Preconception health and wellbeing interventions in the workplace: A systematic review

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Abstract

Background Preconception health status is an important indicator of later health outcomes for mothers and infants. Preconception health promotion strategies are required, as pregnancy may be too late to influence some health behaviors, with impacts on fetal health already established. The workplace has the potential to play an important role in the health and wellbeing of employees and could be an ideal intervention setting in the preconception period. The aim of this systematic review was to evaluate workplace interventions designed to improve the health and/or wellbeing of women during preconception. **Methods** Medline, EMBASE and PsycINFO, CINAHL, and Scopus were systematically searched for relevant studies published between January 2009 and October 2018. Inclusion criteria were interventions involving preconception or pre-pregnancy health, wellbeing or health promotion, and which occurred in the workplace or work organization. **Results** Two hundred and forty-eight records were retrieved in the search, and four were screened in full text. No eligible studies were identified. We then capitalized on the opportunity to learn from the literature explored during the review screening process to identify areas for consideration in future research and policy agendas for workplace health promotion for preconception women. **Conclusions** Specific examples of strategies that could be applied in the workplace include legislative changes to reduce smoking, policy directives to improve the food environment and increase physical activity, and the application of electronic health interventions in the workplace. Further research should be undertaken to design, conduct and evaluate interventions to improve preconception health and wellbeing, as well as to improve our understanding of how the workplace might be leveraged for preconception health promotion.

Introduction

Preconception health has a direct impact on maternal and fetal outcomes, as well as longer-term health outcomes for mothers and their children (1,2). The need for improved preconception care has been brought into focus by rising rates of complications associated with maternal overweight and obesity (3) and an increased prevalence of preterm births (4,5). Preconception can be broadly defined as encompassing all women of reproductive age. This definition includes the critical weeks around conception, whenever a woman decides to have a baby, or any time before pregnancy when health behaviors that may affect maternal and fetal outcomes become established (2). Preconception health is important for all reproductive-aged women because both women planning and not planning to become pregnant may go on to conceive: between 30 and 50% of pregnancies are unplanned (6).

Preconception health can impact on outcomes such as premature delivery, infant morbidity and infant mortality (7), is recognized for its importance in relation to the developmental origins of health and disease. Maternal under- or over-nutrition during critical windows, such as at conception, may impact on the development of chronic illness later in the life of offspring, such as obesity, type 2 diabetes and cardiovascular disease (2,8). Independent of maternal weight gain and blood glucose control during pregnancy, maternal obesity is also strongly associated with childhood obesity and metabolic dysregulation (9). This relationship is attributed to the increased expression of lipogenic and inflammatory genes in maternal adipose tissue and the placenta (10). Thus, improved maternal nutrition, lifestyle and health before conception is crucial for the prevention of chronic disease in offspring (2,11–13) and improved maternal outcomes (2).

Interventions designed to improve women's health and lifestyle during the preconception period are required to optimize the health of current and future generations (2). Because women may not anticipate conception, and up to half of all pregnancies are unplanned, (6) it may be necessary for interventions to be implemented at a population level. The World Health Organization (WHO) (14) and the World Economic Forum (15) promote the workplace as a key setting for improving lifestyle behaviors of reproductive-aged women. In their discussion paper on preconception care from an employer perspective, Phillips and Flood (16) also suggested that the important role employers play in promoting health and wellbeing in the workplace could be extended to preconception health. Most women of reproductive age in high income countries such as Australia and Canada are in the workforce (17,18). Therefore, workplace strategies designed to optimize preconception health may protect and promote the health of a significant proportion of preconception women.

Pregnancy complications associated with sub-optimal preconception health may increase the burden on health systems and impose major productivity costs on employers (16). Therefore, optimizing preconception health is a significant public health issue, and requires the engagement of workplaces, as well as other key settings such as healthcare, communities, governments and policy. Despite compelling reasons for including preconception care as an integral part of women's health, there is little evidence of practical action in many high-income countries (4). In this context, a focus on preconception health is invaluable in improving health outcomes for mothers and infants, and has been described as the 'next frontier' of maternal and child health (19). Given the potential role of workplaces in promoting preconception health, the aim of this study was to conduct a systematic review to evaluate interventions designed to improve the health and/or wellbeing of preconception women that have been delivered in a workplace setting.

Materials And Methods

The study protocol was designed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework and prospectively registered with PROSPERO (ID: CRD42018116435).

Information sources and search strategy

Papers were sourced by searching five databases: Medline, EMBASE and PsycINFO via Ovid, CINAHL via EBSCO, and Scopus. Keywords and MeSH terms were generated, with relevant text-word synonyms included. Searches adapted to each database were developed by the first author, then reviewed and tested by the research team. Studies were restricted to the previous ten years (January 2009 - October 2018) to ensure that the data was contemporary and relevant. Papers for all study types were included, but were restricted to studies published in English (Table S1). Primary search terms are shown in Box 1; concepts were combined with the "and" operator.

Box 1.

Due to technical limitations, Box 1 is only available as a download in the supplemental files section.

Eligibility criteria and study selection

All interventions that referred to preconception or pre-pregnancy health or wellbeing, involved health promotion, and occurred in the workplace, or work organization were eligible for inclusion. Interventions related to preconception or pre-pregnancy care for specific medical conditions (such as diabetes, HIV, prenatal testing for genetic conditions or for women undergoing Assisted Reproductive Therapy) were excluded.

Study selection and screening

After duplicate studies were removed, two authors (CB, RW) independently screened each study based on title and abstract. Potentially eligible studies were reviewed in full by the same authors to make a final assessment of eligibility. Discrepancies were resolved by discussion between reviewers.

Risk of bias

An assessment of risk of bias using the following criteria was planned: selection bias, design, confounders, blinding, data collection methods, withdrawals and dropouts, intervention fidelity and appropriateness of analysis (27). According to this assessment, each component would be rated on the combined results of the first six criteria. Papers would be considered weak if they had two or more weak ratings, moderate if they had one or less weak rating, and strong if they had no weak ratings and four or more strong ratings (27).

Data extraction and synthesis of results

Data were to be extracted for the following fields, as recommended by Thomas and colleagues (27): study aims and intervention; number of participants and dropouts in each group; target population; intervention and study outcome; length of follow-up; and funding source. An extra field for methodology was added. Results would be synthesized narratively, as it was expected that meta-analysis would not be appropriate due to lack of compatibility of outcome measures.

Results

Study selection

Database searches retrieved 248 articles (including two papers from other sources) after duplicates were removed. A review of titles and abstracts excluded 244 articles. Of the four papers retained for full text assessment, all were excluded (Figure 1) (20–23). No papers were retained for the current review and therefore no data extraction, risk of bias assessment, or synthesis of results were required. Reasons for exclusion were that the publication was 1) a letter to the editor, 2) conference abstract only, 3) pertained to smoking only, and 4) a summary of the study. The full text review studies were excluded for these reasons, and not for the exclusion criteria (intervention only for specific medical conditions, such as diabetes, HIV, prenatal testing for genetic conditions or for women undergoing Assisted Reproductive Therapy). Therefore broadening the search would not have revealed more studies).

Discussion

The aim of this study was to review the literature regarding workplace interventions designed to improve the health and wellbeing of preconception women. No peer-reviewed, published interventions for preconception women conducted in workplace settings over the past ten years were found. Hence, to date, there appears to be minimal contemporary research that can inform our approach to offering effective workplace health promotion for preconception women specifically. This finding also reveals an opportunity for researchers, health promotion experts and policy-makers to explore this untapped area of women's health.

In the following section, we discuss some studies that have been delivered for preconception women, though not necessarily in the workplace, to determine possible directions for future policy and research initiatives. In addition, interventions aimed at promoting healthy lifestyle behaviors and/or improving health outcomes in the general population (i.e., not specifically designed for preconception women) that may provide potential directions for this 'next frontier' of maternal and child health are included (19). This information may help to generate the knowledge needed to leverage the workplace as a setting for preconception health promotion.

Preconception interventions in the workplace: Potential strategies

Legislative or policy changes. Changes to public health legislation and/or policy may have an impact on the lifestyle behaviors of preconception women, especially when applied at a population level. Klein and colleagues (21) assessed the impact of a state-wide, smoke-free workplace policy on low-income, preconception women who were smoking prior to pregnancy in Ohio, USA. The impact of this policy was evaluated using administrative data from women enrolled in a state-run supplementary nutrition program who gave birth between March 2002 and December 2009 (N = 483,911). A small but statistically significant reduction in the odds of preconception smoking (smoking in the three months prior to conception) was identified in the six months after policy enforcement. Further examples of policy change that may improve the health of preconception women include removing sugary drinks from vending machines, or enforcing employers to offer only nutritious foods in on-site cafes (28,29). These types of strategies, where legislation and/or policy either enforces or supports positive lifestyle behavior change, could be considered as important tools in preconception health promotion strategies in the workplace. Such policy changes may also have the benefit of reaching all employees in impacted workplaces, not just preconception women.

Women at high risk. Preconception health interventions in the workplace may be particularly beneficial for women considered to be at greater risk of adverse pregnancy outcomes. Greater risk could be defined as being malnourished, food-insecure, under- or overweight, adolescent, exposed to harmful substances in the environment, or having a chronic illness (30). From an employer's perspective, women with increased health risks may also be a higher financial risk. The impetus for a workplace intervention described by Valentin *et al* (22) in their review of preconception interventions in eastern North Carolina, USA, was the area's disproportionate share of poor maternal and infant health outcomes, compared with the rest of the state.

Participants were part of a job-training program designed to assist individuals to prepare for entering the workforce. Men and women were encouraged to consider their reproductive life plan, including the timing and spacing of pregnancies, and prevention of pregnancy until ready. Intervention goals were to improve personal health by specifically targeting fruit and vegetable consumption, folic acid and other vitamin supplementation, genetic history of the family, drugs, alcohol and tobacco consumption, stress management, contraception and sexually transmitted disease. Participants stated they learned new information and planned to change their health behavior in some way; however, no empirical data on the effectiveness of the intervention were presented (22). The synopsis of the intervention by Valentin *et al*/lacked specific details (no study design, sample size or results) and the intervention itself was not published, and thus not included in this review. Nevertheless, providing opportunities for women who are at greater risk of adverse pregnancy outcomes may be an avenue for improving the preconception health of women, as well as promoting equity in the workplace.

Low-income communities were also targeted in a non-workplace RCT, described by Hillemeier *et al.*, where a preconception intervention was implemented in group sessions (26). The multidimensional program, 'Strong Healthy Women', was designed to modify risk factors for adverse pregnancy outcomes and improve women's health-related behaviors prior to pregnancy. Participants (N = 362) were pre- and inter-conception women, recruited from 15 low-income communities in Pennsylvania, USA. The 12-week, six-session intervention was presented in small groups in community settings. At 14 weeks post-intervention, there were significant changes in women's intentions to be more physically active, eat healthier foods, to read food labels, and to use multivitamins such as daily folic acid (26). At 6- and 12-months post-intervention, in a follow up study by Weisman *et al.* (25), women in the intervention group had higher rates of folic acid supplementation, and decreased weight compared with controls. Group-based interventions could be a cost-effective way for workplaces that employ predominately low-income women to provide advice and the social and emotional support that is beneficial in behavior change interventions that promote preconception health (31). Workplaces that employ predominately low-income women could play an important role in preconception health promotion.

E-health. Pre-existing preconception interventions delivered outside the workplace may be usefully applied in a workplace setting, including eHealth or web-based interventions. Agricola *et al* (24) investigated the efficacy of a web-based intervention designed for Italian women aged 18–45 years who were planning to become pregnant in the next 12 months. Participants were given access to tailored online information on preconception health behaviors and knowledge. Baseline information was used to generate personal, tailored documents for preconception behaviors such as folic acid supplementation, weight, smoking, alcohol and vaccinations. At six months post-intervention, there were significant increases in folic acid supplementation and alcohol consumption had significantly decreased. There were also significant positive changes related to knowledge and preconception check-ups with a physician. The outcomes of this study suggest that the information supplied to women may contribute successfully to behavior change, albeit sound conclusions about efficacy cannot be drawn because there was no control group.

In another example of an online preconception intervention, Jack *et al* (27) tested an online conversational agent, 'Gabby', designed to decrease preconception health risks in African American women in an RCT (n = 100). Participants were recruited through the US Department of Health and Human Services of Minority Health's national Preconception Peer Educator program, Healthy Start Sites, and Health Expos across 20 US states, and were aged 18–34 years. Gabby was programmed with dialogue related to motivational interviewing, shared

decision-making, goal setting and problem solving, to support women make lifestyle behavior changes. The intervention was efficacious in identifying and resolving preconception health risks in participants. A reported benefit of the Gabby system was that women had the autonomy to discuss what was important to them, at a time and place that was comfortable for them. Interventions, such as those piloted by Agricola *et al* (24) or Jack *et al* (27) suggest that tailored web interventions help to improve women's general health in preconception and decrease specific health risks related to pregnancy, and that eHealth may be a cost-effective approach for reaching women in large organizations, or in organizations where the workforce is geographically dispersed. These studies suggest that tailored web interventions may help to improve women's general health in preconception and decrease specific health risks related to pregnancy. In both studies, however, the women who opted to participate may have already been motivated to make behavioral changes for the health of their future children. Women not planning pregnancy may not be similarly motivated; further research is needed to explore this possibility.

Unplanned pregnancies. In order to reach women who are not intending to become pregnant, different strategies will be required (32). Lynch *et al* found that for women who intended to become pregnant in the next 12 months, a motivating factor for preconception health behaviors was being aware of the possible negative consequences of unhealthy behaviors. Messages that mention preconception, pregnancy or infants did not resonate with women not intending to become pregnant. The authors recommended that for women not intending to become pregnant, preconception health promotion should not be labelled as such, but should be positioned to meet the woman's health and wellness goals and self-empowerment. Furthermore, targeting all women of reproductive age in the workplace will capture women who are not planning pregnancies, and thus may be an appropriate preconception health promotion approach.

Limitations

Strengths of this review lie in the design of the systematic search and rigorous methodology. An obvious limitation of this research was the lack of eligible studies. Although no papers met the inclusion criteria for this systematic review, this study used rigorous systematic review methodology including PRISMA guidelines. Knowing that there were no published papers in this area is an important finding, given the importance of preconception health promotion and that the workplace may be an ideal intervention setting to reach a significant number of preconception women.

Conclusions

The workplace is an important setting to intervene to improve the health of women during the preconception period. Given the lack of published papers resulting from the review, we do not yet know how to provide women with preconception health promotion in the workplace effectively. This study has identified a significant gap in the literature with regard to promoting preconception health. We outlined several directions for future research, including policy that reaches all women at a population level, and interventions tailored to meet the needs of women who are most at risk. Future studies that enhance our understanding of how the workplace can be leveraged as a setting for preconception health promotion are required urgently.

Declarations

Ethics approval and consent for publication: not required

Availability of data and material: all data is included in the manuscript

Competing interests None of the authors have any competing interests

Author contributions HS and CB contributed to the conceptualisation of the study. CB and RW designed the search strategy and undertook the search, in consultation with HS. CB wrote the initial draft of the paper, which was then discussed and refined by HS, BH and RW. All authors contributed to the final version through critical review, revision and editing of the final manuscript.

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Figures

Figure 1

PRISMA flow chart of studies in the review.

Supplementary Files

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- [Box1.jpg](#)