Behavioural interventions for weight management in pregnancy: a systematic review of quantitative and qualitative data
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CRD summary
The authors of this review concluded that interventions to prevent excessive weight gain during pregnancy showed no clear evidence of effect or lack of effect. Further research to explore the types of interventions that might be effective was needed. This is a well conducted review and the conclusion and recommendations for research should be considered reliable and appropriate.

Authors' objectives
To assess the effectiveness of behavioural interventions to prevent excessive weight gain in pregnancy and to explore the factors that influence intervention effectiveness.

Searching
Eleven databases were searched and the reference lists of relevant review articles and included papers were also searched for both published and unpublished studies. Searches were conducted in early December 2008 and updated in January 2010. Searches were limited by year (1990 to 2010) to reflect the Institute of Medicine's introduction of the concept. Details of the search strategy were provided in the report. Experts in the field were contacted for any additional studies.

Study selection
Both quantitative and qualitative studies were eligible for this review. Quantitative studies needed to be randomised controlled trials (RCTs) published in English that explored the effectiveness of interventions to prevent excessive weight gain during pregnancy. Eligible trials could be conducted in any country in the Organisation for Economic co-operation and Development. Participants were women aged eighteen years or over either planning a pregnancy or who were pregnant and considered normal weight, overweight or obese. Trials were excluded if women had underlying medical conditions, were pregnant with twins or if women were underweight. Trials that evaluated any dietary intervention with or without additional advice or support for physical activity were included. Eligible trials needed to report weight-related outcomes, dietary and physical activity outcomes or outcomes related to the pregnancy, birth or the infant. Qualitative studies needed to explore the beliefs and perceptions about diet, physical activity and weight management in pregnancy and have been conducted in the UK.

The overall mean age of the participants across the trials was 27.2 years. The mean pre-pregnancy BMI of participants in the included studies ranged from 22.6 to 34.7 kg/m². Two of five trials recruited only obese women. Women were enrolled at a mean gestational age that ranged from 9.8 weeks to 15.5 weeks. Differences in ethnic profile were also noted across the studies. Interventions were multi-component and most included both a dietary and a physical activity component. In all of the trials the intervention was delivered by a health professional with expertise in nutrition/psychology or public health. Sessions ranged from one meeting with a dietician to ten consultations of one hour duration. All of the trials compared the intervention to usual or standard antenatal care. Pre-pregnancy weight was based on self-report and final weights were based on final weight before delivery or on the day of delivery.

Search results were screened by one reviewer and all excluded references were checked by a second reviewer. Full papers were obtained where necessary. Disagreements over the inclusion of studies were resolved through discussion.

Assessment of study quality
Study quality was assessed using the Cochrane Collaboration's tool for assessing risk of bias. This assesses six domains: sequence generation; allocation concealment; baseline comparability; intention-to-treat analysis; loss to follow-up; and selective outcome reporting. Blinding was only judged to be appropriate for outcome assessor in this review. Qualitative studies were assessed using NICE's assessment tool covering 14 assessment criteria aimed at assessing the extent to which study findings were an accurate representation of participants' perspectives and experiences. Further details were provided in the paper. Qualitative studies were then sorted into high quality (those meeting 12 or more criteria) and low
quality (those meeting fewer than nine criteria).

Quality was assessed by two reviewers.

**Data extraction**

Separate data extraction forms were developed for the quantitative and qualitative studies. Data were independently extracted from included trials by two researchers to enable the presentation of mean differences and 95% confidence intervals (CI).

Each qualitative study was repeatedly read and appraised taking account of the influence of different methodologies by two researchers who resolved differences by discussion.

**Methods of synthesis**

Data synthesis was conducted in three stages according to published frameworks. Where appropriate, trials were pooled in a meta-analysis to assess the effectiveness of the interventions. The standardised mean difference (SMD) was used to estimate the pooled mean difference in weight gained between intervention and control groups using a random-effects model. Statistical heterogeneity between trials was assessed using $\chi^2$ and $I^2$. Sensitivity analyses were undertaken without poor quality trials. Subgroup analyses were conducted grouping trials into pre-specified categories. A thematic synthesis of the findings from qualitative studies was undertaken which involved coding studies line by line, identifying common themes and supporting quotes from the included studies and drawing out implications for appropriate interventions suggested by each theme. This abstract focused on the results presented in the trials.

**Results of the review**

Thirteen studies (five RCTs, eight qualitative studies) were included in the review. The five RCTs had a total of 577 participants (range 52 to 195). Three trials had adequate randomisation but only one had adequate allocation concealment. None had blinding of outcome assessors. The proportion of participants not included in the analysis due to withdrawal or exclusion ranged from 8.3% to 34.6%.

In meta-analysis, which assessed 390 participants in the five trials, there was no difference between intervention and control in reducing gestational weight gain (SMD -0.28, 95% CI: -0.64 to 0.09). There was substantial statistical heterogeneity in this analysis ($I^2=67\%$, $p=0.02$). Subgroup and sensitivity analyses did not identify contextual elements that influenced the effectiveness of the intervention. Two trials with adequate sequence generation showed that the intervention group gained significantly less weight than the control group (-4.71kg, 95% CI: -8.11 to -1.91) with significant heterogeneity ($I^2=58\%$, $p=0.007$). More details of analyses were given in the report.

Results of the eight qualitative studies were also presented. A methodological and conceptual matrix was constructed to integrate the findings of the quantitative and qualitative syntheses. Potential implications of the views from the qualitative studies were presented alongside the findings of the interventions.

**Authors' conclusions**

Interventions to prevent excessive weight gain during pregnancy showed no clear evidence of effect or lack of effect. Further research to explore the types of interventions that were effective in which contexts (and for which women) was needed.

**CRD commentary**

This review was underpinned by defined inclusion criteria and an extensive search strategy that covered both published and unpublished sources of information. It was possible that trials were missed by the restriction to only studies published in English. However it was unlikely given the body of evidence that this would have changed the overall conclusions of the review. Study quality was assessed and results presented in the light of the methodological limitations in the studies. Studies were found to be heterogeneous but potential reasons for this heterogeneity were explored. Two reviewers were involved in the review process which helped to minimise bias and error. The review was well conducted. This commentary related only to the critical appraisal of the quantitative evidence and the conclusions were likely to be reliable.

**Implications of the review for practice and research**
Practice: The authors stated that definitive conclusions about the efficacy of diet and physical activity interventions to guide practice could not be drawn from this literature. They also stated that behaviour change interventions may be more effective if there were also efforts to target communities and seek to change social attitudes to diet and exercise in pregnancy.

Research: The authors recommended further research to explore the types of interventions that were effective in which contexts and for which women. Such research in a UK context should be evaluated with well reported robust methods (further details were reported in the paper). Trials needed to research action at a community level. Cluster randomised trials may have been appropriate for this type of intervention. Additionally research should investigate the potential for greater effectiveness for interventions amongst obese women, long-term outcomes and the value of pre-pregnancy interventions. Barriers to effective interventions could be evaluated using qualitative research methods to design more effective interventions.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.