

Weight management during pregnancy and following childbirth

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A thesis submitted in fulfilment of the requirements
for the degree of Doctor of Philosophy in Nutrition & Dietetics

June 2018

This research was supported by an Australian Government Research
Training Program (RTP) Scholarship

Statement of originality

I hereby certify that the work embodied in the thesis is my own work, conducted under normal supervision.

The thesis contains published scholarly work of which I am a co-author. For each such work a written statement, endorsed by the other authors, attesting to my contribution to the joint work, has been included.

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 in the text. 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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Acknowledgments

The completion of this thesis would not have been possible without a number of amazing mentors, friends, colleagues and loved-ones. I will forever be grateful to you all.

Professor Clare Collins. It's difficult to describe the appreciation I have for your mentorship throughout my PhD. I am so grateful to have had the opportunity to learn from a woman who is kind, dedicated, strong, independent, passionate and willing to push those around her forward for success. The generosity with which you gave your time, advice and kindness for both my research and personal life will never be forgotten.

Dr Megan Rollo. You have been an immense support to me from the day I first walked in to your office wanting to do a PhD. You encouraged me to grow independently but have always listened and provided direction when I was getting lost. Thank you for your patience, dedication and constant flow of down-to-earth practical advice.

Dr Melinda Hutchesson. Your pursuit of excellence has pushed me to become a better researcher. Your ability to look at the bigger picture, but also the finer details has been invaluable, and has undoubtedly improved the quality of my work. Thank you.

Professor Robin Callister. I am inspired by your kindness and grateful for your wisdom. Your practical approach to problems, and your availability to listen to my thoughts was priceless for my PhD journey. You have helped me to become a better teacher, researcher and person.

To my netball team mates. Thank you for taking my mind off research! Thank you for asking how it is going, but steering clear of the details to give my brain a break.

Dr Narelle Eather. This journey was enjoyable because of you! Thank you for every weights, pool and running session to de-stress and refresh my brain. Your practical and hard-working nature inspire me. Your friendship will stay with me long after this thesis is submitted.

To all of the staff and students in the Priority Research Centre for Physical Activity and Nutrition. You have made this PhD experience richer because of your positivity and all round good vibe! The PRC is a class act and I am fortunate to have been a part of its story. To my fellow PhD candidates. So many of you have contributed to my journey and I will always be grateful for your support, advice and friendship. In particular to my ATC-209 girls. Hannah Brown, Magda Wilczyńska, Chelsea Carle, Li Kheng and Sarah Kennedy, you are all legends. I'm lucky to have had you all as desk neighbours. Your 'encourage-mint' really got me over the line! Lee Ashton,

Amy Ashman, Kirrilly Mills and Bec Haslam, thank you for listening and supporting, but more importantly for your friendship. Finally, Ryan Hulteen. Thank you for helping me through the highs and the lows of each PhD day, week and year. Your friendship will last long after submission.

Dr Mel Hayman. Who would have thought we would both do a PhD?! Thank you for the million hours of phone conversations about research ideas...and life! You are priceless.

Jennie Thomas. Thank you for believing in me. Your scholarship, and the generosity of your heart that comes with it, have helped me believe in myself. Thank you also to Felicity Thomson and Exercise Sports Science Australia for the funding you provided. Your support has helped me to become a better researcher and improve maternal health care.

To the women who participated in this project. Thank you for your time, commitment and being so supportive of my research. I hope this PhD helps to support you in return.

To the De Vito family. You mean the world to me. Thank you for your support through all stages of this PhD. From the initial application to the final sentence you have been with me the whole way and have championed me to success. You will always be my family.

To my mother, Margaret, and my father, Brian, thank you for making me who I am. Life has been hard on us all and I wish I could share this with you. Regardless, thank you for instilling in me the determination, passion, strong-will and belief that I can do whatever I put my mind to.

To my big brothers, Pete and Brad. Thank you for listening, supporting, understanding and being the best big-brother-cheer-squad a little sister could ask for. The passion you both show for life inspires me to be better at what I do.

Finally, my super husband, Zoltan. You are just the best. You have encouraged me to be strong and successful, but have always been there to put my pieces back together when I've broken. You have been my rock through this journey and have been the best at taking my mind off things when needed (Peña and Miller helped!). I love you and this success is shared with you..now...onwards and upwards to the adventures ahead!!

Author note

Publications and presentations for Lisa Vincze (née Spencer) are listed under both maiden (Spencer) and married (Vincze) surnames in this thesis.

Publications arising from this thesis

This thesis is presented with the inclusion of five peer-reviewed papers. I am the lead author on all papers. At the time of submission, four of these papers were published and one is under review. The body of this thesis includes four of these papers (Chapters 3-6) and one is included as an appendix (Appendix 1).

Manuscripts in peer-reviewed journals: Published

1. **Spencer L**, Rollo M, Hauck Y, MacDonald-Wicks L, Wood L, Hutchesson M, Giglia R, Smith R, Collins C. The effect of weight management interventions that include a diet component on weight related outcomes in pregnant and postpartum women: a systematic review protocol. *The Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports*. 2015;13(1):88-98. doi: 10.11124/jbisrir-2015-1812
2. **Vincze L**, Rollo M, Hutchesson M, Burrows T, MacDonald-Wicks L, Blumfield M, Collins C. A cross sectional study investigating weight management motivations, methods and perceived healthy eating and physical activity influences in women up to five years following childbirth. *Midwifery*. 2017;49:124-133. doi: 10.1016/j.midw.2017.01.003
3. **Vincze L**, Rollo M, Hutchesson M, Callister R, Collins C. VITAL change for mums: a feasibility study investigating nutrition and exercise care delivered by video-consultations in women 3-12 months postpartum. *Journal of Human Nutrition and Dietetics*. 2018;(3):337-348. doi: 10.1111/jhn.12549
4. **Vincze L**, Rollo M, Hutchesson M, Callister R, Collins C. Postpartum women's perspectives of engaging with a dietitian and exercise physiologist via video-consultations for weight management: a qualitative evaluation. *Healthcare*. 2018;6(1):8. doi: 10.3390/healthcare6010008

Manuscripts in peer-reviewed journals: Under review

1. **Vincze L**, Rollo M, Hutchesson M, Hauck Y, MacDonald-Wicks L, Wood L, Callister R, Collins C. Interventions including a nutrition component aimed at managing gestational weight gain or postpartum weight retention: a systematic review. *Under review at The Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports.*

Presentations arising from this thesis

During my candidature, I presented results arising from this thesis at eight conferences. This resulted in five oral and three poster presentations.

Conference abstracts

1. **Vincze L**, Rollo M, Hutchesson M, Callister R, Thompson D, Collins C. Postpartum women's perspectives of engaging with a dietitian and exercise physiologist via video-consultations for weight management: a qualitative evaluation. Dietitians Association Australia National Conference. 17-19 May, 2018. Sydney, Australia. Oral presentation.
2. **Vincze L**, Rollo M, Hutchesson M, Callister R, Collins C. VITAL change for mums: A feasibility study investigating tailored video-coaching for exercise and nutrition care for postpartum women. Research to Practice (Exercise & Sports Science Australia). 27-29 March, 2018. Brisbane, Australia. Poster presentation.
3. **Vincze L**, Rollo M, Hutchesson M, Callister R, Collins C. VITAL change for mums: A feasibility study investigating tailored video-coaching for exercise and nutrition care for postpartum women. International Society for Behavioural Nutrition and Physical Activity (ISBNPA) Meeting. 7-10 June, 2017. Victoria, Canada. Oral presentation: presented by Dr Megan Rollo on my behalf.
4. **Vincze L**, Rollo M, Hutchesson M, Callister R, Collins C. VITAL change for mums: A feasibility study investigating tailored video-coaching for nutrition and exercise care for postpartum women. Dietitians Association Australia National Conference. 18-20 May, 2017. Hobart, Australia. Oral presentation in the Early Career Researcher Showcase.
5. **Spencer L**, Rollo M, Hutchesson M, Collins C. A cross sectional study investigating motivations for weight change and weight loss methods used in women following childbirth. Reaping the Benefit: Australian Longitudinal Study on Women's Health Scientific Meeting. 3-6 May, 2016. Newcastle, Australia. Oral Presentation.

6. **Spencer L**, Rollo M, Hutchesson M, Callister R, Collins C. Study protocol: VITAL for mums – A feasibility study investigating tailored video-coaching for exercise and nutrition care for postpartum women. Research to Practice (Exercise & Sports Science Australia). 14-16 April, 2016. Melbourne, Australia. Poster presentation.
7. **Spencer L**, Rollo M, Hutchesson M, Collins C. Weight management after childbirth: Factors perceived to influence healthy eating and physical activity. Developmental Origins of Health and Disease (DOHaD) Society of Australia and New Zealand conference. 17-19 April, 2015. Melbourne, Australia. Poster presentation.
8. **Spencer L**, Rollo M, Hutchesson M, Collins C. Perceived healthy eating and physical activity factors influencing weight management in postpartum women: a mixed methods analysis. Australian and New Zealand Obesity Society (ANZOS) Scientific Meeting. 16-18 October, 2014. Sydney, Australia. Oral presentation.

Additional publications co-authored during candidature

During my candidature I worked as a Research Assistant at the University of Newcastle's Priority Research Centre in Physical Activity and Nutrition and contributed to one additional publication. The publication is consistent with my research focus, however it sits aside from the research included within this thesis and was therefore not included. Details of the additional publication to which I contributed are listed below.

Additional manuscripts in peer-reviewed journals: Published

1. Rollo M, Burrows T, **Vincze L**, Harvey J, Collins C, Hutchesson H. Cost evaluation of providing evidence-based dietetic services for weight management in adults: In-person vs. eHealth delivery. *Nutrition & Dietetics*. 2018;75(1):35-43. doi: 10.1111/1747-0080.12335

Awards

Throughout my candidature, I have been supported by an Australian Government Research Training Program (RTP) Scholarship (previously Australian Postgraduate Award).

In 2014, I won a top up scholarship from the Rainbow Foundation (Thomson Family) through the Hunter Medical Research Institute. I also successfully won the nationally competitive Tom Penrose Research and Community Services Award from Exercise & Sports Science Australia (project grant).

In 2015, I won the Emlyn and Jennie Thomas Postgraduate Medical Research Scholarship through the Hunter Medical Research Institute (top up over two years).

In 2017, I won the Dietitians Association of Australia *New Researcher Award* at the Annual Scientific Meeting following my oral presentation in the Early Career Research Showcase.

Contribution statement

The body of work detailed in this thesis has resulted in five papers. I was the sole PhD student responsible for this project and was involved in all aspects of this project. A summary of my contributions and involvement is presented below.

Systematic Review

I was responsible for leading all stages of the systematic review. Specifically, with the support of Debbie Booth (Senior Research Librarian) I developed and ran the search strategy. With support from my supervisors, I led both title and abstract and full-text screening. I was responsible for completing and leading all data extraction and synthesis of results for included articles, with the support of my supervisors. I conducted all quality appraisals in collaboration with my co-authors. I drafted the full manuscript which was approved by my supervisors and all co-authors.

Cross-sectional survey

Formative work involving the cross-sectional survey was carried out by my supervisors prior to my PhD candidature (H-2012-0436). However, with the support of my supervisors I defined the research question applicable to my PhD, cleaned the data-set and conducted all data analysis for the manuscript. I developed and drafted the full manuscript which was approved by all co-authors.

VITAL change for mums

Acquisition of funding

I was the lead project manager on the two grants that funded the VITAL change for mums study:

Exercise & Sports Science Australia (ESSA) 2015. Spencer L, Rollo M, Hutchesson M, Collins C. Providing one-on-one virtual exercise care via video consultations: a feasibility study in postpartum women. \$10,000

Rainbow Foundation (Thomson Family) through the Hunter Medical Research Institute 2014. Collins C, Rollo M, Hutchesson M, Spencer L. Helping postpartum women achieve a healthy lifestyle and good outcomes for themselves and their baby. \$5000

Intervention design and development

With support from my supervisors, I led the overall development of the VITAL change for mums feasibility study. Specifically, I was responsible for developing video-consultation structure, content and implementation including set-up and management of all online platforms utilised in delivery.

Ethics approval

I was responsible for drafting, submitting and obtaining ethical approval from the University of Newcastle's Human Research Ethics Committee for VITAL change for mums (H-2015-0369). This involved developing a study protocol, completing all ethics forms, designing recruitment materials and constructing information statements, consent forms and participant screening procedures.

Study measures

In conferring with my supervisors, I selected all objective and subjective outcome measures used in the VITAL change for mums study and developed the process evaluation questionnaire. In addition, I developed the post-intervention interview protocol.

Participant recruitment

I was responsible for identification and recruitment of postpartum women for VITAL change for mums. I designed and developed all recruitment materials and liaised with Hunter Medical Research Institute's media department to draft a social media post to promote the study. I processed all of the screening data and determined eligibility for participation.

Data collection, entry and management

I was responsible for conducting the assessment sessions for VITAL change for mum on two occasions (pre- and post- intervention). Prior to the data collection period, I developed an assessment protocol for completing all measures. I conducted comprehensive training with research assistants (taking waist measure and assisting with data recording) to ensure adequate understanding of the measurement protocol. Following data collection, I was responsible for entering, cleaning and de-identifying data for all participants.

Program implementation

As an Accredited Exercise Physiologist I delivered all exercise video-consultations for VITAL change for mums. I employed and comprehensively trained an Accredited Practising Dietitian to deliver nutrition video-consultations. I managed all consultation booking, rescheduling and reminders. I was the contact person for participants for all aspects of the study. Given I delivered the intervention I was unable to conduct the post-intervention interviews. I employed and comprehensively trained a researcher to conduct the interviews based on the developed protocol.

Data analysis

I conducted all quantitative statistical analyses using STATA computer software and also interpreted the results and presented the data in either text, table or figure formats. The qualitative data analysis in Chapter 6 was carried out by an independent qualitative researcher.

Presentation of study results

During my candidature, I presented results from my thesis at six conferences (see page vii for details). One of these presentations was the Early Career Research Showcase for the Dietitians Association of Australia National Conference (2017) for which I was awarded the 'New Researcher' Award. Subsequently I gave a short interview on the findings from my research which has been disseminated through the Nutrition and Dietetics Journal's social media accounts (<https://vimeopro.com/dietitians/journal/video/225047934>). I was also an invited speaker at an Exercise and Sports Science Australia accredited professional development seminar entitled 'Women's Health Workshop' (Sydney, Australia - June, 2015). I authored two articles (June, 2015 and December, 2016) for Exercise and Sports Science Australia's Member's Magazine (*Activate*) regarding the Tom Penrose Research and Community Services Award for VITAL change for mums (see Appendix 4-6).

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Abbreviations

Abbreviation	Meaning
AEP	Accredited Exercise Physiologist
AES	Australian Eating Survey
APD	Accredited Practising Dietitian
ARFS	Australian Recommended Food Score
BMI	Body Mass Index
CI	Confidence Interval
DAA	Dietitians Association of Australia
EDNP	Energy-Dense Nutrient-Poor
ESSA	Exercise & Sports Science Australia
FFQ	Food Frequency Questionnaire
GDM	Gestational Diabetes Mellitus
GP	General Practitioner
GWG	Gestational Weight Gain
IOM	Institute of Medicine
IQR	Interquartile Range
MBS	Medicare Benefits Schedule
MD	Mean Difference
MVPA	Moderate-to-vigorous Physical Activity
NHMRC	National Health and Medical Research Council
OR	Odds Ratio
PPWR	Postpartum Weight Retention
SD	Standard Deviation
SMS	Short Message Service
VO₂max	Maximal Oxygen Consumption
WHO	World Health Organisation
WMD	Weighted mean difference

Thesis Abstract

Supporting women to achieve a healthy weight following childbirth has important implications for their life long weight trajectory, chronic disease risk and offspring health. To reduce postpartum weight retention, guidelines recommend women engage in a healthy lifestyle; however, few women achieve optimal levels of physical activity or appropriate nutrient intakes at this life-stage. The unique and complex barriers faced by women following childbirth (i.e. time constraints and need for childcare), make achievement of lifestyle recommendations challenging. Further, accessing professional support for weight management is difficult via traditional models of care. Given that previous interventions aimed at supporting healthy weight attainment after childbirth have had variable and/or modest success, there is a need to identify how weight management support at this important life-stage can be improved. Therefore, this thesis includes three distinct but complementary studies aiming to address the overarching research question, *“How can women be better supported to achieve a healthy weight following childbirth.”* Five specific research questions with three corresponding thesis aims were proposed to address this overarching question. Results are summarised by thesis aim below.

Thesis Aim 1: To systematically review the characteristics and effectiveness of interventions that include a nutrition component aimed at improving gestational weight gain and/or postpartum weight retention.

To investigate this aim, a comprehensive systematic review was conducted. In total, 39 studies were included. The review identified 20 studies conducted in pregnancy only (11 reported significantly reducing gestational weight gain), five studies commenced in pregnancy and continued through to the postpartum period (one reported significantly reducing gestational weight gain and postpartum weight retention) and 14 studies commenced after childbirth (nine reported significantly reducing postpartum weight retention). The review demonstrated that a large variety of approaches have been used to optimise weight management in pregnancy and following childbirth. Interventions varied in modality used to deliver the intervention, number of modalities included, intervention content, qualifications and experience of the interventionist, the BMI range of recruited women and gestation criteria for recruitment, and thus intervention length. Notably, intervention reporting lacked detail with only 11/38 studies reporting mode, duration and intensity information for all included intervention components.

Thesis Aim 2: To explore weight loss methods used, motivations for weight change and factors perceived to influence healthy eating and physical activity for weight management following childbirth, and to evaluate differences in these variables by socio-demographic, weight status and pregnancy characteristics.

Results from the cross-sectional survey of 874 women who were ≤ 5 years postpartum indicated that majority of women were dissatisfied at their current weight (68.1%). The most important reasons women wanted to change their weight were to improve their health, feel better about themselves/lift mood and improve their self-confidence. Three-quarters of women (75.8%) had used at least one weight loss method in the previous two years, however less than 5% of those reported visiting a health professional for weight loss support. Time constraints due to family commitments was the most common factor rated to have a major influence on both healthy eating (79.5%) and physical activity (86.7%). Importantly, weight loss methods used, motivations for weight change and factors influencing healthy eating and physical activity significantly differed by socio-demographic, weight status and pregnancy characteristics. Results from the survey indicate that interventions targeting weight management in this population group need to individually tailor advice to improve adherence and engagement with healthy lifestyle behaviours.

Aim 3: To evaluate the implementation, acceptability and preliminary efficacy of a personally tailored nutrition and exercise program (VITAL change for mums) for postpartum women (3-12 months), delivered via video-consultations by an Accredited Practising Dietitian (APD) and an Accredited Exercise Physiologist (AEP).

The implementation, acceptability and preliminary efficacy of VITAL change for mums was evaluated in 30 women (31.6 ± 3.1 years, BMI 29.0 ± 4.0 kg/m²) who were 3-12 months postpartum in a pre-post-test single-arm study. Following the 8-week intervention period where the participants received up to five real-time video-consultations (2x APD, 2x AEP & 1x optional APD/AEP), the 27 completers rated satisfaction (out of 5) with the video-consultations (4.4 ± 0.9) and the online setting (4.5 ± 0.8) highly. The participants also agreed that accessing an APD (4.4 ± 0.8) and AEP (4.3 ± 0.9) was easier using video-consultations than attending an in-person consultation. Eleven participants (11/27, 41%) reported a technical issue with at least one video-consultation. From baseline to 8-weeks significant improvements from intention-to-treat analysis were observed for waist circumference, skeletal muscle mass, fat mass, VO₂, self-reported MET.min/week and percentage energy intake from energy-dense, nutrient-poor foods.

Post-intervention telephone interviews with 21 completers (32.3 ± 3.0 years, 28.1 ± 3.8 kg/m²) provided insight into women's perspectives of engaging with the APD and AEP in the online setting. Themes relating to the video-consultation experiences of the women included feeling that they did not differ from in-person consultations, they were convenient, and flexible options were appropriate, however there was a desire for increased contact frequency. The dietitian and exercise physiologist were perceived to increase the knowledge and confidence of participants to improve health behaviours. The approach to setting realistic and tailored goals was well received.

The findings from VITAL change for mums are the first to demonstrate that tailored advice from a dietitian and exercise physiologist received via video-consultations is feasible and acceptable to postpartum women.

Conclusion

The findings from this research thesis have identified key areas for improving weight management in women following childbirth. Research gaps have been identified including lack of recruitment of women from all BMI groups, limited interventions commencing in pregnancy and continuing through to the postpartum period and poor intervention detail reporting. These areas require addressing to improve maternal weight management. Both researchers and health practitioners need to consider women's individual motivations and barriers for weight change following childbirth based on their characteristics (i.e. pregnancy, BMI and sociodemographic characteristics), and tailor counselling, support and research interventions accordingly. VITAL change for mums identified that tailored nutrition and exercise care delivered by qualified health practitioners via online real-time video-consultations is feasible and acceptable to postpartum women and offers a viable alternative to in-person care. Overall, the results from this thesis have implications for pregnant and postpartum women and health practitioners, and key recommendations for future research into optimising maternal weight management are provided.