

Preconception and pregnancy: opportunities to intervene to improve women's diets and lifestyles

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Recently, large-scale trials of behavioural interventions have failed to show improvements in pregnancy outcomes. They have, however, shown that lifestyle support improves maternal diet and physical activity during pregnancy, and can reduce weight gain. This suggests that pregnancy, and possibly the whole periconceptional period, represents a 'teachable moment' for changes in diet and lifestyle, an idea that was made much of in the recent report of the Chief Medical Officer for England. The greatest challenge with all trials of diet and lifestyle interventions is to engage people and to sustain this engagement. With this in mind, we propose a design of intervention that aims simultaneously to engage women through motivational conversations and to offer access to a digital platform that provides structured support for diet and lifestyle change. This intervention design therefore makes best use of learning from the trials described above and from recent advances in digital intervention design.

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Though recent, large-scale trials of behavioural interventions during pregnancy have not shown improvements in pregnancy outcomes, they have shown that these interventions can support significant improvements in maternal diet and physical activity. Both LIMIT and UPBEAT were testing the efficacy of using contacts with health care professionals during pregnancy to deliver intervention programmes to improve diet and physical activity levels.^{1,2}

In LIMIT, 2152 overweight and obese pregnant women were randomized to receive individualized support at 6 points during pregnancy through a mixture of face-to-face and telephone contact with dietitians and trained research assistants.^{1,3} They were encouraged to problem solve, set realistic goals and self-monitor in an intervention design guided by a Stages of Change model.⁴ The trial demonstrated no reduction in the proportion of babies born large for gestational age (the primary outcome) but a significant improvement in scores on a healthy eating index and in other indicators of dietary quality which were sustained throughout pregnancy, along with an increase in total physical activity. UPBEAT was a trial of intensive behavioural support for diet and lifestyle improvement in 1555 obese pregnant women, designed to reduce the incidence of gestational diabetes and of large-for-gestational-age infants. UPBEAT drew on control theory and social cognitive theory in the design of the intervention.⁵ Women in the intervention arm of the trial were offered an initial interview plus eight group or individual sessions

delivered face-to-face or over the phone by a Health Trainer, who supported them to problem solve, set goals, self-monitor and enlist social support in attempting to develop a healthier pattern of eating. Dietary recommendations were tailored to the woman's habitual diet, and were designed to reduce glycaemic load. Physical activity advice focused on incremental increases in walking, tailored to pre-existing activities. The authors reported no differences in incidence of gestational diabetes or babies born large for gestational age.² They did show, however, reduced dietary glycaemic load, energy intake, carbohydrate and total fat, and increased protein and fibre intake and physical activity. Authors of both trials concluded that these diet and physical activity changes mediated the reductions they saw in gestational weight gain in the case of UPBEAT and in the risk of infant birth weight above 4 kg in LIMIT.

The failure of these changes in diet and physical activity to translate into improvements in the pregnancy outcomes on which the trials were powered leads the authors of UPBEAT to conclude that even successful diet and lifestyle interventions in pregnancy may simply not be sufficient to reduce the likelihood of gestational diabetes or to improve insulin sensitivity in women who enter pregnancy already obese. This suggests that maternal overweight and obesity are best addressed before pregnancy, and that all women of childbearing age need to be encouraged to adopt healthy diets and lifestyles before pregnancy, an approach advocated strongly by the Chief Medical Officer of England in her 2014 Annual Report, by the International Federation of Gynaecology and Obstetrics recent recommendations on adolescent, preconception and maternal nutrition, and supported by the data.^{6–8}

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Pregnancy and the potential to influence the development of their unborn child are powerful motivators for many women to adopt healthy behaviours. Pregnancy is therefore an important life stage or 'teachable moment' for introducing changes in diet and lifestyle.⁹ It is also, as LIMIT and UPBEAT have shown, too late to improve many of the important outcomes for mother and baby that are known to be influenced by maternal health and nutrition before conception. This leaves us with two options. Either we have to use the teachable moment offered by pregnancy, recognizing that it is an investment not in the current pregnancy but potentially for subsequent pregnancies, or we have to find a way of engaging women in change in the period before conception. We can, of course, do both, but herein lies the greatest challenge. If we are to reach women at a general population level or before they are motivated by pregnancy, we need to find new, affordable and acceptable ways of engaging women in diet and lifestyle change.¹⁰ Both LIMIT and UPBEAT described relatively good compliance and adherence, though authors of UPBEAT acknowledged that they found a large proportion of the obese women they approached were reluctant to take part; concluding that complex, intensive interventions such as UPBEAT were suitable only for highly motivated obese women. Given the unpredictability of falling pregnant, knowing when best to approach women and the difficulties of accessing women who may be planning pregnancies are two practical issues which add to the challenge.

There is now a substantial literature describing the components of effective diet and lifestyle interventions in the general population.¹¹ What remains is to find ways of engaging people in adopting these interventions and sustaining this engagement and to do these in ways that are both acceptable and affordable. These challenges are as relevant to interventions with women before conception or pregnant as they are for any other population group. In an attempt to meet some of these challenges, we have developed a set of easily-acquired, theory-based skills for health care professionals called Healthy Conversation Skills.^{12,13} These skills have been designed to support diet and lifestyle change by engaging and motivating hard-to-reach patients and clients during routine brief consultations and could be employed in standard antenatal care delivered by midwives and other health care professionals to engage pregnant women in thinking about change. Equally, health care professionals such as GPs, practice nurses and health visitors could use the skills to maximize the value of any appointments they might have with women before they become pregnant. Unlike information and advice-giving, Healthy Conversation Skills training promotes use of open discovery questions, listening, reflecting and goal-setting to enable a woman to reflect on her particular priorities for herself or for a planned pregnancy, and to support her in finding her own solutions to the challenges she faces. Underlying the choice of skills is a social cognitive model of health behaviour, which emphasizes the role of increasing self-efficacy in promoting behaviour change.⁵ Healthy Conversation Skills are

based on the understanding that giving clients knowledge is insufficient to change their behaviour; they must also be motivated to change, and to be supported to increase their capability to make the best use of existing opportunities for change.¹⁴ We have shown that practitioners from all backgrounds can achieve competence in these Healthy Conversation Skills, and gain confidence in engaging women from disadvantaged backgrounds.^{13,15} Training health practitioners in Healthy Conversation Skills has potential to engage women at a population level in preparing for pregnancy and in improving their diets and lifestyles during pregnancy. A recent community-based trial illustrated some of the issues involved in training sufficient numbers of health and social care staff that women receive sufficient support.¹⁶ We are currently testing the efficacy of Healthy Conversation Skills in engaging pregnant women in improving their diets and lifestyles as part of the SPRING trial in Southampton, UK (ISRCTN 07227232). In addition, we are involved in the implementation of the UK National Health Service (NHS) 'making every contact count' agenda by training staff in Healthy Conversation Skills, and in delivering Healthy Conversation Skills training to maternal and child health workers across New Zealand as part of that country's anti-obesity strategy. One important advantage of delivering support for health behaviour change through routine health and social care contacts is its capacity to reach women and families living in disadvantaged circumstances, who may be less likely to become involved in interventions offered outside of routine care than more advantaged women.

Once engaged and motivated to change their diets and lifestyles, women are likely to need structured support for making those changes.¹⁷ Given the potential to maximize reach and therefore impact, behaviour change interventions using digital platforms of various types are becoming increasingly common, and recent reviews point to promising results.¹⁸ Digital interventions, particularly those delivered by smartphone, have the advantage that they are portable, making them useable 'in the moment', cheap to deliver and may be less stigmatizing than conventionally delivered interventions. For these reasons, they may be particularly useful in supporting change in disadvantaged populations of women.¹⁹ Maybe because of this, there is a proliferation of diet and lifestyle interventions for pregnant women that use digital technology in one form or another. The majority of these, however, have not been subjected to evaluation rigorous enough to form the basis for opinions as to their effectiveness in improving outcomes for mothers and their babies. Those who have demonstrated a moderate degree of success in changing health behaviours enough to suggest that using digital platforms to deliver diet and lifestyle support in pregnancy is worth pursuing.²⁰ There are far fewer digital interventions designed specifically to support women before conception. 'Smarter Pregnancy' is an exception and is an m-health tool specifically designed to improve pre-pregnancy health. The 'Smarter Pregnancy' platform (www.slimmerzwanger.nl), based on

established behaviour change theory,⁴ generates a personal risk profile for each woman who registers. It uses this to produce a personal 6-month coaching programme that sends up to three suggestions per week using text messages, which contain tips, recommendations, vouchers and answers to frequently asked questions. Every 6 weeks participants complete a short online survey to monitor nutrition and lifestyle changes, and to record pregnancy status, body mass index, quality of diet and use of the recipes they have received. Results are fed back to participants throughout, and can be given to the woman's health care professional so that additional preconception and antenatal care can be offered if the participant chooses. Initial outcome evaluation indicates that 65% of women completed the 6-month coaching programme; and between 18 and 65% (depending on the behaviour) improved their fruit and vegetable intake and folic acid consumption, stopped smoking and drinking alcohol.²¹ It is early days in the evaluation of Smarter Pregnancy and selection bias means that participants in the study reported above are likely to be amongst the highly motivated. What Smarter Pregnancy has demonstrated is that support can be specifically tailored to meet the concerns of women before conception. Tailoring intervention content and delivery to meet the needs of different population groups is a key phase in digital intervention design, and user involvement in design is commonplace.²² Developed in this way, digital interventions have the capacity to be responsive to people's need for autonomy and choice in intervention delivery, and are therefore empowering.

Though digital interventions have extensive reach and affordability, they typically suffer from low usage, high attrition and small effect sizes.²³ A recent trial of a digital weight loss intervention of known effectiveness showed that adding an element of human interaction in the form of telephone coaching increased engagement with, and effectiveness of, the intervention when compared with a condition where there was no telephone coaching.²⁴ The intervention designers still reported suboptimal usage of the intervention and difficulties with engagement overall, but found that those who did receive the coaching had more sustained involvement with the intervention programme and greater weight loss than those who did not. The design of digital interventions is at a point where methods of improving uptake, usage, engagement and health-related outcomes are beginning to be identified, and this approach of combining digital interventions with motivational human contact shows promise for increasing their capability in delivering effective, population-wide support for diet and lifestyle change.²³

Research has shown that low-intensity, community-based approaches can be effective in reducing adiposity in women of childbearing age.²⁵ Digital interventions are a way of offering such low-intensity, community-based interventions to women before conception and during pregnancy. Women could be engaged in a digital intervention through face-to-face or telephone support from health care staff trained in a motivational approach such as Healthy Conversation Skills, offering a

solution to issues of suboptimal usage and high attrition, and making the best use of learning from recent advances in digital intervention design. Using a digital intervention to support a process of diet and lifestyle change initiated through a 'healthy conversation' is mutually reinforcing, both intervention approaches emphasizing empowerment and autonomy. This combined approach may represent one way of providing the population-wide response to the Chief Medical Officer of England's call for a focus on preconception health 'an important newly recognised opportunity for improving the health of the nation' (p. 55).⁶

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Conflict of Interest

None.

Ethical Standards

The work reported on in this article was carried out in accordance with universal ethical principles.

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