A systematic review of women's experiences of interventions to prevent excessive gestational weight gain

Abstract

Objective: To synthesise research on women's experiences of interventions to prevent excessive gestational weight gain. This will help to inform the development of acceptable and effective interventions.

Data Sources: A systematic search of the following databases was conducted: CINAHL Complete, Maternity & Infant Care Database, APA PsycArticles, APA PsycInfo and MEDLINE.

Study Selection: Studies were included if they involved primary research regarding the experiences of women who are pregnant or up to 1-year post-partum when reflecting on their involvement in interventions to prevent excessive weight gain during pregnancy. Non-empirical studies and those that considered the experiences of women who are not pregnant or over 1-year post-partum were excluded.

Data Extraction: Information was extracted and captured in a summary table that included the study aim, participants, study design, intervention, findings and summary score, with exceptions to quality.

Data Synthesis: Data were synthesised thematically into three themes: i) intervention qualities valued by women, ii) challenges faced by women and iii) perceived benefits and recommendations for modifications.

Conclusion: Interventions should be tailored to individual need in order to ensure that they are both acceptable and effective.

Keywords: gestational weight gain; obesity; pregnancy; weight counselling; intervention

Précis statement: This review highlights a need for interventions that are tailored to individual need in order to address the challenges that women encounter.

Clinical Implications

- Interventions to prevent excessive gestational weight gain should provide women with sufficient guidance that is tailored to their needs.
- Providers of interventions should address the internal and external barriers that women face, such as their lack of time or anxieties about weight monitoring.
- Interventions should incorporate women's preferences for alternative strategies such as partner inclusion and a holistic approach that addresses both mental and overall maternal health.

Introduction

The risks associated with excessive gestational weight gain (GWG) are well established and include a greater risk of gestational diabetes (Lan et al., 2020; Peng et al., 2021), pregnancy-related hypertension (Institute of Medicine, 2009; Macdonald-Wallis et al., 2013) and caesarean birth (Johnson et al., 2013; Reis et al., 2019). Longer-term outcomes may include cardiovascular disease (Hutchins et al., 2022), post-partum weight retention (Linne et al., 2004) and childhood obesity in offspring (Wan et al., 2018). Therefore, there is a need for effective interventions to prevent excessive weight gain during pregnancy.

Pregnancy is an ideal life-stage to encourage positive lifestyle behaviours (Olander et al., 2018; Phelan, 2010). Researchers conducted a review of the outcomes of interventions to prevent *further* GWG in women who are already overweight or obese (Aung et al., 2022). The authors found that the impact of lifestyle interventions was mixed, but there was value to interventions including a psych-behavioural component, and the role of the midwife was essential. Hamilton et al. (2018) reviewed randomised controlled trials (RCTs) that examined women's experiences of weight and lifestyle interventions. The majority of studies explored changes in maternal dietary behaviour and attitude toward GWG. However, there was less emphasis on assessing acceptability from the woman's perspective. The authors concluded that future interventions should be holistic (addressing broader influences such as the partner) and acceptable to women and their families (i.e. could be followed in daily life).

Researchers who have conducted existing reviews offer some direction in supporting healthy GWG but are limited by i) the focus on women already overweight or obese and ii) a predominant emphasis on randomised controlled trials (RCTs).

There remains a need to capture experiences from pregnant women of all weights who participate in a broad range of research, not just RCTs. Therefore, the aim of this mixed-methods systematic review is to explore women's experiences of interventions to prevent excessive GWG. The findings will help to inform the development of acceptable and effective interventions.

Methods

This review followed the Joanna Briggs Institute (JBI) methodology for mixed-methods systematic reviews (Lizarondo et al., 2020). This involved a convergent integrated approach in which quantitative and qualitative data from primary research studies were extracted, appraised and synthesised simultaneously. In addition, textual descriptions of quantitative results were produced to ensure integration with qualitative data. Included studies were subject to quality appraisal.

Search strategy

The following databases were searched using PRISMA methodology (Page et al., 2021): CINAHL Complete, Maternity & Infant Care Database, APA PsycArticles, APA PsycInfo and MEDLINE. Figure 1 outlines the search strategy, which included terms related to the study population, exposure and outcome of interest. Specifically, these combined terms related to pregnancy, interventions, healthy weight management and experiences. Studies were included if the interventions placed an emphasis on gestational weight management irrespective of the strategy used. Specific inclusion criteria included: i) studies of women who were pregnant or up to 1-year post-partum when experiences were assessed, ii) empirical papers that were peer reviewed, iii) studies published between 2012–2022 to ensure an inclusive yet contemporary overview and iv) studies published in the English language. Studies were excluded if they involved any of the following: i) women who are not pregnant

or over 1-year post-partum, ii) non-empirical papers (e.g., editorials and opinion papers) and iii) interventions that were implemented before pregnancy. Backward and forward citation searches of included studies were also conducted. This involved screening reference lists and identifying articles that cited the included papers.

Study selection

Titles and abstracts were screened against the inclusion and exclusion criteria (SR and FC). Studies that met the inclusion criteria at this stage were subject to full text review (SR and JD). Any disagreements were resolved by the full author team. Figure 2 provides a PRISMA summary of the number of studies that were identified at each stage.

Data extraction and quality assessment

Data were extracted to a summary table capturing aim, participants, study design, intervention, findings and quality appraisal (summary score and exceptions to quality) (Table 1). Quality was assessed using JBI appraisal tools (Moola et al., 2017) relevant to study design. The tools involved an assessment of the methodological quality of studies, and the extent to which bias was addressed in the design, implementation and analysis. These consisted of checklist criteria for the above regarding whether a series of criteria were “met”, “not met”, or if this was “unclear” or “not applicable”. A summary score (based upon the number of relevant criteria that were met) was produced for each study, alongside descriptions of any exceptions to quality.

Analysis

Qualitative data were analysed thematically (Clarke et al., 2015) and quantitative data were summarized descriptively using frequencies and means and presented within themes. The overall findings are summarised in Table 1.

Results

Study characteristics

Twenty-nine-studies were included. Sixteen explored women's experiences of interventions, nine focused on acceptability of interventions and the remainder focused on feasibility and/or acceptability of interventions (n=4). Whilst interventions often included different modes of delivery and foci, we report the primary facets as follows. Modes of delivery; face to face (n=19), web or app based (n=6), telephone (n=2) and self-directed (n=2). Content; healthy lifestyle (n=29). Methods used included qualitative approaches (n=13), surveys (n=7) and mixed methods (n=9).

Studies were conducted in Australia (n=8), United Kingdom (n=7), United States (n=5), Sweden (n=3), Canada (n=2), Ireland, Norway, Portugal and Greece (all n=1).

3.2 Methodological quality

The overall methodological quality of qualitative studies was robust. Most exceptions were the absence of underpinning philosophy and researcher positionality. The latter can form a useful component in acknowledging one's biases and ensuring rigour in analysis (Braun & Clarke, 2019). Quantitative surveys were generally of good quality, but some had few participants (i.e. sample sizes below fifteen).

3.3 Findings

Three themes and nine sub-themes were identified (Figure 3). Themes included: i) intervention qualities valued by women, ii) challenges faced by women and iii) perceived intervention benefits and recommendations for modifications.

Theme 1: Intervention qualities valued by women

Intervention qualities valued by women included the sub-themes i) interpersonal approach of practitioners, ii) social support and iii) useful intervention components. Women reported how important the interpersonal approach of practitioners was to them. Attributes that were particularly valued were a non-judgmental stance, acceptance and empathy (Atkinson et al., 2016; Malmström et al., 2022). These approaches enabled open and honest communication (Knight-Agarwal et al., 2015; Knight-Agarwal et al., 2022; Malmström et al., 2022) and facilitated a strong rapport between women and staff (Daley et al., 2015; Goldstein et al., 2021). Where positive interpersonal interactions were reported, all but one intervention was delivered face-to-face, the exception being an app-based intervention, where participants had direct contact with advisors (Knight-Agarwal et al., 2015). Women derived encouragement from the emotional support of intervention providers and individualized attention (Jarman et al., 2019; Lee et al., 2012; Malmström et al., 2022; Seward et al., 2018).

Social support was received from both intervention peers and from family and friends. Group based interventions, including classes to support physical activity, (Green et al., 2021; Malmström et al., 2022) were evaluated positively. Similarly, some study authors reported that interventions led to greater support from friends or family to foster lifestyle changes (Fieril et al., 2017; Goldstein et al., 2021; Knight-Agarwal et al., 2022; Warren et al., 2017).

Women also reported intervention components they found most useful. Personalised support, in the form of tailoring advice according to personal preferences, was key to success (Atkinson et al., 2016; Fieril et al., 2017; Goldstein et al., 2021; Jarman et al., 2019; Knight-Agarwal et al., 2022; Sandborg et al., 2021; Seward et al., 2018; Tzouma et al., 2021). The majority of participants valued

personal goal setting. Similarly, regular monitoring of health behaviours (such as diet and physical activity) was regarded positively by many (Goldstein et al., 2021; Seward et al., 2018; Warren et al., 2017).

Theme 2: Challenges faced by women

This theme comprises the sub-themes: i) personal and external barriers and ii) poor guidance. Women faced a range of personal and external barriers to effectively engaging in the interventions. Personal barriers included lack of understanding of the importance of healthy gestational weight management (Atkinson et al., 2013; Daley et al., 2015; Lee et al., 2012), anxiety about weight monitoring (Daley et al., 2015; de Jersey et al., 2019; Ferrey et al., 2021; Goldstein et al., 2021) and pregnancy-related symptoms (Ferrey et al., 2021; Goldstein et al., 2021; Lee et al., 2012; Sandborg et al., 2021; Sanders et al., 2020). In addition, some women regarded regular weight monitoring as emotionally distressing (Goldstein et al., 2021; Lawrence et al., 2020).

Practical external barriers included transport difficulties when attending sessions (Green et al., 2021; Lee et al., 2012) and lack of time (Fieril et al., 2017; Goldstein et al., 2021; Green et al., 2021; Greene et al., 2021; Kinser et al., 2019; Lee et al., 2012; Sandborg et al., 2021; Willcox et al., 2020). For instance, competing responsibilities related to work and childcare were reported, which contributed to a perceived lack of time (Sandborg et al., 2021).

Across seven studies that provided an overall measure of how helpful or useful interventions were, most women (a mean percentage of 72%) rated interventions or guidance as helpful or useful (Carolan-Olah et al., 2021; Coughlin et al., 2020; Ferrey et al., 2021; Goldstein et al., 2021; Greene et al., 2021; Halili et al., 2018; Knight-Agarwal et al., 2015). However, poor guidance was experienced.

Women reported a lack of clarity or consistency of information about ideal weight or lifestyle behaviours (Atkinson et al., 2013; Knight-Agarwal et al., 2022; Sanders et al., 2020). Others encountered a lack of clarity in guidance related to weight gain or nutrition (de Jersey et al., 2019; Sandborg et al., 2021). Similarly, some women were challenged by conflicting advice from friends or family (Fieril et al., 2017; Tzouma et al., 2021).

Relevance of guidance was also an issue. Women expressed frustration when receiving guidance that was not sufficiently tailored to their circumstances (Atkinson et al., 2013; Knight-Agarwal et al., 2015; Lee et al., 2012; Willcox et al., 2020). This was also apparent in quantitative data where across two studies that evaluated the personal relevance of interventions, a mean of 62% agreed that web-based interventions were tailored their needs (Carolan-Olah et al., 2021; Hayman et al., 2017).

Theme 3: Perceived benefits and recommendations for modifications

Sub-themes included: i) positive emotions, ii) shifts in knowledge and thinking, iii) physical benefits and iv) recommendations for modifications. Across the three studies that explored satisfaction most women (mean 70%) enjoyed interventions (Carolan-Olah et al., 2021; Greene et al., 2021; Haakstad et al., 2017). Positive emotions were evident when women described a sense of comfort or ease in engaging with interventions (Atkinson et al., 2016; Daley et al., 2015; Fieril et al., 2017; Greene et al., 2021). Women reported a sense of satisfaction when they were able to engage with intervention components. Various components of information delivery were positively received. Websites and weight tracking mobile applications were perceived as easy to use and helpful (Carolan-Olah et al., 2021; Coughlin et al., 2020). Women also described feelings of enjoyment when engaging in some

interventions, which were often derived from a sense of fun from physical activity (Green et al., 2021; Malmström et al., 2022). Women reported increased confidence (Atkinson et al., 2016; Warren et al., 2017) and motivation to manage their weight effectively across interventions that included counselling or individualised guidance (Atkinson et al., 2016; Fieril et al., 2017; Goldstein et al., 2021; Knight-Agarwal et al., 2022; Seward et al., 2018; Willcox et al., 2020), weight monitoring (Daley et al., 2015; Ferrey et al., 2021), exercise classes (Green et al., 2021; Kinser et al., 2019) and a mobile app (Knight-Agarwal et al., 2015; Sandborg et al., 2021). Motivation was invariably linked with the baby's health (Fieril et al., 2017; Goldstein et al., 2021; Green et al., 2021; Knight-Agarwal et al., 2022; Sanders et al., 2020; Seward et al., 2018). For instance, women expressed a desire to safeguard the health of their baby (Goldstein et al., 2021; Knight-Agarwal et al., 2022; Sanders et al., 2020; Seward et al., 2018) and were encouraged by the prospect of health benefits to their child (Fieril et al., 2017; Green et al., 2021).

There was also evidence of shifts in women's knowledge and thinking. Increased knowledge led to greater awareness of their diet and activity habits and the importance of healthy GWG (Atkinson et al., 2016; Ferrey et al., 2021; Fieril et al., 2017; Goldstein et al., 2021; Green et al., 2021; Halili et al., 2018; Lawrence et al., 2020; Sandborg et al., 2021; Sanders et al., 2020; Warren et al., 2017; Willcox et al., 2020). In particular, women valued the opportunity to reflect upon their lifestyle (Lawrence et al., 2020; Warren et al., 2017). Women also experienced greater levels of clarity about safe physical activities during pregnancy (Kinser et al., 2019; Malmström et al., 2022).

Physical benefits included enhanced energy as a result of increased physical activity. Results from two interventions indicated most participants (mean 65%) felt

an increase in energy for daily activities (Haakstad et al., 2017; Santos-Rocha et al., 2022).

When reflecting on their experiences of interventions, women proposed modifications. Thoughts about the benefits of group versus individual approaches were equivocal. Some researchers reported participants voiced a clear preference for group-based support from other pregnant women while others preferred individual appointments (Atkinson et al., 2013; Halili et al., 2018; Lee et al., 2012; Willcox et al., 2020). Other recommendations from women included the need for more partner inclusion (Atkinson et al., 2016; Sandborg et al., 2021; Tzouma et al., 2021), greater frequency and/or duration of support (Atkinson et al., 2016; Kinser et al., 2019; Sandborg et al., 2021; Willcox et al., 2020), advice tailored to different cultures or weight gain trajectories (Atkinson et al., 2016; Carolan-Olah et al., 2021; Halili et al., 2018; Knight-Agarwal et al., 2015) and a holistic approach that addresses the woman's wellbeing (Halili et al., 2018; Knight-Agarwal et al., 2015; Sandborg et al., 2021).

Discussion

This review included both quantitative and qualitative research and synthesised findings regarding women's experiences of interventions to prevent excessive GWG. Three themes were generated from the 29 included research studies: i) intervention qualities valued by women, ii) challenges faced by women and iii) perceived benefits and recommendations for modifications. Positive interpersonal interactions with practitioners were highly valued by women as was social support from both peers and family and friends. Challenges included lack of understanding, dislike of weight monitoring, issues of time and travel and poor guidance. Intervention benefits included increased confidence and motivation and

some enhancement in physical and mental health and wellbeing. Modifications should allow for the inclusion of partners, offer longer or more frequent support, be holistic and tailored to individual need.

Findings from this review extend knowledge from a previous review on interventions to prevent *further* weight gain in women who start their pregnancy being overweight or obese (Aung et al., 2022). Our focus was on women in all weight categories. We further extended breadth of understanding beyond a review of RCTs of women's experiences of weight and lifestyle interventions (Hamilton et al., 2018) by including both qualitative and quantitative appraisals. As with our review these authors conclude interventions, methods and outcomes were heterogenous, therefore transferability is limited. Our findings support the recommendations that interventions should be holistic and acceptable to women and their families (Hamilton et al., 2018). Researchers who conducted a systematic review and meta-synthesis of 92 studies reported women's perceptions or experiences of behaviour change in pregnancy related to dietary habits, exercise, smoking and alcohol consumption (Rockliffe et al., 2021). These authors provide valuable insights into barriers and facilitators to change. Specifically, women tended to be driven by a desire to be seen as a 'good' mother with behaviour being driven by securing good health for their baby and by societal and personal roles and expectations. The role of social influences was perceived as both a barrier and a facilitator and the need for provision of sound knowledge, understanding and advice is identified (Rockliffe et al., 2021). As with other reviews the need for a holistic approach is emphasised.

Pregnancy is an opportunity to secure health behaviour change (Olander et al., 2016; Olander et al., 2018). In our review a minority of papers explicitly indicated use of a theoretical underpinning. There is evidence that behaviour change

interventions are more effective when they are underpinned by psychological/behaviour change theory (Taylor et al., 2012; Webb et al., 2010) and tailored to the specific needs of the individual (Baker et al., 2015). Therefore, future intervention designers should consider a theory-based approach.

Strengths and Limitations

The review was conducted using a pre-specified methodology based upon the JBI approach to mixed-methods systematic reviews (Lizarondo et al., 2020). It was inclusive and comprehensive, integrating both qualitative and quantitative findings. Our search strategy and screening process were diligent and clearly described. However, as with all searches, it is possible we may not have captured all relevant research. All included papers were of reasonable quality. Although many interventions were similar, focusing on diet, weight and exercise, the heterogenous nature of study methods and evaluation processes may not make the results of this review generalizable to all populations. Whilst intentions to change behaviour are reported robust evidence of action is absent and needs to be further explored in future research.

Implications for Practice

Interventions to manage healthy GWG continue to proliferate. However, the evidence base remains poorly articulated. This review highlights several implications for practice. Firstly, it is important that weight management advice is current and comprehensive. For instance, recent researchers highlight the important role of sleep quality (Pauley et al., 2020; Pauley et al., 2022) in gestational weight management. As such, new scientific evidence should inform the support that women receive and strategies to promote sleep during pregnancy should be reviewed.

Secondly, interventions for patient-centred care should acknowledge individual needs such as specific food cravings and the promotion of safe exercise. Furthermore, practical concerns such as time and travel should be addressed through the inclusion of remote methods such as a mobile app in order to prevent barriers to engagement. It is also clear that holistic support is valued highly by women and may be achieved through partner inclusion and nurturing overall maternal health.

The importance of consistent advice underlines the value of shared understanding for women. Interventions should capitalise on this by including both women and health professionals within the design of local interventions (Walker et al., 2020). Indeed, interventions that are co-designed with end-users have the potential to be more useful in practice (Santin et al., 2019; Tsianakas et al., 2015).

Conclusion

In summary, women experienced several positive outcomes as a result of their engagement in interventions. These included social support, positive emotions and shifts in knowledge and thinking. However, a perceived lack of clarity in guidance and personal and external barriers were also reported. This highlights a need for interventions that are tailored to individual need in order to ensure that they are both acceptable and effective.

340 **Table 1**

341 *Summary of included papers*

First author (year) Country	Aim and participants	Research design	Intervention description	Findings/women's experiences	Quality appraisal
Atkinson (2013) UK	Investigate the views of women who had disengaged from a pregnancy weight management service. Pregnant and post-partum women (n=11)	Qualitative - semi-structured interviews	Maternal and Early Years Healthy Weight Service (MAEYS). Informed by focus groups with service users and a literature review. Healthy Weight Advisers in one-to-one sessions (n≤4) at home until 24 months post-partum. Diet/exercise behaviour change goals identified and reviewed, weight checked, support to access services and assorted materials provided.	Insufficient information (service and diet), lack of tailored support, preference for group-based support, belief that weight management should be prioritised after pregnancy, lack of communication about weight and barriers to engagement (e.g. motivation, family commitments).	9/10: positionality[a]
Atkinson (2016) UK	Evaluate service acceptability. Pregnant and post-partum women with obesity	Qualitative - semi-structured interviews	Described above (Atkinson et al., 2013).	Valued home based, individualised non-judgmental discussions, healthy eating guidance, goal setting to facilitate confidence and motivation. Need for more information, inclusion of partners and	10/10

First author (year) Country	Aim and participants	Research design	Intervention description	Findings/women's experiences	Quality appraisal
	women (n=20)			adaptation to different cultures.	
Carolan-Olah (2021) Australia	Assess intervention acceptability. Pregnant women (n=40)	Mixed-methods survey	Clinician developed website informed by Social Cognitive Theory to promote healthy weight gain, diet and exercise.	Valued easy to use, useful, trustworthy, enjoyable website which matched their needs. Some suggested a different layout, choice of languages and more detailed information.	6/6
Coughlin (2020) USA	Explore intervention acceptability. Post-partum women (n=11)	Quantitative survey	Healthy for Two/Healthy for You (H42/H4U). Coaching calls until 3 months post-partum. Included learning materials on exercise, diet and wellness. Encouraged to maintain social support and record diet, exercise and weight weekly.	Valued telephone coaching, ease of scheduling and app to self-monitor. Found learning activities less helpful.	6/6
Daley (2015) UK	Assess intervention feasibility and acceptability. Post-partum women (n=12)	Mixed-methods - RCT and semi-structured interviews	Midwife led, informed by self-regulation theory and relapse prevention model including encouragement, referral where needed, encouragement and self/clinician weight monitoring.	Experienced increased motivation to monitor diet and exercise, a sense of comfort in discussing weight. Perceived lack of impact and some anxiety about being weighted. Smaller increases in depression and anxiety compared with usual care.	RCT – 8/9: Groups not similar at baseline 7/10: Philosophical perspective[b], positionality and influence

First author (year) Country	Aim and participants	Research design	Intervention description	Findings/women's experiences	Quality appraisal
de Jersey (2019) Australia	Evaluate and explore views of the intervention. Pregnant women (n=291)	Mixed-methods survey	Adapted weight gain chart. Practitioner and self-monitoring.	Enjoyment and reassurance from self-monitoring. Mixed views on impact. A lack of consistency in midwives' use of the chart. Anxiety and self-consciousness about weight monitoring.	6/6
Ferrey (2021) UK	Understand intervention experience. Pregnant women (n=35)	Mixed methods - think-aloud recordings (n=25) and mixed-methods follow-up survey (n=10)	Self-Weighing in Pregnancy Experiences (SWIPE) informed by previous interventions. Provided with scales, weekly self-weight and audio recording thoughts and feelings.	More aware of feelings and enhanced motivation to plan. More guidance and support needed, feelings of dread and discomfort about self-weighing and negative feelings about body shape.	Recordings: 7/10: Philosophical perspective, positionality and influence Survey: 6/6
Fieril (2017) Sweden	Explore intervention experiences. Pregnant women with obesity (n=11)	Qualitative - unstructured interviews	Mighty Mums. Lifestyle counselling, dietician discussions, aquanatal classes, information on local exercise opportunities and provision of walking poles and pedometers.	Enhanced motivation, feelings of support reassurance, camaraderie, encouragement and acceptance and increased awareness of habits and agency. Lack of time to exercise and a need for more practical advice on diet.	10/10
Giacobbi (2021) USA	Assess views on intervention.	Qualitative - semi-structured interviews	PregPal: mobile health application informed by a cognitive-motivational framework. Five-week	Positive experiences but some uncertainty of the efficacy of guided imagery. Audio file to encourage	6/10: Philosophical perspective, positionality,

First author (year) Country	Aim and participants	Research design	Intervention description	Findings/women's experiences	Quality appraisal
	Pregnant women (n=42)		programme. Content on exercise, sleep, food cravings, body image and relaxation.	healthy eating was the least preferred intervention component.	influence and data analysis not transparent
Goldstein (2021) Australia	Explore intervention experiences Pregnant women (n=54)	Mixed methods - quantitative questionnaire (n=40) and semi-structured interviews (n=14)	Healthy Pregnancy Service. A "co-designed" service integrating Healthy Lifestyle in Pregnancy intervention (HeLP-her) and SCT. Five one-to-one practitioner led coaching sessions on diet, exercise, weight with goal setting and problem-solving.	Valued rapport, supported autonomy and tailored advice. Experienced enhanced awareness, motivation and self-efficacy intention to maintain changes post-partum. Some anxiety about weight monitoring and judgements from staff. Experienced barriers to adopting advice.	Survey: 6/6 Interviews: 9/10: Philosophical perspective
Green (2021) USA	Understand intervention experiences. Pregnant women. (n=13)	Qualitative - semi-structured interviews	Instructor led yoga classes once or twice a week for 12 weeks.	Enjoyed yoga, enhanced awareness of body, weight gain and diet. Enhanced motivation and peer support. Difficulty in performing some exercises and logistical issues in attending.	8/10: Philosophical perspective and positionality
Greene (2021) Ireland	Explore intervention acceptability Pregnant	Mixed methods - quantitative survey (n=123) and semi-structured interviews (n=28)	Pregnancy, exercise and nutrition research study (PEARS). Underpinned by Control Theory and Capability, Opportunity,	Satisfaction with app content, and credibility, sense of ease in adopting diet and exercise advice. Some barriers to adopting	Survey: 6/6 Interviews: 7/10: Philosophical perspective,

First author (year) Country	Aim and participants	Research design	Intervention description	Findings/women's experiences	Quality appraisal
	women (n=151)		Motivation and Behaviour (COM-B) model. Practitioner led education session, diet and exercise app use, e-mails and follow-up visits.	advice including time and finances.	positionality and influence
Haakstad (2017) Norway	Explore intervention experiences. Post-partum women (n=197)	Quantitative survey	Norwegian Fit for Delivery. Diet counselling, exercise classes and information.	Satisfaction with instructors, enjoyment, increased energy and motivation. Desire for an alternative training time.	5/5
Halili (2018) Canada	Explore intervention perspectives. Pregnant and postpartum women (n=30)	Mixed-methods - quantitative survey (n=17) and two focus groups (n=13)	SmartMoms Canada. Mobile app based on an earlier version. Individualised diet lifestyle support and provision of scales and Fitbit.	Guidance useful and informative and enhanced awareness exercise. Technical and aesthetic issues, mixed views about daily weighing, need for more interactivity, personalised content, peer support and feedback.	Survey: 6/6 Focus groups: 8/10: Philosophical perspective and positionality
Hayman (2017) Australia	Assess intervention acceptability. Pregnant women. (n=39)	Quantitative survey	Fit4Two. Informed by SCT. Web-based exercise intervention. Modules included setting SMART goals, developing social support networks and overcoming barriers to	Valued usability, credibility of website and personalised content. Desire to continue using the website and a need for actual exercise plans.	6/6

First author (year) Country	Aim and participants	Research design	Intervention description	Findings/women's experiences	Quality appraisal
			exercise. Accelerometers provided.		
Jarman (2019) Canada	Explore intervention acceptability. Post-partum women (n=53)	Mixed methods - quantitative survey (n=50) and focus group (n=3)	Dietician led counselling underpinned by Healthy Conversation Skills (HCS) and Behaviour Chance Techniques (BCTs). Five visits or telephone calls, with goal setting and reviews.	Valued personalised support.	Survey 6/6 Focus group: 7/10: Philosophical perspective, positionality and data analysis not transparent
Kinser (2019) USA	Explore intervention experiences post-partum women (n=14)	Mixed-methods - focus groups (n=8) and quantitative survey (n=6)	CenteringPregnancy Care Plus Yoga (CPC+Y). Meeting followed by yoga session.	Greater clarity about safe exercise, enhanced motivation to exercise and convenience. Preference for longer classes and conflict with existing schedule for some.	Focus groups: 8/10: Philosophical perspective and positionality Survey: 6/6
Knight-Agarwal (2015) Australia	Acceptability test intervention. Pregnant women (n=10)	Mixed-methods - mixed-methods survey (n=10), focus groups (n=9) and semi-structured interview (n=1)	Eating4Two app. A GWG calculator and daily weight tracker, dietary guidance and feedback based upon BMI. Mobile phone provided.	Enhanced motivation and communication with providers. Differences in perceived usability and included information. More personal feedback required.	Survey: 6/6 Focus groups and interview: 7/10: Philosophical perspective, positionality and influence
Knight-Agarwal	Explore views on intervention.	Qualitative - semi-structured interviews	Dietician led Specialist Antenatal Nutrition (SAN) clinic based on Motivational	Valued non-judgemental approach and personalised advice. Conflict between	9/10: Positionality

First author (year) Country	Aim and participants	Research design	Intervention description	Findings/women's experiences	Quality appraisal
(2022) Australia	Pregnant women with obesity (n=8)		Interviewing. Education on diet and emotional determinants of eating.	dietician's advice and cultural norms and some information included was already known.	
Lawrence (2020) UK	Explore intervention acceptability. Pregnant women (n=20)	Qualitative - semi-structured interviews	Counselling underpinned by HCS - see above (Jarman et al., 2019). Midwife and nurse led.	Greater awareness of health behaviours and perception of support in planning lifestyle changes. Some feelings of judgement and surveillance.	10/10
Lee (2012) Australia	Assess intervention acceptability. Post-partum women (n=37)	Mixed-methods telephone survey	Maternal Weight Management (MWM) programme. Dietician appointments and three group exercise classes plus newsletters.	Valued encouragement and support. Experienced barriers to attendance, a lack of culturally and individually tailored practical advice. Preferred individual compared with group-based sessions.	6/6
Malmström (2022) Sweden	Explore intervention experiences. Post-partum women (n=4)	Qualitative - semi-structured interviews	Dancing for birth, a 12-week group based antenatal education and dance class programme.	Experience of acceptance, shared understanding, social support, enjoyment, happiness, greater clarity about how to exercise and open communication.	9/10: Philosophical perspective
Sandborg (2021) Sweden	Explore intervention experiences. Pregnant	Qualitative - semi-structured interviews	HealthyMoms app. Informed by SCT and BCTs. Six-month diet and exercise and weight monitoring programme.	Greater motivation, knowledge, trust and high levels of engagement. Frustration with goal setting	9/10: Philosophical perspective

First author (year) Country	Aim and participants	Research design	Intervention description	Findings/women's experiences	Quality appraisal
	women (n=19)			and monitoring, practical barriers to engagement, contradictory advice.	
Sanders (2020) UK	Understand intervention experiences. Pregnant and post-partum women (n=15)	Qualitative - semi-structured interviews	Women were provided with an individualised weekly weight chart and bathroom scales. Chart reviewed at each antenatal visit.	Increased awareness and monitoring of weight. Perceptions of midwife reluctance to advise.	8/10: Philosophical perspective and positionality
Santos-Rocha (2022) Portugal	Explore intervention feasibility. Pregnant women (n=29)	Quantitative survey	Active Pregnancy. Twelve group exercise sessions over one month, a nutritional plan, pedometer, fitness assessments to establish progress and online link to group and further resources.	Satisfied with the exercise professional, improvement in physical fitness, less stress and more energy for daily activities.	6/6
Seward (2018) USA	Assess intervention acceptability. Pregnant women with obesity or classed as overweight (n=44)	Mixed methods - semi-structured interviews (n=18) and quantitative survey (n=26)	Health coaching informed by principles of MI, SCT, health belief model and protection motivation theory. Telephone calls 2-3 weekly with emails and texts to provide weight management support, goal setting and monitoring.	Valued feeling accountable due to monitoring and rapport with health coach. Need for further resources.	Interviews: 8/10: Philosophical perspective and data analysis not transparent Survey: 6/6

First author (year) Country	Aim and participants	Research design	Intervention description	Findings/women's experiences	Quality appraisal
Tzouma (2021) Greece	Assess intervention experiences. Postpartum women (n=8)	Qualitative - semi-structured interviews	Exercise Counselling (EC) underpinned by the Transtheoretical Model of Change and SCT. Two face-to-face sessions, six tailored telephone calls and an accelerometer were provided.	Valued the physical and psychological benefits of exercise. Friends/family discouraged engagement and a preference for partner involvement.	9/10: Philosophical perspective
Warren (2017) UK	Explore intervention feasibility and acceptability. Pregnant women. (n=20)	Qualitative - semi-structured interviews	Eat Well Keep Active - based upon Self-Determination Theory (SDT) delivered over six weeks. Included counselling based on Motivational Interviewing, goal setting, a follow-up telephone call.	Valued goal setting and prompts to re-assess diet and exercise. Resulted in feelings of confidence, safety, accomplishment and autonomy.	8/10: positionality and influence
Willcox (2020) Australia	Explore intervention experiences. Pregnant women (n=9)	Qualitative - semi-structured interviews	Pregnancy Lifestyle Activity and Nutrition (PLAN) intervention. 12-week BCT based programme including self-monitoring, goal setting, advice on diet and exercise and access to a web-based app, accelerometer and food diary.	Valued support and encouragement, weight tracker and goal setting. Reported increased motivation, enhanced awareness of healthy lifestyle and comfort and familiarity with mode of delivery. Some frustration with the quantity of information and inability to relate this to personal circumstances, technical	9/10: Philosophical perspective

First author (year) Country	Aim and participants	Research design	Intervention description	Findings/women's experiences	Quality appraisal
				problems and barriers to adopting advice. Need for more practical information, more flexibility in goals and different modes of delivery.	

[a] A statement of positionality includes the influence of the researcher's experiences and perspectives on the research.

[b] This refers to the interpretive frameworks that guide the researcher's assumptions about the nature of reality and knowledge.

Figure Legends

Figure 1: Search terms used across databases

Figure 2: PRISMA 2020 flow diagram of the study selection and screening process

Figure 3: Illustration of themes and sub-themes

References

Atkinson, L., Olander, E. K., & French, D. P. (2013). Why don't many obese pregnant and post-natal women engage with a weight management service? *Journal of Reproductive and Infant Psychology*, *31*(3), 245-256. https://doi.org/10.1080/02646838.2013.809518

Atkinson, L., Olander, E. K., & French, D. P. (2016). Acceptability of a weight management intervention for pregnant and postpartum women with BMI >/=30 kg/m2: A qualitative evaluation of an individualized, home-based service. *Maternal and Child Health Journal*, *20*(1), 88-96. https://doi.org/10.1007/s10995-015-1806-y

Aung, W., Saw, L., & Sweet, L. (2022). An integrative review of interventions for limiting gestational weight gain in pregnant women who are overweight or obese. *Women and Birth*, *35*(2), 108-126. https://doi.org/10.1016/j.wombi.2021.04.009

Baker, R., Camosso-Stefinovic, J., Gillies, C., Shaw, E. J., Cheater, F., Flottorp, S., RobertsoFin, N., Wensing, M., Fiander, M., Eccles, M. P., Godycki-Cwirko, M., Lieshout, J. V., & Jager, C. (2015). Tailored interventions to address determinants of practice. *Cochrane Database of Systematic Reviews*, *4*(4), CD005470-CD005470. https://doi.org/10.1002/14651858.CD005470.pub3

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, *11*(4), 589-597. https://doi.org/10.1080/2159676X.2019.1628806

Carolan-Olah, M., Vasilevski, V., Nagle, C., & Stepto, N. (2021). Overview of a new ehealth intervention to promote healthy eating and exercise in pregnancy:

Initial user responses and acceptability. *Internet Interventions*, *25*(100393), 1-9. https://doi.org/10.1016/j.invent.2021.100393

Clarke, V., Braun, V., & Hayfield, N. (2015). Thematic analysis. In J. A. Smith (Ed.), *Qualitative psychology: A practical guide to research methods* (Vol. 222, pp. 222-248). SAGE Publications.

Coughlin, J. W., Martin, L. M., Henderson, J., Dalcin, A. T., Fountain, J., Wang, N. Y., Appel, L. J., Clark, J. M., & Bennett, W. (2020). Feasibility and acceptability of a remotely-delivered behavioural health coaching intervention to limit gestational weight gain. *Obesity Science and Practice*, *6*(5), 484-493. https://doi.org/10.1002/osp4.438

Daley, A. J., Jolly, K., Jebb, S. A., Lewis, A. L., Clifford, S., Roalfe, A. K., Kenyon, S., & Aveyard, P. (2015). Feasibility and acceptability of regular weighing, setting weight gain limits and providing feedback by community midwives to prevent excess weight gain during pregnancy: Randomised controlled trial and qualitative study. *BMC Obesity*, *2*(35), 1-15. https://doi.org/10.1186/s40608-015-0061-5

de Jersey, S., Guthrie, T., Tyler, J., Ling, W. Y., Powlesland, H., Byrne, C., & New, K. (2019). A mixed method study evaluating the integration of pregnancy weight gain charts into antenatal care. *Maternal & Child Nutrition*, *15*(3), 1-11. https://doi.org/10.1111/mcn.12750

Ferrey, A. E., Astbury, N. M., Kenworthy, Y., Mackillop, L., Frie, K., & Jebb, S. A. (2021). Exploring women's thoughts on self-weighing during pregnancy: Results of the self-weighing in pregnancy: Experiences (SWIPE) study. *BMC Pregnancy Childbirth*, *21*(154), 1-9. https://doi.org/10.1186/s12884-021-03636-5

Fieril, D. P., Olsen, P. F., Glantz, D., & Premberg, D. A. (2017). Experiences of a lifestyle intervention in obese pregnant women - a qualitative study. *Midwifery*, *44*, 1-6. https://doi.org/10.1016/j.midw.2016.10.011

Giacobbi, P., Jr., Symons Downs, D., Haggerty, T., Pidhorskyi, S., Long, D. L., Clemmer, M., Steinman, S. A., Olfert, M. D., Kinnamon, K., Rao, N., Staggs, H., & Adjeroh, D. (2021). Feasibility and acceptability of guided imagery to sequentially address multiple health behaviors during pregnancy. *Journal of Midwifery & Womens Health*, *66*(5), 664-670. https://doi.org/10.1111/jmwh.13251

Goldstein, R. F., Boyle, J. A., Lo, C., Teede, H. J., & Harrison, C. L. (2021). Facilitators and barriers to behaviour change within a lifestyle program for women with obesity to prevent excess gestational weight gain: A mixed methods evaluation. *BMC Pregnancy Childbirth*, *21*(1), 1-16. https://doi.org/10.1186/s12884-021-04034-7

Green, J., James, D., Larkey, L., Leiferman, J., Buman, M., Oh, C., & Huberty, J. (2021). A qualitative investigation of a prenatal yoga intervention to prevent excessive gestational weight gain: A thematic analysis of interviews. *Complementary Therapies in Clinical Practice*, *44*(10414), 1-7. https://doi.org/10.1016/j.ctcp.2021.101414

Greene, E. M., O'Brien, E. C., Kennelly, M. A., O'Brien, O. A., Lindsay, K. L., & McAuliffe, F. M. (2021). Acceptability of the pregnancy, exercise, and nutrition research study with smartphone app support (PEARS) and the use of mobile health in a mixed lifestyle intervention by pregnant obese and overweight women: Secondary analysis of a randomized controlled trial. *JMIR MHealth and UHealth*, *9*(5), 1-17. https://doi.org/10.2196/17189

Haakstad, L. A., Sanda, B., Vistad, I., Sagedal, L. R., Seiler, H. L., & Torstveit, M. K. (2017). Evaluation of implementing a community-based exercise intervention during pregnancy. *Midwifery*, *46*, 45-51. https://doi.org/10.1016/j.midw.2017.01.010

Halili, L., Liu, R., Hutchinson, K. A., Semeniuk, K., Redman, L. M., & Adamo, K. B. (2018). Development and pilot evaluation of a pregnancy-specific mobile health tool: A qualitative investigation of SmartMoms Canada. *BMC Medical Informatics and Decision Making*, *18*(1), 1-11. https://doi.org/10.1186/s12911-018-0705-8

Hamilton, E. A. A., Nowell, A. K., Harden, A., & Thangaratinam, S. (2018). Conduct and reporting of acceptability, attitudes, beliefs and experiences of pregnant women in randomised trials on diet and lifestyle interventions: A systematic review. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, *225*, 243-254. https://doi.org/10.1016/j.ejogrb.2018.05.008

Hayman, M., Reaburn, P., Browne, M., Vandelanotte, C., Alley, S., & Short, C. E. (2017). Feasibility, acceptability and efficacy of a web-based computer-tailored physical activity intervention for pregnant women - the fit4two randomised controlled trial. *BMC Pregnancy Childbirth*, *17*(1), 1-10. https://doi.org/10.1186/s12884-017-1277-9

Hutchins, F., El Khoudary, S. R., Catov, J., Krafty, R., Colvin, A., Barinas-Mitchell, E., & Brooks, M. M. (2022). Excessive gestational weight gain and long-term maternal cardiovascular risk profile: The study of women's health across the nation. *Journal of Women's Health, 31*(6), 808-818. https://doi.org/10.1089/jwh.2021.0449

Institute of Medicine. (2009). *Weight gain during pregnancy: Reexamining the guidelines*. http://nationalacademies.org/hmd/~/media/Files/Report%20Files/2009/Weight-Gain-During-Pregnancy-Reexamining-the-Guidelines/Report%20Brief%20-%20Weight%20Gain%20During%20Pregnancy.pdf

Jarman, M., Adam, L., Lawrence, W., Barker, M., Bell, R. C., & the ENRICH team. (2019). Healthy conversation skills as an intervention to support healthy gestational weight gain: Experience and perceptions from intervention deliverers and participants. *Patient Education and Counseling*, *102*(5), 924-931. https://doi.org/10.1016/j.pec.2018.12.024

Johnson, J., Clifton, R. G., Roberts, J. M., Myatt, L., Hauth, J. C., Spong, C. Y., Varner, M. W., Wapner, R. J., Thorp, J. M., Jr., Mercer, B. M., Peaceman, A. M., Ramin, S. M., Samuels, P., Sciscione, A., Harper, M., Tolosa, J. E., Saade, G., & Sorokin, Y. (2013). Pregnancy outcomes with weight gain above or below the 2009 institute of medicine guidelines. *Obstetrics & Gynecology*, *121*(5), 969-975. https://doi.org/10.1097/AOG.0b013e31828aea03

Kinser, P., Jallo, N., Thacker, L., Aubry, C., & Masho, S. (2019). Enhancing accessibility of physical activity during pregnancy: A pilot study on women's experiences with integrating yoga into group prenatal care. *Health Services Research and Managerial Epidemiology*, *6*, 1-5. https://doi.org/10.1177/2333392819834886

Knight-Agarwal, C., Davis, D. L., Williams, L., Davey, R., Cox, R., & Clarke, A. (2015). Development and pilot testing of the eating4two mobile phone app to monitor gestational weight gain. *JMIR Mhealth Uhealth*, *3*(2), 1-11. https://doi.org/10.2196/mhealth.4071

Knight-Agarwal, C. R., Brewer, K., Minehan, M., Jani, R., Parker, A., Kaur, G., Alkinani, B., & Golley, P. (2022). Evaluation of a specialist antenatal nutrition clinic for women with a body mass index ≥ 40kg/m2: A qualitative study. *Midwifery*, *109*(103315), 1-6. https://doi.org/10.1016/j.midw.2022.103315

Lan, X., Zhang, Y. Q., Dong, H. L., Zhang, J., Zhou, F. M., Bao, Y. H., Zhao, R. P., Cai, C. J., Bai, D., Pang, X. X., & Zeng, G. (2020). Excessive gestational weight gain in the first trimester is associated with risk of gestational diabetes mellitus: a prospective study from Southwest China. Public Health Nutrition, 23(3), 394-401. https://doi.org/10.1017/S1368980019003513

Lawrence, W., Vogel, C., Strömmer, S., Morris, T., Treadgold, B., Watson, D., Hart, K., McGill, K., Hammond, J., Harvey, N. C., Cooper, C., Inskip, H., Baird, J., & Barker, M. (2020). How can we best use opportunities provided by routine maternity care to engage women in improving their diets and health? *Maternal & Child Nutrition*, *16*(e12900), 1-14. https://doi.org/10.1111/mcn.12900

Lee, A., Karpavicius, J., Gasparini, E., & Forster, D. (2012). Implementing a diet and exercise program for limiting maternal weight gain in obese pregnant women: A pilot study. *Australian and New Zealand Journal of Obstetrics and Gynaecology*, *52*(5), 427-432. https://doi.org/10.1111/j.1479-828X.2012.01436.x

Linne, Y., Dye, L., Barkeling, B., & Rossner, S. (2004). Long-term weight development in women: A 15-year follow-up of the effects of pregnancy. *Obesity Research*, *12*(7), 1166-1178. https://doi.org/10.1038/oby.2004.146

Lizarondo, L., Stern, C., Carrier, J., Godfrey, C., Rieger, K., Salmond, S., Apostolo, J., Kirkpatrick, P., & Loveday, H. (2020). *Chapter 8: Mixed methods systematic reviews*. JBI. https://jbi-global-

wiki.refined.site/space/MANUAL/4687380/Chapter+8%3A+Mixed+methods+systematic+reviews

Macdonald-Wallis, C., Tilling, K., Fraser, A., Nelson, S. M., & Lawlor, D. A. (2013). Gestational weight gain as a risk factor for hypertensive disorders of pregnancy. *American Journal of Obstetrics and Gynecology*, *209*(4), 1-34. https://doi.org/10.1016/j.ajog.2013.05.042

Malmström, N., Lydell, M., & Carlsson, I. M. (2022). "Womanhood," a shared experience of participating in a lifestyle intervention with a focus on integration and physical activity to promote health among pregnant women: Perspectives from pregnant women, midwives, and cultural interpreter doulas. *International Journal of Qualitative Studies on Health and Well-being*, *17*(1), 1-13. https://doi.org/10.1080/17482631.2022.2043527

Moola, S., Munn, Z., Tufanaru, C., Aromataris, E., Sears, K., Sfetcu, R., Currie, M., Qureshi, R., Mattis, P., Lisy, K., & Mu, P.-F. (2017). Chapter 7: Systematic reviews of etiology and risk. In E. Aromataris & Z. Munn (Eds.), *Joanna Briggs Institute Reviewer's Manual*. https://reviewersmanual.joannabriggs.org/

Olander, E. K., Darwin, Z. J., Atkinson, L., Smith, D. M., & Gardner, B. (2016). Beyond the 'teachable moment' – a conceptual analysis of women's perinatal behaviour change. *Women and Birth : Journal of the Australian College of Midwives*, *29*(3), e67-e71. https://doi.org/10.1016/j.wombi.2015.11.005

Olander, E. K., Smith, D. M., & Darwin, Z. (2018). Health behaviour and pregnancy: A time for change. *Journal of Reproductive and Infant Psychology*, *36*(1), 1-3. https://doi.org/10.1080/02646838.2018.1408965

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R.,

542 Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E.
543 W., Mayo-Wilson, E., McDonald, S., …, Moher, D. (2021). The PRISMA 2020
544 statement: An updated guideline for reporting systematic reviews. *British*
545 *Medical Journal*, *372*(n71), 1-9 https://doi.org/10.1136/bmj.n71
546 Pauley, A. M., Hohman, E. E., Leonard, K. S., Guo, P., McNitt, K. M., Rivera, D. E.,
547 Savage, J. S., & Downs, D. S. (2020). Short nighttime sleep duration and high
548 number of nighttime awakenings explain increases in gestational weight gain
549 and decreases in physical activity but not energy intake among pregnant
550 women with overweight/obesity. *Clocks & Sleep*, *2*(4), 487-501.
551 https://doi.org/10.3390/clockssleep2040036
552 Pauley, A. M., Moore, G. A., Mama, S. K., Molenaar, P., & Downs, D. S. (2022).
553 Systematic review of the associations between prenatal sleep behaviours and
554 components of energy balance for regulating weight gain. *Journal of Sleep*
555 *Research*, *e13619*, 1-11. https://doi.org/10.1111/jsr.13619
556 Peng, Y., Han, N., Su, T., Zhou, S., Bao, H., Ji, Y., Luo, S., Liu, J., & Wang, H.-J.
557 (2021). Gestational weight gain and the risk of gestational diabetes mellitus: A
558 latent class trajectory analysis using birth cohort data. *Diabetes Research and*
559 *Clinical Practice, 182*(109130), 1-10.
560 https://doi.org/10.1016/j.diabres.2021.109130
561 Phelan, S. (2010). Pregnancy: a "teachable moment" for weight control and obesity
562 prevention. *American Journal of Obstetrics and Gynecology*, *202*(2), 1-16.
563 Reis, M. O., Maia de Sousa, T., Oliveira, M. N. S., Maioli, T. U., & Dos Santos, L. C.
564 (2019). Factors associated with excessive gestational weight gain among
565 Brazilian mothers. *Breastfeeding Medicine*, *14*(3), 159-164.
566 https://doi.org/10.1089/bfm.2018.0234

Rockliffe, L., Peters, S., Heazell, A. E. P., & Smith, D. M. (2021). Factors influencing health behaviour change during pregnancy: A systematic review and meta-synthesis. *Health Psychology Review*, *15*(4), 613-632. https://doi.org/10.1080/17437199.2021.1938632

Sandborg, J., Henriksson, P., Larsen, E., Lindqvist, A. K., Rutberg, S., Soderstrom, E., Maddison, R., & Lof, M. (2021). Participants' engagement and satisfaction with a smartphone app intended to support healthy weight gain, diet, and physical activity during pregnancy: Qualitative study within the HealthyMoms trial. *JMIR Mhealth Uhealth*, *9*(3), 1-10. https://doi.org/10.2196/26159

Sanders, J., Channon, S., Cannings-John, R., Coulman, E., Hunter, B., Paranjothy, S., Warren, L., Drew, C., & Phillips, B. (2020). Pregnancy and weight monitoring: A feasibility study of weight charts and midwife support. *Maternal & Child Nutrition*, *16*(4), 1-10. https://doi.org/10.1111/mcn.12996

Santin, O., McShane, T., Hudson, P., & Prue, G. (2019). Using a six-step co-design model to develop and test a peer-led web-based resource (PLWR) to support informal carers of cancer patients. *Psycho-oncology*, *28*(3), 518-524. https://doi.org/10.1002/pon.4969

Santos-Rocha, R., Fernandes de Carvalho, M., Prior de Freitas, J., Wegrzyk, J., & Szumilewicz, A. (2022). Active pregnancy: A physical exercise program promoting fitness and health during pregnancy-development and validation of a complex intervention. *International Journal of Environmental Research and Public Health*, *19*(8), 1-19. https://doi.org/10.3390/ijerph19084902

Seward, M. W., Simon, D., Richardson, M., Oken, E., Gillman, M. W., & Hivert, M. F. (2018). Supporting healthful lifestyles during pregnancy: A health coach

591 intervention pilot study. *BMC Pregnancy and Childbirth*, *18*(1), 1-11.
592 https://doi.org/10.1186/s12884-018-2010-z
593 Taylor, N., Conner, M., & Lawton, R. (2012). The impact of theory on the
594 effectiveness of worksite physical activity interventions: A meta-analysis and
595 meta-regression. *Health Psychology Review*, *6*(1), 33-73.
596 https://doi.org/10.1080/17437199.2010.533441
597 Tsianakas, V., Robert, G., Richardson, A., Verity, R., Oakley, C., Murrells, T., Flynn,
598 M., & Ream, E. (2015). Enhancing the experience of carers in the
599 chemotherapy outpatient setting: An exploratory randomised controlled trial to
600 test impact, acceptability and feasibility of a complex intervention co-designed
601 by carers and staff. *Supportive Care in Cancer, 23*(10), 3069-3080.
602 https://doi.org/10.1007/s00520-015-2677-x
603 Tzouma, N. A., Morres, I. D., Goudas, M., Krommidas, C., Kotronis, K. V.,
604 Papaioannou, A., Theodorakis, Y., & Comoutos, N. (2021). Women's views
605 and experiences of a perinatal exercise counselling intervention: A qualitative
606 study. *International Journal of Sport and Exercise Psychology*, 1-20.
607 https://doi.org/10.1080/1612197x.2021.2019297
608 Walker, R., Morris, H., Lang, S., Hampton, K., Boyle, J., & Skouteris, H. (2020). Co-
609 designing preconception and pregnancy care for healthy maternal lifestyles
610 and obesity prevention. *Women and Birth*, *33*(5), 473-478.
611 https://doi.org/10.1016/j.wombi.2019.11.005
612 Wan, N., Cai, L., Tan, W., Zhang, T., Yang, J., & Chen, Y. (2018). Associations of
613 gestational weight gain with offspring thinness and obesity: By prepregnancy
614 body mass index. *Reproductive Health*, *15*(149), 1-10.
615 https://doi.org/10.1186/s12978-018-0585-5

Warren, L., Rance, J., & Hunter, B. (2017). Eat well keep active: Qualitative findings from a feasibility and acceptability study of a brief midwife led intervention to facilitate healthful dietary and physical activity behaviours in pregnant women. *Midwifery*, *49*, 117-123. https://doi.org/10.1016/j.midw.2016.12.002

Webb, T. L., Joseph, J., Yardley, L., & Michie, S. (2010). Using the internet to promote health behavior change: A systematic review and meta-analysis of the impact of theoretical basis, use of behavior change techniques, and mode of delivery on efficacy. *Journal of Medical Internet Research*, *12*(1), 1-18. https://doi.org/10.2196/jmir.1376

Willcox, J. C., Chai, D., Beilin, L. J., Prescott, S. L., Silva, D., Neppe, C., & Huang, R. C. (2020). Evaluating engagement in a digital and dietetic intervention promoting healthy weight gain in pregnancy: Mixed methods study. *Journal of Medical Internet Research*, *22*(6), 1-11. https://doi.org/10.2196/17845

Yeo, S., Walker, J. S., Caughey, M. C., Ferraro, A. M., & Asafu-Adjei, J. K. (2017). What characteristics of nutrition and physical activity interventions are key to effectively reducing weight gain in obese or overweight pregnant women? A systematic review and meta-analysis. *Obesity Reviews*, *18*(4), 385-399. https://doi.org/10.1111/obr.12511