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Overcoming psychosocial barriers to maternal exercise: intervention strategies to improve participation and adherence

Brad Schoenfeld, Gül Tiryaki-Sönmez

Lehman College, Department of Health Sciences, The City University of New York, Bronx, NY, USA

Summary

Poor adherence to physical activity programmes during pregnancy is a serious national issue, one that has detrimental effects on a large percentage of the population. Not only does a lack of activity result in a decrease in quality of life for women during term, but the effects can carry over well after pregnancy, potentially leading to increased morbidity and mortality. What's more, reduced prenatal activity can cause adverse effects on the foetus, with impairments seen in physical health as well as cognition. Accordingly, the purpose of this paper is twofold: first, to examine the socio-demographic data and psychosocial influences that modify exercise behaviours in pregnant women and, second, to make recommendations as to effective intervention strategies that can be adopted by health and fitness professionals to help improve maternal exercise participation and adherence.

Key words: Pregnancy exercise – Pregnancy fitness – Exercise psychology

Introduction

Leisure time physical activity (LTPA) is universally regarded as positive mediator on health and wellness, with beneficial effects seen on incidence of disease, functional capacity, and mental health. Yet, despite the overwhelming body of research supporting its efficacy, a large percentage of the population remains sedentary and less than half meet minimum participation guidelines set forth by the American College of Sports Medicine (ACSM) [20].

On average, women are less active than men, especially in terms of performing moderate-to-vigorous activity [34]. This is even more apparent with respect to the exercise habits of pregnant women – a subgroup that has much to gain from staying active. So much so that the Institute of Medicine has identified pregnancy as a period of critical risk for inactivity and overweight, and categorised women who fall into these categories at an increased risk for various chronic disease states and premature mortality [14]. Accordingly, the purpose of this paper is twofold: first, to examine the socio-demographic data and psychosocial influences that modify exercise behaviours in pregnant women and, second, to make recommendations as to effective intervention strategies that can be adopted by health and fitness professionals to help improve maternal exercise participation and adherence.

Socio-demographic Influences on Maternal Exercise

Participation in LTPA is highest in developed nations such as the United States and United Kingdom [6,10] and lowest in third-world countries [7]. Precise measurements of participation in the United States have been difficult to qualify, with figures varying between studies. For example, Evenson *et al.* [10] reported that approximately 2/3 of American women perform at least some LTPA during pregnancy while Zhang *et al.* [36] found that nearly 60% were sedentary. These differences are perhaps attributable to limitations in study designs. Most protocols use a questionnaire format and the phrasing of questions can influence the perception as to what actually constitutes LTPA. For instance, some women might not realise that gardening and various household chores are forms of physical activity if the questionnaire does not specifically state as such. What is clear from all studies is that LTPA during pregnancy is suboptimal to provide desired benefits for health and wellness [10], with only 15.1% of pregnant women estimated to meet ACSM guidelines for physical activity [20].

Leisure time physical activity declines once a woman becomes pregnant and progressively drops off as the term advances [6,7,10,24,36]. Clapp and Dickstein [5] found

Author's address Prof. Gül Tiryaki-Sönmez, Lehman College, The City University of New York, Department of Health Sciences, 250 Bedford Park Blv. West, Bronx, NY 10468, USA gul.sonmez@lehman.cuny.edu

that 60% of women who exercised vigorously pre-term, markedly reduced their activity levels early in pregnancy and ceased training by the 18th week. Sternfeld *et al.* [30] found that the participation of 41% of women who performed aerobic exercise before pregnancy steadily declined and only 14% were still active by the 3rd trimester, and Pereira *et al.* [25], showed a decrease of LTPA during pregnancy from 9.6 to 6.9 h/week from the first to second trimester, a majority of the reduction being seen in moderate and vigorous activities.

Types of activities: Walking is by far the most popular mode of LTPA. Evenson *et al.* [10] reported that 53% of pregnant women declared having walked at some time during pregnancy. Zhang *et al.* [36] reported 43% – well above the next two activities cited (swimming and aerobics), both being declared by 12% of the population. Only a small percentage of women reported participation in resistance training activities, which could be highly beneficial for maintenance of functional capacity as the pregnancy progresses [12,35]. In third world countries, the percentage of women who declared walking as a source of exercise jumped to 70% [7]. This could be attributed to a lack of adequate fitness facilities and/or transportation to these facilities in less developed nations, thus limiting options for other modes of exercise. Regardless of the activity chosen, most women opt to train at low intensities. This was born out in a study by Ning *et al.* [23] , who found that less than half of the 61% of women reporting to have participated in LTPA during pregnancy were regularly engaged in high intensity activities (defined as greater than 6 METs).

Education: There appears to be a direct link between the level of education and maternal LTPA participation [7,16,24]. Evenson *et al.* [10] found that the number of college-educated women who performed any LTPA during pregnancy was significantly greater compared with those who had less than a high-school education (79 vs. 42%, respectively). A similar relation was found for exercise volume and intensity, with 19% of college-educated women reporting to have met ACOG guidelines vs. only 4% for those with less than a high-school education. It is possible that educated women have a better awareness of the benefits of exercise or, alternatively, that they may display an increased propensity to seek out information on the subject and understand its complexities.

Income status: An inverse association exists between household income and exercise during pregnancy [7,23]. This relationship appears to hold true independently of the education level, and is correlated both with volume and intensity of training. Poverty might contribute to a reduced participation in LTPA during pregnancy due to an inability to afford membership to fitness facilities or to have a convenient source of transportation to travel to such a facility.

Ethnicity: Studies on the relationship between ethnicity and maternal LTPA are somewhat equivocal. On the whole, there seems to be a tendency for whites to have a slightly greater LTPA level during pregnancy than non-whites [7,10,28], with Asians performing the least maternal exercise [36]. This, perhaps, can be explained, at least in part, by differing customs and beliefs within each ethnic group. Exercise seems to be more ingrained in certain cultures than in other ones, possibly due to long-standing cultural values held over many generations. Such belief systems could have an impact on attitudes of pregnant women toward exercising during pregnancy as well as their perception of the benefits associated with maternal fitness. However, Marshall *et al.* [22] noted that most of the ethnic variability in exercise participation is moderated by social class, making it difficult to tease out the actual impact of ethnicity.

Age: Studies on the association between maternal age and exercise frequency are contradictory. Some authors reported them to be positively correlated [16,24] while others reported a negative correlation [10,26]. Ning *et al.* [23] found that women under 35 years of age were more likely than their seniors to participate in high-intensity activities. In those latter ones this could be possibly attributed to fear that intense exercise might harm the foetus and that it then may be difficult to get pregnant again at an advanced biological age.

Psychosocial Factors Affecting Maternal Exercise

The LTPA behaviour during pregnancy is driven by a variety of social, psychological and physical factors. Clarke *et al.* [6] reported that a combination of these factors may ultimately discourage otherwise healthy, pregnant women from exercise. Moreover, women's reasons for exercising or not exercising vary across pregnancy, indicating that there is a continual reassessment of exercise priorities as pregnancy progresses. According to the Theory of Planned Behaviour, psychosocial factors can be classified into three basic categories: attitude, subjective norm, and perceived behavioural control; these will be discussed with respect to their application to maternal LTPA.

Attitudinal factors: A woman's attitude toward exercise plays a dominant role in whether or not she will be physically active throughout pregnancy; it is regarded as the strongest determinant of exercise participation across all three trimesters [8,15]. Those with positive attitudes will tend to continue with existing programmes or begin new ones, while those with negative attitudes will tend

to remain sedentary. Perplexingly, Domingues *et al.* [7] found that despite the overwhelming belief that maternal exercise made labour easier and led to a healthier baby (by 83 and 76%, respectively), only 13% of pregnant women participated in LTPA.

A primary factor that shapes a woman's attitude toward exercise is previous training experience. Research shows that participation in a regimented maternal fitness programme is highly correlated to whether or not a woman has exercised in the past. Ning *et al.* [23] found that women who were physically active as teenagers were 4 times as likely to be active during pregnancy and more than 12 times as likely to engage in intense LTPA. Owe *et al.* [24] reported that women who exercised pre-pregnancy were almost 10 times more likely to continue regular LTPA while pregnant. This demonstrates a clear need to get women exercising early in life to shape and strengthen enduring lifelong habits.

Concerns about safety are another significant attitudinal influence on exercise behaviour. Many women continue to cling to the misguided belief that maternal exercise may be harmful. Clarke *et al.* [6] found that approximately ⅓ of women who reduced exercise during pregnancy mentioned potential danger to the foetus as the primary reason. Moreover, Duncombe *et al.* [9] found that although only 8% of women queried cited safety issues as a barrier to performing light exercise, the vast majority believed weight bearing activity to be unsafe. The study went on to conclude that safety concerns predicted both the amount and intensity of a woman's exercise patterns during pregnancy.

In contrast to non-pregnant women, motivation to stay thin does not seem to be a significant motivator for a majority of expectant mothers. Symons-Downs *et al.* [31] found that the most common behavioural advantage during pregnancy was that exercise improved mood, weight management being of just marginal consequence. Only in the immediate postpartum period did weight loss become a significant attitudinal motivator that influenced a woman's intention to work out.

Subjective norm factors: Exercise factors related to subjective norms consist of social influences on the pregnant woman. Subjective norm was found to be correlated with the intention to exercise during pregnancy only moderately – less than the factors associated with attitude and the perceived behavioural control. However, this should not be taken to mean that social influences are trivial. Women with a supportive network of family and friends are more inclined to exercise than those with less supportive networks [8]. In a study of women in the United Kingdom, Clarke *et al.* [6] reported that 96% of participants received advice about LTPA at least once during the pregnancy and 49% on at least 3 occasions. The importance of social influences appears particularly strong in the Latino community. Thornton *et al.* [33] found husbands and female relatives the primary sources of emotional, instrumental, and informational support for Latino women, and an absence of these influences to provide advice and companionship with respect to exercise were prominent barriers that limited their desire to maintain an active lifestyle.

Research is unclear as to who provides the majority of social influence to exercise during pregnancy. Symons-Downs *et al.* [31] found that the most common normative influence for women came from husbands/fiancés, and that clinicians did not play a prominent role. Clarke *et al.* [6] noted similar findings, reporting that the primary source of advice came from friends and family, with only 18% receiving guidance directly from their health care professional. In contrast, Krans *et al.* [19] reported that nearly half of those surveyed mentioned their physicians as having the greatest influence over their exercise habits.

Regardless of the source of advice, the influences of subjective norms are all-too-often overly negative with respect to maternal exercise. The majority of friends and family provide discouragement based on an inadequate knowledge of the facts on the subject, with 85% of pregnant women reporting that they were dissuaded from participating in LTPA by Week 34 [6]. Physicians are only marginally better in conferring the importance of prenatal exercise. Although Krans *et al.* [19] found that women who were encouraged to exercise by their physicians were more likely to exercise than those who were not so encouraged, less than 10% of women said their doctors helped them develop an exercise programme but almost 70% of them placed exercise restrictions on expectant mothers based on outdated, invalid guidelines. As Clarke *et al.* [6] aptly summed up, our health education system is doing a poor job correcting misperceptions about the risks and benefits of maternal exercise.

Perceived behavioural control factors: The Perceived Behavioural Control (PBC) refers to the ease or difficulty of performing a task as perceived by given woman, and is independently associated with exercise intention during pregnancy [13]. Hausenblaus *et al.* [15] reported that PBC was a stronger predictor of exercise behaviour than motivation. However, because of the various physiological and sociological ramifications of pregnancy, pregnant women tend to sense of a lack of behavioural control over their exercise programmes.

Health-related factors are the most important behavioural control issues, with women who are in good health significantly more likely to exercise than those in poor health [10]. Duncombe *et al.* [9] noted that women

performing little or no exercise during pregnancy reported feeling tired and/or unwell as the primary reasons. In the latter stages of pregnancy, discomfort and lack of energy seem to be the primary health-related PBC barriers to exercise [9], as increased weight gain, impaired sleep, and general fatigue take an increasingly greater toll on a woman's psyche. Owe et al. [24] found that women with pregnancy-related disorders such as pelvic girdle pain, nausea, musculoskeletal pain were less likely to exercise regularly than non-symptomatic women. Other disorders negatively associated with exercise participation include leg cramps, body soreness, and short breath.

Another significant PBC barrier is the time constraint brought on by pregnancy. In a study by Duncombe *et al.* [9], being too busy was reported by women as one of the main reasons for reducing LTPA while pregnant. Job-related issues are at the forefront of these beliefs. Pereira *et al*. [25] found that pregnant women who worked full-time were 3 – 5 times more likely to become inactive than those who were not employed.

Having children at home also contributes to the perceived lack of time to exercise. The number of pregnancies was inversely correlated with exercise volume, the primiaparae being more likely to exercise than women having at least one child [10,23,24]. The odds ratio of becoming inactive was found to be significantly greater in women with at least one child already in the home as compared to the childless ones [25]. This was presumably due to the fact that since the first-time mothers did not have children to occupy their leisure time, they were more apt to spend their free hours exercising [7].

Child care can also be a significant barrier of perceived behavioural control over exercise. While the evidence that primiparae are more active than women with children is most often attributed to time constraints, the lack of child care must also be considered a possible contributor. Pereira *et al.* [25] found that women who considered childcare an issue, were 1.7-fold more likely to become inactive compared to those that had no child care issues.

Intervention Studies

There is a paucity of research on the effects of exercise interventions for pregnant women. Only a handful of studies have specifically addressed their efficacy, with varying degrees of success. The first such intervention study was conducted by Gray-Donald et al. [11] and aimed at improving the dietary intake during pregnancy, at optimising the gestational weight gain, glycaemia levels and birth weight, and at avoiding unnecessary postpartum weight retention. A counselling protocol, based on the Social Learning Theory, was utilised by health care professionals. The employed strategies included modelling, skill training, contracting and self-monitoring. The effects on LTPA levels in the intervention and control groups were alike, the former having actually a much greater percentage of participants classified as sedentary compared with controls. The authors suggested this could be due to the fact that subjects from the interventional group were counselled on exercise thus being more in tune with activity levels; the study, however, was methodologically somewhat inconsistent with other reports. First, the study was more nutrition- than exercise-oriented, with counselling carried out by nutritionists who emphasised the dietary component for weight loss rather than for the importance of LTPA. The interviews revealed that in the Cree's culture being plump was desirable while exercising during pregnancy was not. Additionally, the protocol did not take a stage-matched approach, which has been shown to be more successful in modifying exercise behaviour [3]. Finally, pregnant women in general are not significantly motivated to lose weight [31], which was the primary objective of that study, all that making it difficult to draw conclusions as to the potential benefits of intervention on maternal exercise behaviour.

Polley, *et al.* [27] conducted a similar trial to evaluate a behavioural intervention designed to reduce excessive maternal weight gain. Women were given written and oral information on exercise and nutrition at set counselling sessions. After each clinical visit, the patients received a personalised graph of their weight gain. Those whose weight exceeded recommendations were given additional individualised counselling. A stepped care approach was utilised, where women who gained more than recommended were given increasingly structured behaviour goals with each visit and a between visits telephone follow-up was initiated. The results of the study were mixed regarding the interventional impact on weight gain. Among normal weight women, those in intervention group were markedly less likely to gain excessive weight compared with controls (58 vs. 33%, respectively). Among overweight women, however, the treatment had a negligible effect and actually showed a tendency toward increased weight gain. With respect to exercise, the intervention was of little benefit, showing similar participation rates in both groups. That study, however, had similar methodological issues as that discussed above [11]. Namely, it was more nutritionally than exercise-oriented and focused on promoting weight management rather than on exercise benefits specific to the needs of pregnant women.

Hausenblas *et al.* [14] was the first to employ an intervention that showed potential for altering the exercise

behaviour patterns of pregnant women. In their trial, the researchers employed a multimedia CD-ROM designed to encourage exercising during pregnancy. The content of the CD-ROM incorporated social/cognitive theories of the Transtheoretical Model and the Theory of Planned Behaviour; it contained a blend of theory, practical content and detailed information personally tailored to users, based on their stage of exercise change profile. Interactive components such as true/false quizzes, audio and video clips of pregnant women exercising, and personal accounts from women detailing the physical and psychosocial benefits of exercise were integrated into the presentation. The results were promising, the intervention group reporting significantly higher self-efficacy and exercise knowledge at post-test compared to the control group. The drawback of the study was that it did not track subjects post-testing. Thus, there was no way to determine whether or not the intervention had an enduring effect on women's exercise habits throughout pregnancy.

Aittasalo *et al.* [2] conducted what is to-date the most comprehensive intervention specifically designed to increase participation in maternal exercise. The counselling protocol was based on the Transtheoretical Model and took into account a woman's stages of change. A total of 5 counselling sessions (one primary and 4 booster sessions) were integrated into routine health care visits. Booster sessions were used to assess the compliance as well as to discuss any adverse events related to LTPA, and barriers and incentives affecting compliance. Health care advisors were instructed to consider each woman's readiness to increase exercise participation within their stages of change. The counselling was supported with an option for supervised exercise in close proximity to clinics in order to facilitate behavioural changes. At the end of gestation, both frequency and duration of at least moderate intensity LTPA was significantly higher throughout the pregnancy in the intervention group compared with controls (by 43 and 154%, respectively). These figures prevailed despite the fact that subjects from the intervention group had higher BMI and were less educated – factors bearing an inverse relationship to maternal LTPA [10,24]. Moreover, participants from the intervention group more often reported that counselling provided an incentive to initiate or maintain LTPA than those from the control group (81 vs. 43%, respectively). The one confounding finding of the study was that only 28% of interventional subjects adhered to the group exercise programme. The authors posited that this might have been due to the fact that pregnant women felt less in need for peer support than the postpartum women. It is also conceivable that the limited scheduling of group activities might have been inconvenient for many of the participants, thereby reducing its appeal.

Practical Applications

A poor adherence to physical activity programmes during pregnancy is a serious national issue, one that has detrimental effects on a large percentage of the population. Not only does it result in a decrease in life quality of pregnant women, but the effects can carry over well after pregnancy, potentially leading to increased morbidity and mortality [1,17,18]. A reduced gestational activity can also bring about adverse effects in the foetus, with impairments in physical health as well as in cognition [6].

Properly employed intervention strategies can significantly increase maternal LTPA participation and adherence [2,14]. A face-to-face counselling can provide greater individualised attention than non-personal modes, and is particularly beneficial for lower-income and/or less educated women who might not own a computer and/or are potentially unskilled in modern technologies [7]. Stage-based interventions using the Transtheoretical Model of Behaviour proved to be more successful than traditional approaches in this regard [21], and can facilitate forward-stage progression and increased exercise participation in pregnant women [29]. Expectant mothers should be asked to complete a Stages of Change questionnaire that assesses readiness to exercise. Based on their score, interventions then should be individualised to a woman's current stage of change.

Intervention programmes must be flexible enough to accommodate individual needs. Behaviour beliefs about exercise have been shown to vary across populations, and the practitioners need to take these unique beliefs into account when designing specific LTPA interventions [31]. Moreover, a woman's physical and mental state tends to change across pregnancy, resulting in a continual reassessment of exercise priorities as the pregnancy progresses [6]. Accordingly, recommendations should consider the nutritional intake, BMI before pregnancy and exercise history, personalising a prescription to the participant.

To increase the adherence, individualised counselling can be supplemented with technology-based interventions. Computer interventions have been found to increase knowledge and self-efficacy in pregnant women with respect to exercise [14]. E-mail interventions can be a particularly time-efficient, cost-effective strategy to improve maternal LTPA participation. Computer-generated e-mails with motivational tips and pertinent information have been shown to be as effective as human e-mail counselling, at least in weight loss trials [32]. Personalised e-mails addressing specific issues can be included in the intervention if and when a follow-up appears necessary.

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