1 20          Addr 8          LABEL
MODULE SUBMODUL5
Emlpost=1 or Emlpost=2
Could you please let me know the best address to resend the letter to?
This can be an email or postal address.

```

[Interviewer Note: Record new details on Logsheet as well]

```

*** CLICK ON A CELL NOT PARALLEL TO ONE JUST USED BEFORE MOVING ON ***
NUMC          50
Street          C
Suburb          C
Postcode        C
State           C
Email           C
Specify address
*****TABLE ENTRY ITEM - NO BUTTONS *****
NULL 1          NullAdd 1          NOLAB
MODULE SUBMODUL
Addr gt .
Regrouping address
*****NULL ITEM - DOES NOTHING*****
INFO 1          INFOpost12          NOLAB
MODULE SUBMODUL
NullAdd=1 and Emlpost=2
OK, thanks for that, we'll send the letter out in the next couple of days.

```

[INTERVIEWER NOTE: Place logsheet in problems file for project officer to re-send the letter by Mail]

(Remember to add New address to Log-sheet)

***** INFORMATION SCREEN ITEM *****
INFO 1 INFOeml 12 NOLAB
MODULE SUBMODUL
NullAdd=1 and Emlpost=1
OK, thanks for that, we'll email it through in the next 24 hours.

[INTERVIEWER NOTE: Remember to email the information letter,
this can be found on Onenote. Record date/time email sent on logsheet]
***** INFORMATION SCREEN ITEM *****
INFO 1 INFO1a 8 NOLAB
MODULE SUBMODUL
CALLBKOP=1
OK, thanks for your time.
We'll call you back then.

*** RECORD AS CA ON LOGSHEET ***
***** INFORMATION SCREEN ITEM *****
INFO 1 INFO1c 8 NOLAB
MODULE SUBMODUL
CallbkOP =2
OK, I might try again later. Thanks for your time.

*** RECORD AS CA ON LOGSHEET ***
***** INFORMATION SCREEN ITEM *****
INFO 1 nochild 10 NOLAB
MODULE SUBMODUL
Introl=11
I'm so sorry to hear that... my apologies, we didn't know.
I'm sorry for your loss.

Would you like me to give you the contact details of some support services
you could call?

[INTERVIEWER NOTE: refer to emergency telephone contacts]

I'm sorry to have bothered you today, but thanks for talking with me.
All the best for the future.

*** RECORD AS OS ON LOGSHEET ***
***** INFORMATION SCREEN ITEM *****
INFO 1 INFO_OS 8 NOLAB
MODULE SUBMODUL
Introl in (12,13)
It looks like we don't need to speak with you as part of our survey today,
but thanks very much for your time.


```

*** RECORD AS OS ON LOGSHEET ***
***** INFORMATION SCREEN ITEM *****
INFO 1 roomcall8 NOLAB
MODULE SUBMODUL
INTRO5=1
Great, thanks for agreeing to take part. Any information you report in this
survey will be held as strictly confidential. Individual parents and
children will not be identified in any way in the reporting of results.

The information you provide will be used to help us to better understand
The physical activity habits of children at child care and help us plan
the support we provide to child care services. There are no right or wrong
answers. Please answer the questions to the best of your ability.
***** INFORMATION SCREEN ITEM *****
INFO 1 SKIP 3 NOLAB
MODULE SUBMODUL
roomcall=1
At any time, you are able to decline providing a response to any question
that you do not wish to answer. Please let me know if you do not wish
to answer and I will move on to the next question.
***** INFORMATION SCREEN ITEM *****
CHCE 1 5 Random 8 _MAKE_ LABEL
DEMOGRAPHICS
Skip=1 and Eligkids>1
Throughout the survey, we will be asking about one of your children.
You have provided consent forms for
Child 1 ^Cnam1^
Child 2 ^Cnam2^ Child 3 ^Cnam3^
however as the survey asks about only one child, we would like you to
answer the survey about your child aged between 3 and 6, and
currently attending childcare, with the next birthday.
Would that be ^Cnam1^ / ^Cnam2^ / ^Cnam3^?
1 Child 1
2 Child 2
3 Child 3
4 Other
.R Refused
Which child for CATI
***** SINGLE CHOICE - CATI VERSION *****
OPEN 1 200 Ranchild8 LABEL
DEMOGRAPHICS
Random=4
May I ask the name of this child?

```

[Interviewer note: Record on logsheet]

Name of child with next birthday

```

***** OPEN ENDED ENTRY ITEM *****
CHCE 1 3 Consent 8 _MAKE_ LABEL
DEMOGRAPHICS
Ranchild gt ''
Thank you for your help so far. I will need to check whether we have
received a consent form for ^Ranchild^ before we can continue.

```

Would it be ok if I call you back another time?

[Interviewer note: If required - If we haven't received a consent form, we can complete the survey about ^Cnam1^ or ^Cnam2^ or ^Cnam3^.]

1 Yes
2 No
.R Refused
Consent for CB

***** INFORMATION SCREEN ITEM *****
OPEN 2 200 StatusDR8 NOLAB
MODULE SUBMODUL
Intro1=.R or Takepart in (3,.R) or INTRO5 in (4,.R) or Random=.R or
Consent in (2,.R)
That's ok. Thank you for your time today.
Have a nice day

*** RECORD AS DR ON LOGSHEET ***

[Do not ask, but record reason- if no reason given, record as no reason]
***** INFORMATION SCREEN ITEM *****
CHCE 1 3 CALLBKSP8 _MAKE_ NOLAB
DEMOGRAPHICS
INTRO5=2 or TAKEPART=2 or INFOpost=1 or INFOeml=1 or Consent=1 or INTRO1=4
Could you suggest a convenient time for me to call back?

[INTERVIEWER NOTE: If yes, record on Log Sheet]
[INTERVIEWER NOTE: Allow at least 5 working days if letter is being posted]
1 Yes
2 No
.R Refused
***** SINGLE CHOICE - CATI VERSION *****
INFO 1 INFO1 8 NOLAB
MODULE SUBMODUL
CALLBKSP=1
OK, thanks for your time.
We'll call you back then.

[Interviewer note: If parent nominated another child, place in problems folder with a note for the project team]

*** RECORD AS CB ON LOGSHEET ***

***** INFORMATION SCREEN ITEM *****
INFO 1 INFO1b 8 NOLAB
MODULE SUBMODUL
CallbkSP in (2,.R)
OK, I might try again later. Thanks for your time.

```

*** RECORD AS CB ON LOGSHEET ***
***** INFORMATION SCREEN ITEM *****
CALC 1          Childclc0                                NOLAB
MODULE SUBMOD 24          4
Random in (1,2,3) or skip=1 and Eligkids=1
Childclc=1;
length ChildFIN $100 heshe $4. hisher $5.;
if EligKids=1 then do;
    ChildFIN=strip(propcase(CNAM1));
    GenderFN=Cgender1;
end;
if EligKids>1 then do;
    if Random=1 then do;
        ChildFIN=strip(propcase(CNAM1));
        GenderFN=Cgender1;
    end;
    if Random=2 then do;
        ChildFIN=strip(propcase(CNAM2));
        GenderFN=Cgender2;
    end;
    if Random=3 then do;
        ChildFIN=strip(propcase(CNAM3));
        GenderFN=Cgender3;
    end;
end;
if GenderFN=1 then do;hesheFIN="he";hisherFN="his";end;
if GenderFN=2 then do;hesheFIN="she";hisherFN="her";end;
if GenderFN=. then do;hesheFIN="they";hisherFN="their";end;
hesheFIN= strip(lowcase(hesheFIN));hisherFN= strip(lowcase(hisherFN));
ChildFIN          C
GenderFN          C
hesheFIN          C
hisherFN          C
***** CALCULATION ITEM *****
INFO 2          Begin 4                                NOLAB
MODULE SUBMODUL
Childclc=1 and childFIN gt '' and GenderFN gt ''
and hesheFIN gt '' and hisherFN gt ''
Do you have any questions before we begin the survey?

[INTERVIEWER NOTE: Answer as best as you can, based on the training,
please do not provide information outside of the info covered in training]
***** INFORMATION SCREEN ITEM *****
INFO 1          Begin2 2                                NOLAB
MODULE SUBMODUL
Begin=1
Many of the questions I'll be asking you today are about your child
^childFIN^, however the first few questions are about you.
***** INFORMATION SCREEN ITEM *****
CHCE 1 10          Relation4          _MAKE_          LABEL
DEMOGRAPHICS
Begin2=1
What is your relationship to ^childfin^? For example, are you
^hisherFN^ father/mother, stepfather/stepmother or other relation?

[INTERVIEWER NOTE: Read out all response options]
1          Mother
2          Father
3          Stepmother
4          Stepfather
5          Grandmother

```

```

6      Grandfather
7      Legal guardian/Foster Parent
8      Other
9      Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
Relationship to child
***** SINGLE CHOICE - CATI VERSION *****
OPEN  1 200      OTrel  1                                LABEL
DEMOGRAPHICS
Relation = 8
What is your relationship to ^childfin^?
Other relationship to child
***** OPEN ENDED ENTRY ITEM *****
CHCE  1 6      reside  3                                _MAKE_      LABEL
Sleep recruitment
(Relation in (1,2,3,4,5,6,7,9,.R) or OTrel gt '') and SLEEPSRV=1
Do you live in the same house as ^childfin^?

[Prompt - And on average, how many days per week do you reside together?]
1      Yes: 1-3 days
2      Yes: 4-6 days
3      Yes: 7 days
4      No: Do not reside with child
5      Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
Days residing in same house
***** SINGLE CHOICE - CATI VERSION *****
CHCE  2 9      Age      1                                _MAKE_      LABEL
DEMOGRAPHICS
(Relation in (1,2,3,4,5,6,7,9,.R) or OTrel gt '') and SLEEPSRV=0
or reside gt .
How old are you?
1      less than 20 years
2      20 to 29 years
3      30 to 39 years
4      40 to 49 years
5      50 to 59 years
6      60 to 69 years
7      greater than 70 years
8      Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
Age
***** SINGLE CHOICE - CATI VERSION *****
CHCE  1 8      INMAR    1                                _MAKE_      LABEL
DEMOGRAPHICS
Age gt .
What is your current formal marital status?
1      Married or living in a relationship
2      Widowed
3      Separated but not divorced
4      Divorced
5      Never Married
6      Other (please specify)
7      Don't know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
Marital Status
***** SINGLE CHOICE - CATI VERSION *****
OPEN  1 200      OTmar  1                                LABEL
DEMOGRAPHICS
INMAR = 6
What is your current formal marital status?

```

Other marital status

***** OPEN ENDED ENTRY ITEM *****

CHCE 1 9 INEDU 8 _MAKE_ LABEL

DEMOGRAPHICS

inmar in (1,2,3,4,5,7,.R) or OTmar gt ''

What is the level of the highest qualification you have completed?

[INTERVIEWER NOTE: Read out all response options]

- 1 Completed School Certificate/ Intermediate/ Year 10/4th Form
- 2 Completed HSC/Leaving/Year 12/ 6th Form
- 3 TAFE Certificate or Diploma
- 4 University, CAE or some other tertiary institute degree or higher
- 5 Other
- 6 Completed primary school
- 7 Completed years 7 to 9
- 8 Don't know [DO NOT READ OUT]
- .R Prefer not to answer[DO NOT READ OUT]

Education Level

***** SINGLE CHOICE - CATI VERSION *****

OPEN 1 200 OTedu 1 LABEL

DEMOGRAPHICS

INEDU = 5

What is your highest qualification?

Other qualification

***** OPEN ENDED ENTRY ITEM *****

CHCE 1 9 EMP 8 _MAKE_ LABEL

DEMOGRAPHICS

INEDU in (1,2,3,4,6,7,8,.R) or OTedu gt ''

In the last week, which of the following best describes your employment status?

[INTERVIEWER NOTE: "As above" = re-read option 1

Did not have a job includes those on a pension / receiving welfare]

- 1 A salary or wage earner or conducting a business
- 2 As above, but absent on paid leave (incl unpaid
- 3 CONT. maternity) holidays, on strike/stood down
- 4 Student
- 5 Unpaid work in a family business
- 6 Other unpaid work
- 7 Did not have a job
- 8 Don't know/Not sure [DO NOT READ OUT]
- .R Prefer not to answer [DO NOT READ OUT]

Employment status

***** SINGLE CHOICE - CATI VERSION *****

CHCE 1 7 income 8 _MAKE_ LABEL

DEMOGRAPHICS

EMP gt .

The next question asks about your HOUSEHOLD'S income.

What is your annual HOUSEHOLD income before tax?

```

[INTERVIEWER NOTE: Do NOT read out response options]
1      Less than $20,000
2      $20,000 to $40,000
3      $40,000 to $60,000
4      $60,000 to $80,000
5      More than $80,000
6      Don't know / Not Sure [DO NOT READ OUT]
.R     Refused / Prefer not to answer [DO NOT READ OUT]
Household income
***** SINGLE CHOICE - CATI VERSION *****
CHCE  1 4      Born      1      _MAKE_      LABEL
MODULE SUBMODUL
income gt .
In which country were you born?
1      Australia
2      Other
3      Don't Know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
Country of birth
***** SINGLE CHOICE - CATI VERSION *****
OPEN  1 200      OTborn  1      LABEL
DEMOGRAPHICS
Born = 2
In which country were you born?
Other country of birth
***** OPEN ENDED ENTRY ITEM *****
CHCE  1 4      Lang      1      _MAKE_      LABEL
MODULE SUBMODUL
Born in (1,3,.R) or OTborn gt ''
Do you usually speak a language other than English at home?
1      Yes
2      No
3      Don't Know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
Speak LOTE at home
***** SINGLE CHOICE - CATI VERSION *****
OPEN  1 200      OTlang  1      LABEL
DEMOGRAPHICS
Lang = 1
What language do you usually speak at home?
Language spoken at home
***** OPEN ENDED ENTRY ITEM *****
CHCE  1 6      ATSI      3      _MAKE_      LABEL
MODULE SUBMODUL
Lang in (2,3,.R) or OTlang gt ''
Are you of Aboriginal or Torres Strait Islander origin?

[INTERVIEWER NOTE: Do not read out response options]
1      Aboriginal
2      Torres Strait Islander
3      Aboriginal and Torres Strait Islander
4      No, neither
5      Don't Know [DO NOT READ OUT]
.R     Refused [DO NOT READ OUT]
Speak LOTE at home
***** SINGLE CHOICE - CATI VERSION *****
INFO  1      HTWT      2      NOLAB
MODULE SUBMODUL
ATSI gt .
The next few questions are about YOUR OWN height, weight and usual

```

activities. If you're not sure, please just give your best estimate.

***** INFORMATION SCREEN ITEM *****

TABL 1 20 HTP 8 MM LABEL

MODULE SUBMOD 5

HTWT=1

How tall are you without shoes?

[Interviewer Note: Their best estimate is fine]

[INTERVIEWER NOTE: Record in centimetres OR feet and inches. Enter '0'
in the remaining cell / cells. Do not enter a value for all three]

N 0
Centimetres 0 220
Feet 0 7
Inches 0 11
Don't Know B 1
Refused B 1
0 1000

Survey person's height

*****TABLE ENTRY ITEM - NO BUTTONS *****

TABL 1 20 WTP 8 MM LABEL

MODULE SUBMOD 5

HTp gt .

How much do you weigh without clothes or shoes?

[INTERVIEWER NOTE: Answer in kilograms OR stones and pounds. Enter '0'
in the remaining cell / cells. Do not enter a value for all three]

N 0
Kilograms 0 140
Stone 0 20
Pound 0 300
Don't Know B 1
Refused B 1
0 1000

Survey person's weight

*****TABLE ENTRY ITEM - NO BUTTONS *****

INFO 1 Activ 2 NOLAB

MODULE SUBMODUL

WTP gt .

The next few questions are about any activity that you may have done
in the last week.

***** INFORMATION SCREEN ITEM *****

NUM 1 Walka 8 MM QINFORM QFORMAT LABEL

MODULE SUBMODUL

Activ=1

In the last week, between Monday and Friday, how many TIMES have you
walked continuously, for at least 10 minutes (without stopping),
for recreation, exercise or to get to or from places?

[INTERVIEWER NOTE: Don't know=88, Refused=99]

0 10
0 99

Number of times walking Mon-Fri
 ***** NUMERIC OR DATE ENTRY - CATI VERSION *****
 TABL 1 20 Wlkb 8 MM LABEL
 MODULE SUBMOD 4
 Walka gt 0
 What do you estimate was the TOTAL TIME that you spent walking in this way
 in the last week, between Monday and Friday?

[INTERVIEWER NOTE: Please fill in both hours and minutes. If they
 just give hours, enter '0' in minutes]

SUM	0			
Hours	N	0	25	
Minutes	N	0	60	
Don't Know	B	1		
Refused	B	2		
0		100		

Time spent walking Mon-Fri
 *****TABLE ENTRY ITEM - NO BUTTONS *****
 NUM 1 Walkc 8 MM QINFORM QFORMAT LABEL
 MODULE SUBMODUL
 Wlkb gt . or Walka le 0
 On the last WEEKEND, how many TIMES have you
 walked continuously, for at least 10 minutes (without stopping),
 for recreation, exercise or to get to or from places?

[INTERVIEWER NOTE: Don't know=88, Refused=99]

0	10		
0	99		

Number of times walking on weekend
 ***** NUMERIC OR DATE ENTRY - CATI VERSION *****
 TABL 1 20 Wlkd 8 MM LABEL
 MODULE SUBMOD 4
 Walkc gt 0
 What do you estimate was the TOTAL TIME that you spent walking in this way
 on the last weekend?

[INTERVIEWER NOTE: Please fill in both hours and minutes. If they
 just give hours, enter '0' in minutes]

SUM	0		
Hours	N	0	25
Minutes	N	0	60
Don't Know	B	1	
Refused	B	2	
0		100	

Time spent walking on weekend
 *****TABLE ENTRY ITEM - NO BUTTONS *****
 NUM 1 Moda 8 MM QINFORM QFORMAT LABEL
 MODULE SUBMODUL
 Wlkd gt . or Walkc le 0
 In the last week, between Monday and Friday, how many TIMES did you do
 any other more moderate physical activities that you have not already
 mentioned? (e.g. lawn bowls, golf, tai chi, and sailing etc.)?

[INTERVIEWER NOTE: Don't know=88, Refused=99]

0 10
0 99

Number of times moderate PA Mon-Fri

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

TABL 1 20 Modb 8 MM LABEL

MODULE SUBMOD 4

Moda gt 0

What do you estimate was the TOTAL TIME that you spent doing these more moderate activities in the last week, between Monday and Friday?

[INTERVIEWER NOTE: Please fill in both hours and minutes. If they just give hours, enter '0' in minutes]

SUM 0

Hours N 0 25

Minutes N 0 60

Don't Know B 1

Refused B 2

0 100

Time spent moderate PA Mon-Fri

***** TABLE ENTRY ITEM - NO BUTTONS *****

NUM 1 Modc 8 MM QINFORM QFORMAT LABEL

MODULE SUBMODUL

Modb gt . or Moda le 0

On the last WEEKEND, how many TIMES did you do any other more moderate physical activities that you have not already mentioned?
(e.g. lawn bowls, golf, tai chi, and sailing etc.)?

[INTERVIEWER NOTE: Don't know=88, Refused=99]

0 10
0 99

Number of times moderate PA on weekend

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

TABL 1 20 Modd 8 MM LABEL

MODULE SUBMOD 4

Modc gt 0

What do you estimate was the TOTAL TIME that you spent doing these more moderate activities on the last weekend?

[INTERVIEWER NOTE: Please fill in both hours and minutes. If they just give hours, enter '0' in minutes]

SUM 0

Hours N 0 25

Minutes N 0 60

Don't Know B 1

Refused B 2

0 100

Time spent moderate PA on weekend

*****TABLE ENTRY ITEM - NO BUTTONS *****

NUM 1 Viga 8 MM QINFORM QFORMAT LABEL
MODULE SUBMODUL

Modd gt . or Modc le 0

In the last week, between Monday and Friday, how many TIMES did you do any vigorous physical activity which made you breathe harder or puff and pant?

(e.g. football, tennis, netball, squash, athletics, cycling, jogging, keep-fit exercises and vigorous swimming etc.)

[INTERVIEWER NOTE: Don't know=88, Refused=99]

0 10

0 99

Number of times vigorous PA Mon-Fri

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

TABL 1 20 Vigb 8 MM LABEL

MODULE SUBMOD 4

Viga gt 0

What do you estimate was the TOTAL TIME that you spent doing this vigorous physical activity in the last week between Monday and Friday?

[INTERVIEWER NOTE: Please fill in both hours and minutes. If they just give hours, enter '0' in minutes]

SUM 0

Hours N 0 25

Minutes N 0 60

Don't Know B 1

Refused B 2

0 100

Time spent vigorous PA Mon-Fri

*****TABLE ENTRY ITEM - NO BUTTONS *****

NUM 1 Vigc 8 MM QINFORM QFORMAT LABEL

MODULE SUBMODUL

Vigb gt . or Viga le 0

On the last WEEKEND, how many TIMES did you do any vigorous physical activity which made you breathe harder or puff and pant?

(e.g. football, tennis, netball, squash, athletics, cycling, jogging, keep-fit exercises and vigorous swimming etc.)

[INTERVIEWER NOTE: Don't know=88, Refused=99]

0 10

0 99

Number of times vigorous PA on weekend

***** NUMERIC OR DATE ENTRY - CATI VERSION *****

TABL 1 20 Vigd 8 MM LABEL

MODULE SUBMOD 4

Vigc gt 0

What do you estimate was the TOTAL TIME that you spent doing this vigorous physical activity in the last week on the last weekend?

[INTERVIEWER NOTE: Please fill in both hours and minutes. If they just give hours, enter '0' in minutes]

SUM 0

Hours	N	0	25
Minutes	N	0	60
Don't Know	B	1	
Refused	B	2	

0 100

Time spent vigorous PA on weekend

*****TABLE ENTRY ITEM - NO BUTTONS *****

INFO 1 INFOfree1 NOLAB

MODULE SUBMODUL

Vigd gt . or Vigc le 0

These questions relate to what you did in your FREE TIME in the last week.

***** INFORMATION SCREEN ITEM *****

TABL 1 20 Sitb 8 MM LABEL

MODULE SUBMOD 4

INFOfree=1

What do you estimate was the TOTAL TIME that you spent sitting
between Monday and Friday LAST WEEK?

[INTERVIEWER NOTE: Please fill in both hours and minutes. If they just give hours, enter '0' in minutes. This question does NOT include work.]

SUM 0

Hours	N	0	48
Minutes	N	0	60
Don't Know	B	1	
Refused	B	2	

0 100

Free time spent sitting Mon-Fri

*****TABLE ENTRY ITEM - NO BUTTONS *****

TABL 1 20 Sitd 8 MM LABEL

MODULE SUBMOD 4

Sitb gt .

What do you estimate was the TOTAL TIME that you spent sitting
LAST WEEKEND?

[INTERVIEWER NOTE: Please fill in both hours and minutes. If they just give hours, enter '0' in minutes. This question does NOT include work.]

SUM 0

Hours	N	0	48
Minutes	N	0	60
Don't Know	B	1	
Refused	B	2	

0 100

Free time spent sitting on weekend

*****TABLE ENTRY ITEM - NO BUTTONS *****

CHCE 1 7 Yard 8 _MAKE_ LABEL

MODULE SUBMODUL

Sitd gt .

Which best describes your backyard?

[INTERVIEWER NOTE: Read out all response options, sqm= square metres]

- 1 No yard at all
- 2 No private yard
- 3 A small yard
- 4 A medium yard (eg. A standard block of land)
- 5 A large yard (eg. 1/4 acre/1000 sqm or more)
- 6 Don't know [DO NOT READ OUT]
- .R Refused [DO NOT READ OUT]

Yard size

***** SINGLE CHOICE - CATI VERSION *****

MULT 1 6 Facil 8 3 MLTLB

MODULE SUBMODUL

Yard gt .

Do you have access to any of the following facilities within your backyard or home environment?

[INTERVIEWER NOTE: Read out all response options]

- 1 Play equipment (eg. swing set, slide, climbing gym)
- 2 Pool or spa
- 3 Area suitable to ride a tricycle, bike /scooter etc
- 4 None of the above
- 5 Don't know [DO NOT READ OUT]
- .R Refused [DO NOT READ OUT]

Access to facilities

Play equipment (eg. swing set, slide, climbing gym)

Pool or spa

None of the above

Area suitable to ride a tricycle, bike /scooter etc

Don't know [DO NOT READ OUT]

Refused [DO NOT READ OUT]

***** MULTIPLE CHOICE - CATI VERSION *****

INFO 1 INFOch 1 NOLAB

MODULE SUBMODUL

Facil gt '00000'

The next few questions are about ^childfin^.

***** INFORMATION SCREEN ITEM *****

CHCE 1 4 Bornch 1 _MAKE_ LABEL

MODULE SUBMODUL

INFOch=1

In which country was ^childfin^ born?

- 1 Australia
- 2 Other (please specify)
- 3 Don't Know [DO NOT READ OUT]
- .R Refused [DO NOT READ OUT]

Child's country of birth

***** SINGLE CHOICE - CATI VERSION *****

OPEN 1 200 OTbornch1 LABEL

DEMOGRAPHICS

Bornch = 2

In which country was ^childfin^ born?

Other country of birth for child

***** OPEN ENDED ENTRY ITEM *****

CHCE 1 6 ATSich 2 _MAKE_ LABEL

MODULE SUBMODUL

Bornch in (1,3,.R) or OTbornch gt ''

Is ^childfin^ of Aboriginal or Torres Strait Islander origin?

[INTERVIEWER NOTE: Do not read out response options]

1 Yes, Aboriginal
 2 Yes, Torres Strait Islander
 3 Yes, Aboriginal and Torres Strait Islander
 4 No, neither
 5 Don't Know [DO NOT READ OUT]
 .R Refused [DO NOT READ OUT]

Child's ATSI origin?

***** SINGLE CHOICE - CATI VERSION *****

TABL 1 20 HTch 8 MM LABEL

MODULE SUBMOD 5

ATSich gt .

How tall is ^childfin^ without shoes?

[Interviewer note: Do NOT estimate, if unsure - don't know]

[INTERVIEWER NOTE: Record in centimetres OR feet and inches.

Do not enter both.]

N	0		
Centimetres		0	220
Feet		0	7
Inches		0	11
Don't Know	B	1	
Refused	B	1	
0	1000		

Child's height

*****TABLE ENTRY ITEM - NO BUTTONS *****

TABL 1 20 WTch 8 MM LABEL

MODULE SUBMOD 5

WTch gt .

How much does ^childfin^ weigh without clothes or shoes?

[INTERVIEWER NOTE: Answer in kilograms OR stones and pounds.

Do not enter both.]

N	0		
Kilograms		0	140
Stone		0	20
Pound		0	300
Don't Know	B	1	
Refused	B	1	
0	1000		

Child's weight

*****TABLE ENTRY ITEM - NO BUTTONS *****

CHCE 1 8 Siblings2 _MAKE_ LABEL

MODULE SUBMODUL

WTch gt .

Do you have any other children such as siblings, step siblings, or foster children, aged under 18 years currently living in your house?

1 No
 2 Yes, 1 other child
 3 Yes, 2 other children
 4 Yes, 3 other children
 5 Yes, 4 other children
 6 Yes, 5 or more other children
 7 Don't know [Do not read out]
 .R Refused [Do not read out]

```

Other children in house
***** SINGLE CHOICE - CATI VERSION *****
INFO 1          INFOslp 2                                NOLAB
MODULE SUBMODUL
Siblings gt .
The next few questions ask about the activity and sleep routines
in your household.
***** INFORMATION SCREEN ITEM *****
CHCE 1 5          Sleepq 2                                _MAKE_          LABEL
MODULE SUBMODUL
INFOslp = 1
Generally speaking, how would you rate the quality of sleep
^childfin^ usually gets?
1          Good
2          Fair
3          Poor
4          Don't know [Do not read out]
.R          Refused [Do not read out]
Child's general sleep quality
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 10         Sleepa 2                                _MAKE_          LABEL
MODULE SUBMODUL
Sleepq gt .
Approximately what time (to the closest hour) does ^hesheFIN^
usually go to bed on a typical daycare day.
1          6pm or earlier
2          7pm
3          8pm
4          9pm
5          10pm
6          11pm
7          12 midnight
8          1am or later
9          Don't know [Do not read out]
.R          Refused [Do not read out]
Child's bedtime day care day
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 10         Sleepb 2                                _MAKE_          LABEL
MODULE SUBMODUL
Sleepa gt .
Approximately what time (to the closest hour) does ^hesheFIN^
usually go to bed on a typical NON-daycare day?
1          6pm or earlier
2          7pm
3          8pm
4          9pm
5          10pm
6          11pm
7          12 midnight
8          1am or later
9          Don't know [Do not read out]
.R          Refused [Do not read out]
Child's bedtime NON-day care day
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 10         Sleepc 3                                _MAKE_          LABEL
MODULE SUBMODUL
Sleepb gt .
Approximately what time (to the closest hour) does
^childfin^ usually wake up on a typical
daycare day?
1          5am or earlier

```



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.R      Refused [DO NOT READ OUT]
Toys in child's bedroom at night
Television
Computer (laptop or desktop)
Tablet (eg iPad) or smartphone (e.g. Iphone or android)
Cell phone (not a smartphone) or landline phone
Video game
MP3 or other music player and/or radio
None of the above
Don't know [DO NOT READ OUT]
Refused {DO NOT READ OUT]
*****MULTIPLE CHOICE - CATI VERSION*****
CALC 1      itemclc 0                                          NOLAB
MODULE SUBMOD 5              1
Etoys gt '000000000'
Itemclc=1;
Itemcnt=0;
Do i=1 to 6;
    if substr(Etoys,i,1)='1' then itemcnt=itemcnt+1;
End;
Itemcnt              N
***** CALCULATION ITEM *****
INFO 1      offon 5                                          NOLAB
MODULE SUBMODUL
Itemclc=1 and itemcnt>1
For the next questions, please think about the last seven days.

To your knowledge, are the following items always turned off
before going to sleep, or does ^childFIN^ leave them on
at least sometimes while sleeping?
***** INFORMATION SCREEN ITEM *****
INFO 1      oneitem 3                                          NOLAB
MODULE SUBMODUL
Itemclc=1 and itemcnt=1
Thinking about the last seven days, to your knowledge, is this item always
turned off before going to sleep, or does ^childFIN^
leave it on at least sometimes while sleeping?
***** INFORMATION SCREEN ITEM *****
DO 1 6      loopC 0                                          NOLAB
MODULE SUBMODUL
offon=1 or oneitem=1
***** DO LOOP BEGINNING *****
NULL 1      FrstC 0                                          NOLAB
MODULE SUBMODUL
lastC[-1]=1
*****NULL ITEM - DOES NOTHING*****
CHCE 1 4      Etoy_ 8              _MAKE_              LABEL
MODULE SUBMODUL
FrstC[0]=1 and substr(Etoys,loopC3,1)='1'
^Ltoy[0]^

```

[INTERVIEWER NOTE: If needed "to your knowledge, is this item always turned off before going to sleep or does ^childFIN^ leave it on at least sometimes while sleeping?"]

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1      Turns it OFF before going to sleep
2      Leaves it ON at least sometimes while sleeping
3      Don't know [Do not read out]
.R      Refused [Do not read out]

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Does child turn item off or leave on while sleeping
***** SINGLE CHOICE - CATI VERSION *****
NULL 1          lastC  0                                     NOLAB
MODULE SUBMODUL
Etoy_[0] gt . or FrstC[0]=1 and substr(Etoys,loopC3,1)='0'
*****NULL ITEM - DOES NOTHING*****
ENDD 1          endloopC0                                     NOLAB
MODULE SUBMODUL
lastC6=1
*****NULL ITEM - DOES NOTHING*****
INFO 1          INFOprob4                                     NOLAB
MODULE SUBMODUL
endloopC=1 or itemclC=1 and itemcnt=0
For the next several questions we will ask you to think about the last
seven days. I am going to ask you to think about whether certain
activities or conditions made it more difficult for ^childfin^
to get a good night's sleep?
***** INFORMATION SCREEN ITEM *****
CHCE 1 6          proba  2          _MAKE_          LABEL
MODULE SUBMODUL
Infoprob=1
How often did scheduled evening activities make it more difficult for your
child to get a good night's sleep?
1          Never
2          Once
3          Twice
4          Three times or more
5          Don't know [Do not read out]
.R          Refused [Do not read out]
Freq scheduled evening activities caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6          probb  2          _MAKE_          LABEL
MODULE SUBMODUL
proba gt .
How often did pets make it more difficult for your child to get a
good night's sleep?
1          Never
2          Once
3          Twice
4          Three times or more
5          Don't know [Do not read out]
.R          Refused [Do not read out]
Freq pets caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6          probc  2          _MAKE_          LABEL
MODULE SUBMODUL
probb gt .
How often did inside noise such as other people snoring make it more
difficult for your child to get a good night's sleep?
1          Never
2          Once
3          Twice
4          Three times or more
5          Don't know [Do not read out]
.R          Refused [Do not read out]
Freq inside noise caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6          probd  2          _MAKE_          LABEL
MODULE SUBMODUL
probc gt .
How often did outside noise such as street noise, or sirens make it more

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difficult for your child to get a good night's sleep?
1      Never
2      Once
3      Twice
4      Three times or more
5      Don't know [Do not read out]
.R     Refused [Do not read out]
Freq outside noise caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6      probe 2      _MAKE_      LABEL
MODULE SUBMODUL
probd gt .
How often did the temperature (being too hot or cold) make it more
difficult for your child to get a good night's sleep?
1      Never
2      Once
3      Twice
4      Three times or more
5      Don't know [Do not read out]
.R     Refused [Do not read out]
Freq temperature caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6      probf 2      _MAKE_      LABEL
MODULE SUBMODUL
probe gt .
How often did light (from either inside or outside) make it more
difficult for your child to get a good night's sleep?
1      Never
2      Once
3      Twice
4      Three times or more
5      Don't know [Do not read out]
.R     Refused [Do not read out]
Freq light caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6      probg 2      _MAKE_      LABEL
MODULE SUBMODUL
probf gt .
How often did the television in ^hisherFN^ bedroom make it more
difficult for your child to get a good night's sleep?
1      Never
2      Once
3      Twice
4      Three times or more
5      Don't know [Do not read out]
.R     Refused [Do not read out]
Freq television caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6      probh 2      _MAKE_      LABEL
MODULE SUBMODUL
probg gt .
How often did computer use in your child's bedroom make it more
difficult for him/her to get a good night's sleep?
1      Never
2      Once
3      Twice
4      Three times or more
5      Don't know [Do not read out]
.R     Refused [Do not read out]
Freq computer use caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****

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CHCE 1 6          probi 2          _MAKE_          LABEL
MODULE SUBMODUL
probi gt .
How often did a tablet or smartphone in your child's bedroom make it more
difficult for him/her to get a good night's sleep?
1          Never
2          Once
3          Twice
4          Three times or more
5          Don't know [Do not read out]
.R          Refused [Do not read out]
Freq a tablet or smartphone caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6          probj 2          _MAKE_          LABEL
MODULE SUBMODUL
probi gt .
How often did a cell or landline phone in your child's bedroom make it more
difficult for your child to get a good night's sleep?
1          Never
2          Once
3          Twice
4          Three times or more
5          Don't know [Do not read out]
.R          Refused [Do not read out]
Freq a phone caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6          probk 2          _MAKE_          LABEL
MODULE SUBMODUL
probj gt .
How often did a video game in your child's bedroom make it more
difficult for your child to get a good night's sleep?
1          Never
2          Once
3          Twice
4          Three times or more
5          Don't know [Do not read out]
.R          Refused [Do not read out]
Freq a video game caused sleep trouble
***** SINGLE CHOICE - CATI VERSION *****
INFO 1          INFOfin 2          NOLAB
MODULE SUBMODUL
Probk gt .
These final questions are about ^childfin^'s bedtime and mealtime
activities. Thanks for your patience, we are almost finished.
***** INFORMATION SCREEN ITEM *****
CHCE 1 6          bftime 1          _MAKE_          LABEL
MODULE SUBMODUL
INFOfin=1
In the last seven days, was the time of your child's breakfast...
1          About the same every day
2          About the same time on daycare days...
3          [cont.] but different on non-daycare days
4          Different from day to day, including on daycare days
5          Don't know [Do not read out]
.R          Refused [Do not read out]
Regularity of child's breakfast time
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 6          mealtime1          _MAKE_          LABEL
MODULE SUBMODUL
Bftime gt .
In the last seven days, was the time of your child's evening meal...

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1      About the same every day
2      About the same time on daycare days...
3      [cont.] but different on non-daycare days
4      Different from day to day, including on daycare days
5      Don't know [Do not read out]
.R     Refused [Do not read out]
Regularity of child's evening meal time
***** SINGLE CHOICE - CATI VERSION *****
CHCE  1 6      bedtime 2      _MAKE_      LABEL
MODULE SUBMODUL
Mealtime gt .
In the last seven days, was the time that your child went to bed for the
night...
1      About the same every day
2      About the same time on daycare days...
3      [cont.] but different on non-daycare days
4      Different from day to day, including on daycare days
5      Don't know [Do not read out]
.R     Refused [Do not read out]
Regularity of child's bed time
***** SINGLE CHOICE - CATI VERSION *****
CHCE  1 6      waketime2      _MAKE_      LABEL
MODULE SUBMODUL
bedtime gt .
In the last seven days, was the time that your child awoke or was awakened
in the morning...
1      About the same every day
2      About the same time on daycare days...
3      [cont.] but different on non-daycare days
4      Different from day to day, including on daycare days
5      Don't know [Do not read out]
.R     Refused [Do not read out]
Regularity of child's evening meal time
***** SINGLE CHOICE - CATI VERSION *****
INFO  1      INFORuls3      NOLAB
MODULE SUBMODUL
Waketime gt .
Some parents have rules about what their child can do before bedtime
and others do not. Parents who have such rules may not enforce them
all the time.
***** INFORMATION SCREEN ITEM *****
CHCE  1 7      rulesa 2      _MAKE_      LABEL
MODULE SUBMODUL
INFORuls=1
Which comes closest to describing rules your child may have to follow about
the specific time ^hesheFIN^ goes to bed?
1      We have rules that are always enforced
2      We have rules that are usually enforced
3      We have rules that are sometimes enforced
4      We have no formal rules
5      Not applicable
6      Don't know [Do not read out]
.R     Refused [Do not read out]
Rules surrounding bedtime
***** SINGLE CHOICE - CATI VERSION *****
CHCE  1 7      rulesb 2      _MAKE_      LABEL
MODULE SUBMODUL
rulesa gt .
Which comes closest to describing rules your child may have to follow about
how late ^hesheFIN^ can watch television?
1      We have rules that are always enforced

```

2 We have rules that are usually enforced
3 We have rules that are sometimes enforced
4 We have no formal rules
5 Not applicable
6 Don't know [Do not read out]
.R Refused [Do not read out]
Rules surrounding television
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 7 rulesc 3 _MAKE_ LABEL
MODULE SUBMODUL
rulesb gt .
Which comes closest to describing rules ^hesheFIN^ may have to follow about drinking colas, or other sources of caffeine in the afternoon or evening?
1 We have rules that are always enforced
2 We have rules that are usually enforced
3 We have rules that are sometimes enforced
4 We have no formal rules
5 Not applicable
6 Don't know [Do not read out]
.R Refused [Do not read out]
Rules surrounding caffeinated drinks
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 7 rulesd 2 _MAKE_ LABEL
MODULE SUBMODUL
rulesc gt .
Which comes closest to describing rules ^hesheFIN^ may have to follow about how late ^hesheFIN^ can use a smartphone or cell phone?
1 We have rules that are always enforced
2 We have rules that are usually enforced
3 We have rules that are sometimes enforced
4 We have no formal rules
5 Not applicable
6 Don't know [Do not read out]
.R Refused [Do not read out]
Rules surrounding smartphone/cell phone use
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 7 rulese 2 _MAKE_ LABEL
MODULE SUBMODUL
rulesd gt .
Which comes closest to describing rules your child may have to follow about how late ^hesheFIN^ can use a computer/tablet?
1 We have rules that are always enforced
2 We have rules that are usually enforced
3 We have rules that are sometimes enforced
4 We have no formal rules
5 Not applicable
6 Don't know [Do not read out]
.R Refused [Do not read out]
Rules surrounding computer / tablet use
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 7 rulesf 2 _MAKE_ LABEL
MODULE SUBMODUL
Rulese gt .
Which comes closest to describing rules your child may have to follow about how late ^hesheFIN^ can play video games?
1 We have rules that are always enforced
2 We have rules that are usually enforced
3 We have rules that are sometimes enforced
4 We have no formal rules
5 Not applicable

```
6          Don't know [Do not read out]
.R          Refused [Do not read out]
Rules surrounding video games
***** SINGLE CHOICE - CATI VERSION *****
INFO 1      INFO_s1 11                                NOLAB
Sleep recruitment
rulesf gt . and SLEEPSRV=1 and reside in (2,3)
In addition to investigating ways to encourage children to be more
physically active, we are also interested in finding ways to improve
children's sleeping habits. We are offering parents the opportunity to
receive expert support to improve their child's sleep. If you agree to
participate, you will be randomly allocated to one of two groups. One group
will receive support for improving sleep habits, the other will not.
If you are chosen to receive sleep support, your contact details will be
passed onto the Parenting Research Centre. They will provide you with
support and information, including an online video, a 30 minute tailored
telephone call at a time convenient to you, and two text messages to
support you in improving your household's sleep routine.
***** INFORMATION SCREEN ITEM *****
CHCE 1 3      Sconsent8                               _MAKE_           LABEL
Sleep recruitment
INFO_s1=1
If you are chosen to receive no sleep support, you will be asked to
continue your current sleep habits. We can provide you with the online
video resource about improving your child's sleep if you contact the
research team in 4 months' time.

Do you consent to participate in the study, and for your email, address and
contact phone no. to be passed onto the Parenting Research Centre if you
are chosen to receive the sleep support?
1          Yes
2          No
.R          Refused
Consent to participate in sleep study & share contact details
***** SINGLE CHOICE - CATI VERSION *****
INFO 1      ConsentY6                                NOLAB
Sleep recruitment
Sconsent=1
Great, thanks for agreeing to take part. Should you be chosen to
receive the sleep support you will receive an email from the Parenting
Research Centre within a weeks' time. The email will be from
healthysleeping@parentingrc.org.au with the title
"Healthy Sleeping Video".
Please be sure to check your inbox and junk mail in the next week.
***** INFORMATION SCREEN ITEM *****
TABL 1 20      NewE      6      MM                                LABEL
MODULE SUBMOD 4
ConsentY=1
What is the best email address to contact you on?

Click on the CLICK HERE cell before moving in to next question
NUMC              50
CLICK HERE to move on                C
Email                          C
No email                       B      1
Refused                        B      1
0                              1000
New_email_address
```

*****TABLE ENTRY ITEM - NO BUTTONS *****

INFO 1 Inelig 8 NOLAB

Sleep recruitment

NewE gt . and (NewEB3=1 or NewEB4=1)

Unfortunately an email address is needed so that we can send you a link to an online video should you be allocated to the sleep support group, so we won't proceed any further. However, if you would like some information to help improve your child's sleep habits, feel free to visit the Raising Children website at <http://raisingchildren.net.au> or contact Parent Line NSW on 1300 1300 52.

```
***** INFORMATION SCREEN ITEM *****
CHCE  1 3      phonechk4      _MAKE_      LABEL
Sleep recruitment
NewE gt . and NewEC2 gt ''
And is this still the best number to contact you on?
```

Read number from logsheet if requested]

2 No

Is recorded phone number best contact number

OPEN	1	200		newph	1					LABEL
------	---	-----	--	-------	---	--	--	--	--	-------

phonech_{k=2}

New best phone number

CHCE	1 3	dayschk 8	MAKE	LABEL
------	-----	-----------	------	-------

```
phonechk in (1,.R) or newph gt ''
```

[Interviewer note: refer to logsheet for best contact days & times]

Is this correct?

2 No

Are best contact days & times correct?

MULT	1	7	Newd	8	5	MLTLB
------	---	---	------	---	---	-------

```
dayschk = 2
```

```

4      Thursdays
5      Fridays
-6      Any day / Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]
Best days to contact person
Mondays
Tuesdays
Wednesdays
Thursdays
Fridays
No best days / Don't know [DO NOT READ OUT]
Refused {DO NOT READ OUT}
*****MULTIPLE CHOICE - CATI VERSION*****
MULT 1 5      Newt      8      3      MLTLB
MODULE SUBMODUL
Newd gt '0000000'
What are the best times to contact you?

```

[Interviewer note: We cannot guarantee what time we will call them, but we will make every effort to call them within their requested time period(s).]

```

1      9-10am
2      10am-4pm
3      4pm-8pm
-4      Any time / Don't know [DO NOT READ OUT]
.R      Refused [DO NOT READ OUT]

```

Best times to contact person

```

9-10am
10am-4pm
4pm-8pm
Any time / Don't know [DO NOT READ OUT]
Refused {DO NOT READ OUT}

```

*****MULTIPLE CHOICE - CATI VERSION*****

```

INFO 1      ConsentN3      NOLAB

```

Sleep recruitment

Sconsent in (2,.R)

Not a problem. If you would like sleep support for your child, you can always get information from the Raising Children website at <http://raisingchildren.net.au> or contact Parent Line NSW on 1300 1300 52.

***** INFORMATION SCREEN ITEM *****

```

INFO 2      INFO_end2      NOLAB

```

MODULE SUBMODUL

rulesf gt . and (SLEEPSRV=0 or SLEEPSRV=1 and reside in (1,4,5,.R))

or dayschk in (1,.R) or Newt gt '00000' or ConsentN=1

That brings us to the end of the survey. Thanks again for giving up your time today to talk with us. We really appreciate it.

***** INFORMATION SCREEN ITEM *****

```

CHCE 1 2      future 7      _MAKE_      LABEL

```

MODULE SUBMODUL

INFO_end=1 or inelig=1

As you know, we will be calling to follow up with you later in the year. However, we were wondering whether we might be able to call you again for future projects. If we do contact you again, it would not be for at least 12 months.

There is no obligation to participate, but could we retain your name and number for future surveys?

```

1      Yes [THANKS SO MUCH]

```


2 No [That's perfectly OK]
Permission to contact again in the future
***** SINGLE CHOICE - CATI VERSION *****
CHCE 1 2 END 4 MAKE_ LABEL
MODULE SUBMODUL
future gt .
If you have any questions about this survey, the project officer working
on this project is Lubna Razak.

Would you like me to give you her contact details?

1 Yes
2 No

Would they like PO contact details?

***** SINGLE CHOICE - CATI VERSION *****
INFO 1 INFO_PO 5 NOLAB
MODULE SUBMODUL
END=1

Her name is Lubna Razak, and her number is 4924 6305.

Would you like a contact email?

(If yes: Lubna.AbdulRazak@hnehealth.nsw.gov.au)

***** INFORMATION SCREEN ITEM *****
OPEN 1 400 fincom 8 LABEL
MODULE SUBMODUL
END=2 or INFO_PO=1
Do you have any final comments?

[Interviewer Note: If nothing write NIL]

Final comments

***** OPEN ENDED ENTRY ITEM *****
INFO 1 INFO11 2 NOLAB
MODULE SUBMODUL
fincom gt ''

Thanks again. It has been lovely speaking with you, and we wish you
and your family all the best for the future.

***** INFORMATION SCREEN ITEM *****
TIME 1 T_END 0 LABEL
end time
INFO11=1

Recording end time

***** GET DURATION ITEM *****
OPEN 1 600 Q156 8 LABEL
MODULE SUBMODUL
T_END gt .

Interviewer Comments

[NOTE TO INTERVIEWER: please write your comments here]

[If nothing write NIL]

Interviewer comments

***** OPEN ENDED ENTRY ITEM *****
STAT 1 STAT_CQ 1 NOLAB

```

end      stat
Q156 gt ''
Completed
CQ
*****
STAT 1          STAT_RD 1                                NOLAB
RD      stat
intr9c=1 and t_END=.
Respondent Dead
RD
*****
STAT 1          STAT_OT 1                                NOLAB
OT      stat
(INTROTH gt ' ') and t_end=.
Other reason
OT
*****
STAT 1          STAT_OS 1                                NOLAB
OS      stat
(NOchild=1 or INFO_OS=1) and t_end=.
Out of scope / child deceased
OS
*****
STAT 1          STAT_DR 1                                NOLAB
DR      stat
StatusDR gt '' and t_end=.
Refused
DR
*****
STAT 1          STAT_D3 1                                NOLAB
D3      stat
StatusD3 gt '' and t_end=.
Refused
D3
*****
STAT 1          STAT_CA 1                                NOLAB
CA      stat
(INFO1a=1 or INFO1c=1) and t_end=.
Callback
CA
*****
STAT 1          STAT_CB 1                                NOLAB
CB      stat
(INFO1=1 or INFO1b=1) and t_end=.
Callback
CB
*****
STAT 1          STAT_WN 1                                NOLAB
WN      stat
wrongnum=1 and t_end=.
Wrong Number
WN
*****
STAT 1          STAT_OP 1                                NOLAB
OP      stat
Intro1=8 and T_END=.
Abandoned 10 attempts+contact
OP
*****
STAT 1          STAT_UL 1                                NOLAB
UL      stat

```

```

Introl=9 and T_END=.
Unlocatable 10 attempts, no contact
UL
*****
INFO      3          TERM      2                               NOLAB
END      Term
stat_cq='CQ' or STAT_CB='CB' or STAT_CA='CA' or STAT_RD='RD' or
STAT_DR='DR' or STAT_D3='D3' or STAT_OT='OT' or STAT_OS='OS' or
STAT_WN='WN' or STAT_OP='OP' or STAT_UL='UL'
INTERVIEWER TERMINATION INSTRUCTION, PRESS STOP AND
RECORD OUTCOME OF INTERVIEW ON LOG
***** INFORMATION SCREEN ITEM *****

```



Health
Hunter New England
Local Health District

Service ID Number _____

Data collection Team members: _____

Date of Observation:

_____/_____/_____
Day Month Year

Observer Name:

Start Time:

_____:_____

End Time:

_____:_____

Ages of Children: (mark all that apply)

- ☐ Over 3 years and up to 4 years
☐ Over 4 years and up to 5 years
☐ Over 5 years and up to 6 years

**Total Number of
Children in the
observed class:**

**Number of
Staff working on the
observed class:**

***Outdoor PA Play Area:**

_____ m2

**Total Physical Activity
Occasions Observed:**

Weather:

Temp: Min _____ °c

Max: _____ °c

ACTIVE OPPORTUNITIES

1. How many minutes of total active play time was observed (includes indoor, outdoor structured, and unstructured, add these up at end of the day?)

Minutes: _____

2. Was structured physical activity observed?

(Structured physical activity must be initiated and led by a teacher)

☐ No

☐ Yes ↓

2a How many occasions? 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 other : _____

2b Total minutes of structured PA Observed: _____

2c Was the structured PA optional for children? ☐ yes ☐ no

3. Were specific structured, adult guided Fundamental Movement Skills activities observed?

(Check your lanyards for specific skills. FMS include jumping, running, galloping, hopping, leaping, side-sliding, catching, underarm-rolling, ball dribbling, striking ball, kicking, over arm throwing)

☐ No

☐ Yes ↓

*3a How many occasions? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 other _____

*3b Total minutes of session observed: _____

*3c Was the Fundamental movement skill session optional for children?

☐ yes ☐ no

*3d Did it include the following:

- ☐ warm up activity
- ☐ a focus on developing at least one FMS *
- ☐ cool down activity
- ☐ the provision of skill specific feedback e.g. use of verbal cues, error detection and correction *
- ☐ extension and challenge experiences for different levels
- ☐ staff modelling and demonstration *

4. Did you observe any outdoor active play?

☐ Yes → 4a What was the timing of outdoor play occasions? →

* Start time

*End Time

1. _____:_____

2. _____:_____

3. _____:_____

4. _____:_____

5. _____:_____

4b How many occasions?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 other : _____

☐ No → 4c Was it due to weather (too hot, too cold, rain)

☐ yes ☐ no ☐ unsure

5. How many minutes of outdoor active play time was observed (includes structured, and unstructured)?

Minutes: _____

Clearly state if the activity is performed on a veranda, annex, shade shelter, gazebo etc.

SEDENTARY ACTIVITIES - CHILD

6. Did you observe children seated for more than 30 minutes at a time, excluding nap and meal times? (Include all times that a majority of the children are seated eg. story time, craft, circle time and TV)

- ☐ Yes → 6a How many times/day? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 other : _____
- ☐ No

6b How many total minutes of seated activity (majority of children seated) was observed:

minutes _____

7. Was a TV present in the room? ☐ yes ☐ no

8. Was TV viewing observed?

☐ Yes → 8a Total minutes TV was on: _____ minutes

☐ No 8b Was it on during meals? ☐ yes → 8b1 if yes how many meals ☐ 1 ☐ 2 ☐ 3 or more
☐ no

8c Was the TV used only for viewing educational programs? ☐ yes ☐ no

9. Was a VCR/DVD present in the room? ☐ yes ☐ no

10. Was a Computer present in the room for use by children? ☐ yes ☐ no

11. Was there a video game system present in the room? ☐ yes ☐ no

12. Was Video game playing or computer game playing observed?

☐ Yes → 12a Total number of minutes computer/ video game playing was observed: _____ minutes

☐ No

12b Was it being used for educational purposes only? ☐ yes ☐ no

12c How many children participated in computer/ video game playing during the entire day? _____ number of Children

STAFF PRACTICES**13. Did you observe staff restricting active play as punishment?**☐ No☐ Yes ➡ 13a How many times/day? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 other : _____**14. Did staff join in active play?**

This question refers to a staff member joining in with active play with the children, acting as a role model. Not teacher lead.

☐ No☐ Yes ➡ 14a How many times/day? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 other : _____**15. Did staff provide prompts to initiate or increase physical activity (e.g can you jump higher, Can you hop on one foot)?**☐ No☐ Yes ➡ 15a How many times/day? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 other : _____**16. Did staff provide prompts to decrease physical activity (e.g. slow down, give it a rest, don't climb on the slide)?**☐ No☐ Yes ➡ 16a How many times/day? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 other : _____**17. How many positive statements were made about physical activity (e.g Good throw! Running is fun, I like the way you threw that ball!)? (teachers encouraging the children)**☐ No☐ Yes ➡ 17a. How many times/day?☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 other : _____**18. On the day of data collection were any extra curricula (special) physical activity programs provided to the children by external groups or staff (e.g jungle sports)?**☐ Yes ➡ 18a Were any active alternatives provided for those children that did not participate?☐ yes ☐ no☐ No

Service ID Number _____

Data collection Team members: _____

CENTRE ENVIRONMENT

Please indicate where these pieces of physical activity equipment (both fixed and portable) were located: (please tick the appropriate circle as you find the equipment)

19. Fixed Play Equipment

	<i>indoors only</i>	<i>outdoors only</i>	<i>both indoors & outdoors</i>	<i>not present</i>
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"/>

Service ID Number _____

Data collection Team members:

20. Portable Play Equipment (include both Indoor and Outdoor)

	<i>indoors only</i>	<i>outdoors only</i>	<i>both indoors & outdoors</i>	<i>not present</i>
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"/>

These questions refer to aspects of the playground environment. Specifically, does the Outdoor Playground environment have each of the following?

21. 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"/> |

22. 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

23. 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)

24. 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 ➡ 24a How many times/day? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 other: _____
- ☐ No

25. Were any posters, pictures or displayed books about physical activity present in the observation?

- ☐ Yes ➡ 25a How many play occasion? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 other: _____
- ☐ No

ROOM LEADER INTERVIEW AND DOCUMENT REVIEW

Qualifications

26. What is the highest level of relevant qualification that you have completed that is related to your early childhood education and care employment? (Not just enrolled or in process). Please select one option.

- ☐ Post graduate degree
- ☐ Graduate diploma or graduate certificate
- ☐ Bachelor degree honours
- ☐ Bachelor degree pass (4 yrs or equivalent)
- ☐ Bachelor degree pass (3 yrs or equivalent)
- ☐ Advanced diploma
- ☐ Diploma
- ☐ Certificate level IV
- ☐ Certificate level III
- ☐ Certificate level I and II
- ☐ Other certificate
- ☐ No qualifications in relevant field
- ☐ Qualification unknown

How many years of experience do you have in the early childhood education and care sector? Please answer to the nearest whole year and put '0' if less than one year

Physical Activity Policy

27. Does the centre have a written policy on physical activity?

- ☐ Yes → 27a if yes, what areas does it cover?

[obtain a photocopy of documentation or fax through to 02 49246215]

- ☐ No documents received from centre

- 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

28. Does the centre provide physical activity training/ inservice for staff?

- ☐ Yes →

28a if yes, how often

- ☐ No

- ☐ 2 times/year or more
- ☐ 1 time/year
- ☐ less than 1 time/year

28b if yes what was the content of the trainings?

- ☐ No documents received from centre

Service ID Number _____

Data collection Team members:

29. Does the centre have a documented physical activity curriculum or program for children?
(ask to view this document)

☐ Yes → 29a if yes, what was the content of the curriculum
[obtain a photocopy of documentation or fax through to 02 49246215]

☐ No

30. Are any extra curricula (special) physical activity programs provided to the children by external groups or staff (e.g jungle sports)?

☐ Yes → 30a How often does this occur? _____
30b Were any active alternatives provided for those children that did not participate? ☐ yes ☐ no

☐ No

31. Does the centre have a documentation of parent physical activity education/ resources or workshop materials? eg. Handouts, information sheets or newsletters
(ask to view this document)

☐ Yes → 31a if yes, what was the content of the workshops

☐ No

Definitions

Term	What we mean
Total active play time	minutes of total active play time was observed (includes indoor, outdoor structured, and unstructured)
Structured physical activity	Structured physical activity must be initiated and led by a teacher Refers to an activity that is structured such as a video, music, or teacher led activity. Active group time.
Specific structured Adult guided Fundamental movement skills activities	specific time where conduct structured adult guided activities during which children explore and practice fundamental movement skills <i>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.</i>
Fundamental movement skills	<i>Fundamental movement skills are basic gross motor movement skills. Examples include running, catching, jumping, kicking, galloping, leaping, hopping, and underarm and overarm throwing.</i>
Outdoor active play	All outdoor play time observed (includes structured, and unstructured)
Sedentary activities	Activities that are not physically active. For example reading a book, watching television or playing computer games. <i>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.</i>
Staff joining in active play	Staff member joining in with active play with the children, acting as a role model. <u>Not teacher lead.</u> <i>We define <u>joining in during child initiated free active play</u> 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.</i>
Verbal prompts to initiate or increase physical activity	Saying things like ‘run faster’, ‘good throw’, or ‘show me how you can do that again’, ‘how high can you jump’ prompts to initiate or increase level or intensity of physical activity e.g can you jump higher, Can you hop on one foot
Prompts to decrease physical activity	slow down, give it a rest, don’t climb on the slide
Positive statements about physical activity	Good throw! Running is fun, I like the way you threw that ball! (teachers encouraging the children)

Cognitive Assessments protocol

Cognitive assessments will be measured using three tasks, presented as games. All instruments are valid and reliable among children in their early years.

The tasks (iPad games) measures executive functions (i.e. working memory, inhibition and shifting). The tasks are as follows:

Go/No-Go (Inhibition) – children see a series of fish and sharks quickly swim across the screen. Children are required to ‘catch’ the fish (by tapping on the screen) and ‘avoid’ the sharks (withhold tapping the screen). because of the speeded nature of the task, and the majority of the trials being go trials (fish), the prepotent tendency to response needs to be overcome for no-go trials (sharks).

Mr Ant (visual-spatial working memory) – children see a cartoon ant with 1 to 9 coloured stickers on his person. Children are required to remember the placement of these stickers and, after a delay, indicate these spatial locations.

Dimensional Change Card Sorting Task (shifting) – children are required to sort cards by one dimension (e.g. colour) before switching to a new sorting dimension (e.g. shape). If completed successfully children are required to flexibly switch between colour and shape sorting rules on the basis of the presence of absence of a border around the stimulus. Together these 3 tasks take approximately 15 minutes to complete (in some cases shorter, due to stop rules. These measures will be administered at both **baseline** and **follow-up**. After fitting accels, determine with the room leader as to which child will complete the assessments first, check the consenting children list for the days of attendance and select the child who attends the least number of days, especially if that day is the only day they attend.

Preferably this is not done when the children are outside playing and so one child can be brought into a quiet area in the classroom for the assessments to be done.

There is a score displayed at the end of each task, please record this on the document provided.

Score

Go/No-Go:	Proportional Go Accuracy:
	Proportional No-Go accuracy:
Mr Ant:	Overall accuracy
Card Sort:	Overall accuracy

Proper administration of cognitive tests requires use of basic communication skills and careful adherence to the procedures. Basic communication skills are essential to gain the attention and cooperation of the children and to motivate them to complete the tests.

Establishing and maintaining rapport

A brief introduction of the cognitive test e.g.

“Now we are going to do some tasks that ask you to solve different kinds of problems. I will explain each task as we come to it. Please just do the best you can.”

If rapport has not been established, it may be helpful to engage the child in some informal conversation about their hobbies or interests. In general, this conversational period should be kept relatively brief in the interest of time, but it is important not to begin testing until the child seems relaxed enough to give his/her maximal effort.

If the child expresses concern about the tests or his/her ability to perform well, every effort should be made to clarify the nature and purpose of the tests to allay any uncertainty or tension, maintaining a calm and easy conversational manner while interacting with the child will enhance the cooperation of the child while also relieving his/her test taking anxiety.

Basically, encouragement to do one's best and supportive comments to maintain a positive test-taking attitude is acceptable form of feedback during testing. For instance, such comments as: *“you're doing fine”* or *“that's okay, just do your best”* can be used liberally. If a young child expresses concern about his/her performance or seems frustrated, it is appropriate to encourage him/her by saying *“that one was a little hard, you'll be able to do it when you are older”* or a similar supportive comment and then proceed.

Children vary widely in their responses to reinforcement, and it is important to attend to the specific needs of the child. However, special encouragement which provides clues or biases the responses must be avoided. Furthermore, dissatisfaction, disapproval, and disappointment should never be shown during testing. maintaining a neutral and professional manner, while still being sensitive to each child, promotes the highest quality data.

**In_Out Trial - Cognitive Assessments
Follow Up Data Collection
Further instructions**

- ☐ At the beginning of each game, please insert '2' as the Session ID Number.
- ☐ Please remember to:
 - ☐ Record the score that is displayed at the end of each task on to the Data Collection Sheet:

Go/No-Go: Proportional Go Accuracy
 Proportional No-Go accuracy
 Mr Ant: Overall accuracy
 Card Sort: Overall accuracy

For example:

Child Name	Child ID	Data Collection Date	Go/No Go		Mr Ant	Card Sort
			Go	No Go		
			93.33%	80%	8	15

- ☐ Please record any other details, for example, if the child refused to do any of the activities or if the child was absent from the Service on the day of data collection.

Tips from an RA for encouraging children to complete the tasks:

"I found the cognitive assessments quite a challenge and I had to change tact per child. This was mainly due to having to do the younger room (3 and 4 years) rather than the older room which was a bit more consistent.

I found the best time to complete the assessment was at rest time. It was a more relaxed time where I was able to have one on one time with each child and to take them outside the classroom away from other children to complete the tasks. However in saying that, at one service we had no other time to complete the assessment as they had a lot of outdoor free play but it seemed to be successful.

The younger children found the tasks quite difficult, they said more than once that it was 'too hard', so it required a lot of encouragement to get them to have a go. I would continually just say 'just try your best' and told them 'that they were helping me with my work' by completing the tasks.

I found the go/no go game to be the most challenging in regards to paying attention as it was quite repetitive and all three sessions had to be completed. I found that telling the children from the start that there was 'three levels' in this game, it encouraged the children to continue as they could see an end point to the game. A lot of children said in this game 'when is it finished'. I also found using the names Nemo for the fish and Bruce for the shark from Finding Nemo was an encouragement. One time I said that 'we don't want to touch the shark in case it bites our fingers, which I wouldn't recommend saying as the child was scared to play the game from then on.

The card slot game was fine and there were no issues with it.

The Mr Ant game was also a bit of the challenge. I found the instructions from the start threw off the younger age group, while the older age group was able to comprehend. In the instructions part the child would say the game was too hard, particularly in the mirror imaging part of the practice. I found it much better to learn the instructions for myself and explain it to the children, while pointing to the ant image on the screen where the stickers may be. I was then able to skip the practice and the children were much more able to comprehend the game. In the Mr Ant game, a lot of the children were touching Mr Ant everywhere and putting stickers all over him, I had to re confirm that they only need to put it on his body where they saw it.

This was the hardest game for the young kids, hence why some got 0. Some could not understand the task at all in particular with the 3 year olds."