



## Examining Exercise Behavior Beliefs of Pregnant Women's in Second and third trimester: using Health Belief Model

Maryam Moridi<sup>1\*</sup>

Department of Midwifery Nursing and Midwifery Faculty, Guilan University of Medical Sciences, Rasht, Iran.

**Background:** Although the need for theory-based designs, evidences exploring exercising effects during pregnancy is limited by non-theoretical and cross-sectional assessments. This study aimed to prospectively examine women's exercise behavior from their second to third pregnancy trimester using the Health Belief Model (HBM).

**Methods and Materials:** This was a randomized controlled trial in which 100 pregnant women (50 individuals in each group of control or intervention) with gestation age of 20 weeks or more were examined. Just the intervention group participated in eight 40-minute exercise classes with 15-day interval between each class. The control group received only routine prenatal care. The researcher-made questionnaires for general demographic characteristics, and variables of Health Belief Model (HBM) regarding doing exercise during pregnancy were completed at two time points of initial of the study and follow up. Descriptive/analytical statistics were applied to analyze the variables using SPSS version 18.

**Results:** The mean gestational age for intervention and control group were  $27.40 \pm 5.39$  and  $26.26 \pm 5.31$  weeks respectively. Despite similarity of two groups at initial of the study in terms of all studied variables, all HBM constructs in intervention group were significantly higher than control group after intervention (all  $p$  value  $\leq 5\%$ ).

**Conclusion:** This study revealed that the educational program based on HBM could provide the pregnant women with a conceptual framework to improve the beliefs of pregnant women regarding exercise doing.

**Key words:** Health Belief Model, Exercise, Pregnancy

### Introduction

Traditionally, pregnant women have been recommended to restrict exercise to protect the health of the mother and fetus. Although there is no study to show negative effect of moderate intensity aerobic exercise on pregnancy-related outcomes, the safe limits of exercise during pregnancy have not been determined (Duncombe et al., 2009). Furthermore, the American College of Obstetricians and Gynecologists (ACOG, 2002)

recommended that in the absence of medical and obstetric complications, pregnant women can follow the American College of Sports Medicine (ACSM) recommendations for exercise. With this regard, pregnant women can engage in 30 minutes of moderate to vigorous physical activity on most days of the week. However, there is an exception for activities such as vigorous sit-ups that may reduce oxygen flow to the fetus or cause abdominal trauma. Accordingly, doing exercise during pregnancy is a safe and valuable way to promote the physical and psychological health of pregnant women.

Although exercising during pregnancy contributes to women's health, intervention studies designed to increase pregnant women's exercise behavior are limited. Furthermore, the existed studies were not based on a conceptual framework, despite the consensus that intervention studies should be theoretically driven. The studies showed the high dropout rate of exercise doing among non-pregnant populations. Thus it is likely that non-adherence for a

Corresponding author: No 01, Department of Midwifery Nursing and Midwifery Faculty, Guilan University of Medical Sciences, P.O. Box 41457-75857, Tel: 0098 9113829800; Fax: 0098 21 82884555; E-mail: maryammoridi@gums.ac.ir

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DOI:



pregnant woman is even higher because of specific physical and psychological demands during this time. Thus, it seems designing exercise programs for pregnant women, should be based on exercise adoption, motivation, and adherence promotion. (Downs & Hausenblas, 2003). Many theory based studies have been applied to supporting that exercise participation behavior is multidimensional, as cognitive, social and behavioral factors could impact on exercise doing. The most frequently applied theories are classified as 1) belief attitude theories such as Health Belief Model (HBM), protection motivation theory and theory of planned behavior; 2) competence-based theories like self-efficacy theory; 3) control-based theories as self-determination theory and 4) decision-making theories like trans-theoretical model. The health belief model is the most comprehensive and confirmed theory for predicting, explaining, and understanding influencing factor on exercise behavior; and thus, it has guided the majority of the exercise behavior research (Biddle & Nigg, 2000).

The HBM invented by social psychologists in the 1950s to explore tuberculosis screening rates and was developed to better predict and explain individual health behaviors. Over time, this model has been applied to a wide range of health issues, including breast cancer screening in older women and sexual health behaviors in adolescents (Glanz Marcus Lewis, & Rimer 2002). While this model was applied to physical activity engagement of older adults, it helped explain the likelihood of an individual engaging in physical activity, based on the perceived threats brought by inactivity and the individual's conclusion that the potential benefits of physical activity could be the risks reduction (Gristwood, 2011). This model proposes the health behavior change are proceeded by perceived susceptibility-belief about the probability of getting a disease-, perceived severity-belief about the disease seriousness-, perceived benefits-belief about the risk reduction if healthy behaviors complied-, and perceived barriers-belief about costs of the action-, cues to action-motivation to readiness- and self-efficacy that is defined as one's confidence in the ability to successfully perform an action. However, there may be some demographic, socio-psychological, and structural variables that can influence an individual's decision (Glanz Marcus Lewis, & Rimer 2002).

Despite the established health benefits of regular exercise during pregnancy, physical

activity levels appeared to be declined during this time (Evenson, Savitz,, & Huston, 2004; Hausenblas & Symons Downs, 2005). However the determinants of this exercise decline during pregnancy are unclear (Pereira et al., 2007). Several authors address the need for evidence on theoretical prospective determinants of exercise during pregnancy to guide the design and implementation of exercise intervention (Kramer & McDonald, 2006; Poudevigne & O'Connor, 2006). Therefore, we decided to explore the influencing factors on exercise behavior among pregnant women during second and third pregnancy trimester using health belief model.

### Methods and Materias

This randomized control trial was conducted from November 2015 to May 2016 on pregnant women referred to a prenatal clinic. One hundred eligible women were assigned in the study using convenience sampling method, and were to join the trial if they met the following criteria as having singleton pregnancy, being aged between 18 and 35 years old and reaching at least 20 weeks of pregnancy or more. The pregnant women who were suffering from any medical/obstetric disease or were not satisfied to be studied were excluded from the study. After explanations of study objectives and procedures to the potential participants, the informed consents were obtained, and then participants were divided randomly into two intervention and control groups (50 participants in each group).

The trial group participated in the standard exercise education classes which were established by the Iranian Ministry of Health and Medical Education. These classes were administered theoretically and practically for eight 40- min sessions every 15 days. The exercise section included 10 minute neuromuscular training, patterned breathing in pregnancy, teaching how to use proper positions during pregnancy, labor and birth, and 30 min of practical exercise. This section was managed by trained expert midwives. The trainers have received their training license from mentioned ministry. The control group received usual prenatal care but did not participate in the interventional program. Women in both groups were followed until the last session.

A self-reported questionnaire was used for data collection. The investigator reviewed the women's files before carrying out interviews to exclude women who did not met the inclusion criteria.

Interviews by the researchers were carried out in the clinic's waiting rooms. The completion of the questionnaire took about 20-25 minutes. A description of the study and requirement for participation was given to all enrolled women and written informed consent was obtained, where detailed information was offered about the research and confidentiality was assured.

A Personal History Questionnaire was developed for this study, and it assessed the following information: Body mass Index (BMI); age, height, weight, education level, and employment.

BMI was calculated by weight/height squared ( $\text{Kg/m}^2$ ) in all participations. Weight and height were measured by study staffs. The weight was measured by using a standard electronic scale to the nearest 100 gram which was performed without shoes and with least clothing. The height was measured by using a tape measure to the nearest 0.5 centimeter which was done with the women standing on a flat surface erect against a wall.

All of the variables of the HBM consisted of 5-point Likert scales. The Perceived threat scale consisted of ten items about susceptibility and severity of doing exercise, the perceived benefits scale with 5 items, the perceived barriers scale with 4 items, the cues to action scale with 4 items, and the perceived self-efficacy in exercise scale with 5 items. Possible responses for each variable were "completely agree", "agree", "don't know", "disagree", and "completely disagree". A score was given for each response from 1 to 5, whereby higher scores indicated a stronger feeling of each variable. Cronbach's  $\alpha$  of the perceived threat scale was 0.761, 0.859 (perceived susceptibility and severity respectively) for the perceived benefits scale, 0.805 for the perceived barriers scale, 0.764 for the cues to action scale, and 0.831 for the perceived self-efficacy in exercise scale. For content validity, an expert panel of 10 specialists in gynecology and

midwifery was asked to comment independently on necessity in order to calculate the content validity ratio (CVR), and relevancy, clarity and simplicity in order to calculate the content validity index (CVI) of the items. The CVR for the total scale was 0.90, indicating a satisfactory result. The CVI was found to be 0.91, suggesting that it had a good content validity.

Data were presented as number and percentage unless otherwise indicated. Group comparisons were carried out with Student's t-test and Chi square test where necessary. To examine normality of the data, Kolmogorov-Smirnov's test (K-S test) was used.  $P < 0.05$  was accepted as significant. Statistical analysis was performed using Statistical Package for the Social Sciences 16.0 (SPSS Inc., Chicago, IL, USA).

## Results

One hundred eligible women were enrolled in the study. The means gestational age and BMI of women in the trial group such as  $27.40 \pm 5.39$  weeks and  $28.22 \pm 4.90 \text{ Kg/m}^2$ , respectively) were higher than that of control group such as  $26.26 \pm 5.31$  weeks and  $27.38 \pm 5.54 \text{ Kg/m}^2$ , respectively. The majority of women, in both groups, had education level beyond high school, and was housewives. Both groups were the same in terms of maternal age, BMI, employment status, and educational level at initial of the study ( $p > 0.05$ ). Table 1 show the rest demographic characteristic of the participants of both groups.

The mean score of perceived susceptibility before intervention was significantly less than after intervention in trial group ( $P < 0.001$ ) (Table 2). However, this finding was not significant in control group ( $P = 0.80$ ) (Table 2). Furthermore the comparison between the two groups after intervention was presented in Tables 3.

As this Table shows, all HBM constructs of intervention group were significantly better than the other group ( $P < 0.001$ ).

**Table 1. Demographics variables of intervention and control groups at initial of the study.**

variables	Intervention group n = 50	Control group n = 50	P-value
Maternal age (Mean $\pm$ SD)*	$27.40 \pm 5.39$	$26.26 \pm 5.31$	0.209
Pre-pregnancy BMI (Mean $\pm$ SD)*	$28.22 \pm 4.90$	$27.38 \pm 5.54$	0.424
Educational status [n (%)]**			
The first level (1 to 5 years)	4 (8)	2 (4)	0.646
The second level (6-9 years)	28 (56)	19 (38)	
The third level (10-12 years)	15 (30)	20 (40)	
The fourth level (more than 12 years)	2 (6)	9 (18)	
Occupational status [n (%)]**			
Housewife	48 (96)	47 (94)	0.107
Employed	2 (4)	3 (6)	

\*T-test \*\*Chi-squared test HBM\*\*\* Health Belief Model.

**Table 2. Comparison the mean scores of HBM constructs before and after intervention in both groups.**

HBM* constructs	Intervention group	Intervention group	P-value	Control group	Control group	P-value
	Before intervention n = 50 Mean $\pm$ SD**	After intervention n = 50 Mean $\pm$ SD		Before intervention (N = 50) Mean $\pm$ SD**	After intervention (N = 50) Mean $\pm$ SD	
Perceived susceptibility	12.98 $\pm$ 2.88	20.10 $\pm$ 2.44	< 0.001	13.48 $\pm$ 3.98	13.66 $\pm$ 3.22	0.80
Perceived severity	14.46 $\pm$ 3.05	20.70 $\pm$ 2.7	< 0.001	14.96 $\pm$ 3.99	15.48 $\pm$ 4.28	0.53
Perceived benefits	14.10 $\pm$ 3.31	21.64 $\pm$ 2.68	< 0.001	14.40 $\pm$ 4.31	14.32 $\pm$ 3.65	0.92
Perceived barriers	7.68 $\pm$ 2.55	17.84 $\pm$ 4.43	< 0.001	7.40 $\pm$ 2.30	7.84 $\pm$ 1.98	0.31
Cue to action	14.62 $\pm$ 3.44	17.12 $\pm$ 2.06	< 0.001	14.78 $\pm$ 3.12	14.12 $\pm$ 3.83	0.3
Perceived self-efficacy	16.04 $\pm$ 3.79	25.56 $\pm$ 2.74	< 0.001	16.18 $\pm$ 5.78	17.26 $\pm$ 4.37	0.30

HBM \*Health Belief Model SD\*\*: Standard Deviation.

**Table 3. Comparison between the mean scores of HBM constructs before and after intervention in intervention group.**

HBM* constructs	Intervention group (N = 50) Mean $\pm$ SD**	Control group (N = 50) Mean $\pm$ SD	P-value
Perceived susceptibility	20.10 $\pm$ 2.44	13.66 $\pm$ 3.22	< 0.0001
Perceived severity	20.70 $\pm$ 2.7	15.48 $\pm$ 4.28	< 0.0001
Perceived benefits	21.64 $\pm$ 2.68	14.32 $\pm$ 3.65	< 0.0001
Perceived barriers	17.84 $\pm$ 4.43	7.84 $\pm$ 1.98	< 0.0001
Cue to action	17.12 $\pm$ 2.06	14.12 $\pm$ 3.83	< 0.0001
Perceived self efficacy	25.56 $\pm$ 2.74	17.26 $\pm$ 4.37	< 0.0001

HBM\* Health Belief Model SD\*\*: Standard Deviation.

## Discussion

The current study explored the effect of exercise education using HBM on exercise behavior of pregnant women who were in their second to third pregnancy trimester.

The findings of this study showed improved perceived threat, perceived benefits and barriers, cue to action, and self-efficacy in trial group who were complied with educational program. In the line of this study, the previous study revealed that exercise education caused improved all HBM variables in postpartum period (Safarzadez, Behboodi Moghaddam, Saffari, 2014). Mason et al in a study to examine the effects of the pelvic floor exercise education provided to women during pregnancy and following delivery. This study showed that just leaving a training booklet near the hospital beds was not effective way for exercise education (Mason et al., 2013). The other study about determining the effect of educational intervention based on HBM on choosing delivery type revealed that education was effective and caused to improve

more function in trial group compared to controls (Rahimikian et al., 2009).

The results of our study indicated self-efficacy was significantly improved in intervention group compared with other group. The previous researchers have found in different some sub-groups of population that people with higher self-efficacy are more likely to engage in physical activity, (Bronwyn et al., 2012; Koring et al. 2012; Luszczynska et al., 2011) and the interventions that were self-efficacy oriented have been successful in promoting individuals' physical activity (Lee, Arthur & Avis 2008; Jerome & McAuley 2013). In a study the effects of endurance exercise on women's self-efficacy was evaluated and reported that doing these exercises made women in the postpartum period more self-efficient to exercise more (LeCheminant et al., 2012).

In the control group of the present study, women's exercise self-efficacy was increased at follow up compared to baseline. However, this increase was not significant and was less than

that found in the intervention group. It was argued that pregnancy is a vulnerable period in which factors such as anxiety and depression were increased due to occurred changes that in turn could have a negative impact on women's physical activity (Downs and Hausenblas, 2003). Over time, these concerns might diminish and the participants in control group might be also more compatible with the existing status that could be justification for the increase in self-efficacy found in the control group.

In spite of some limitations, this study has strength points of being randomized controlled trial and applying interventional program that may have been applied during prenatal care in the clinical setting.

However, the results of this study should be interpreted carefully because of the following limitations. Most of the participants of present study were housewives with low education level that may limit the generalize ability of the results to other populations. In addition, the small sample size of this study prohibit to examine the impact of education on different subgroups As the general socio-demographic variables, pregnancy-related demographic, and psychosocial factors affect women's exercise behaviors during pregnancy (Hausenblas et al., 2008), exploring these factors in future researches are guaranteed. Existed literature regarding pregnant women reveals that studies on exercise determinants, particularly psychosocial factors, are sparse (Mottola & Campbell, 2003). Therefore, an understanding of the relationship between psychosocial variables and exercise behavior is needed in order to design proper interventional program to promote exercise doing.

## Conclusion

This study revealed that the educational program based on health belief model could provide the pregnant women with a conceptual framework to improve the beliefs of pregnant women regarding exercise doing.

## Conflict of Interest

There is no conflict of interest for this article.

## Acknowledgement

The authors would like to thank research deputy of Tarbiat Modares University for its financial support of this study.

## Authors ' contribution

MM: Designing and conducting the study. Analyzing the data and writing the manuscript.

## Funding/Support

No Declared.

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