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The effect of Internet-based nutrition education according to Pender's health promotion model on gestational weight gain: Study protocol for a randomized controlled clinical trial

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Abstract:

BACKGROUND: Gestational weight gain (GWG) should be managed appropriately because both inadequate and excessive weight gain have negative health consequences for mother and child. Therefore, we report the study design for investigating the effect of nutrition education based on Pender's health promotion model (HPM) through the smartphone app on GWG.

MATERIALS AND METHODS: This randomized controlled trial (RCT) will be performed on the Internet for intervention by uploading text messages, audio, images, and portable document format (PDF) files via a group in one of the virtual messenger networks with the title "Nutrition education research plan." After random allocation, both control and intervention groups will receive the routine prenatal care including dietary recommendations. The data will be collected using a multipart researcher-made questionnaire containing 33 questions including demographic information and Pender's construct parts. The evaluation is performed with pretest, posttest, and measurement of the obtained weight. Paired and independent samples *t*-tests and analysis of variance (ANOVA) with repeated measurements will be applied to compare mean scores of constructs of Pender's HPM and gained weights.

RESULTS: The results of this study will clarify whether the present intervention will be effective on the total gestational weight gain and the weight gained in different weeks of pregnancy compared to the control group.

CONCLUSION: The obtained findings of this study might be useful for managing GWG and consequently maternal and neonatal outcomes.

Keywords:

Diet, food, and nutrition, health education, health promotion, Internet-based intervention, pregnancy weight gain

Introduction

Gestational weight gain (GWG) is controlled during pregnancy and refers to the difference between the last recorded weight (usually between 37 and 40 weeks of gestation) and the pre-pregnancy weight.^[1] Both inadequate

and excessive weight gain have negative health consequences; therefore, weight gain should be managed appropriately during pregnancy.^[2,3] Pender's health promotion model (HPM) is an attempt that has been used in changing the unhealthy nutritional behaviors, considering that it focuses on personal experiences and characteristics,

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behavior-specific cognitions and affect, and behavioral outcomes.^[4] As previous studies have shown that nutrition education based on the Pender model has made it possible to follow the food pyramid and weight correctly according to the limits recommended by the Medical Institute of Medicine (IOM).^[5,6] However, problems such as distance, fear of getting infected with coronavirus disease 2019 (COVID-19), pregnancy complaints such as pica and bed rest, and exposure to heat and cold make it difficult to hold training sessions. Therefore, nutritional interventions using mobile health applications with different goals were designed for pregnant women,^[7,8] which are available anytime and anywhere, and provide online consultation, user interaction, and easy access regardless of personal characteristics.^[9] However, there are very few interventions that use apps to control GWG following IOM guidelines and promote data-based healthy weight-related behaviors during pregnancy.^[10] Similarly, a systematic review reported that no published report used smartphone apps to manage GWG.^[11] Oppositely, Koeryaman *et al.*^[7] indicated that education through web-based applications was effective in healthy gestational weight gain. Moreover, we found no Pender-based trials that addressed pregnancy weight management via mobile apps, while there are reports of educational interventions using other models to promote maternal health behaviors.^[12,13] Therefore, according to the above-mentioned issues and our previous effective study on web-based education,^[14] we decided to conduct a study design for investigating the effect of nutrition education based on Pender's HPM through the smartphone app on GWG in all body mass index (BMI) groups.

Materials and Methods

Study participants and sampling

This randomized controlled trial (RCT) [IRCT20160120026129N2] will be conducted in accordance with the Consolidated Standards of Reporting Trials (CONSORT) checklist in Isfahan, Iran. Originally, Iranian primiparous women aged 18–40 years old after a single pregnancy will be recruited at 6–10th weeks of gestation between May 22, 2022, and July 21, 2023. Participants will be excluded if they suffer from medical problems affecting body weight (untreated thyroid disease), type 1 or 2 diabetes mellitus, specific mental illness, smoking and drug addiction, nutritional deficiencies and problems, chronic disease, usage of drugs that interfere with the study goals, kidney disease, all anemias including thalassemia minor, having a special diet, BMI greater than 35, and problems such as hyperemesis gravidarum. According to stratified sampling, 15 community health centers will be selected to introduce pregnant women. Using the following formula and counting affiliation rate of 20%, the significance

level of 0.05 (α), the required power of 0.90 (1- β), and to achieve a weight difference of at least 2.9 kilograms between the two groups (d) whose standard deviation values (61 and 62) are estimated to be 7.3 and 7 kg, respectively,^[15] at least 160 samples of pregnant women will be considered in each group. In such a way that at least 40 women for each BMI group (underweight, normal, overweight, and obese) will be selected for both intervention and control groups.

$$n = (Z_{1-\alpha/2} + Z_{1-\beta})^2 (61^2 + 62^2) / d^2$$

Study design and setting

A responsible person who will not participate in any of the research phases will use stratified randomization to reduce the possibility of heterogeneity due to pre-pregnancy BMI in the intervention and control groups. In such a way, four categories will be determined based on pre-pregnancy BMI (underweight, normal, overweight, and obese) which includes at least 80 participants (40 in the intervention and 40 in the control). Therefore, the mentioned person will have 20 blocks of four, which is the most common block size, and the number of participants in them is 6, and the devoted number to the sequence of each block is from 1 to 6. Then, using R^[16] software, that person chooses a group of random numbers and the first number with the same sequence number is assigned to the first block, and based on the specific order of the block, the participants in each category are assigned to the intervention or control group.

At the beginning of the intervention, the first author will carefully explain the study goals for the willing women who have been introduced to 15 community health centers. The selection of primiparous women will homogenize the study population, as well as eliminate the confounding effects caused by the parity on the pregnancy outcome. After taking the written consent, the participants will open the next closed letters to determine the assigned number in intervention or control. It should be noted that they will receive the routine prenatal care including dietary recommendations; also, fetal health will be checked according to routine pregnancy care. Furthermore, a group will be created in one of the virtual messenger networks for the intervention with the title "Nutrition education research plan" to offer educational content for the experiment group. Because of the nature of the intervention, participants will not be blinded, but healthcare providers and data analysts will be blinded.

Data collection tool and technique

The data will be collected using a multipart researcher-made questionnaire containing 33 questions. The demographic information part will include 11 questions related to age, education level, occupation,

spouse's characteristics (age, education, and occupation), desired or unplanned pregnancy, the housing conditions, having or not a having car, monthly household income, and pre-pregnancy BMI.

Perceived benefits based on the association between healthy nutrition and the prevention of maternal and child obesity, the possibility of having healthy nutrition considering the costs, the correlation between healthy nutrition and reducing pregnancy, and childbirth complications will be asked by asking four questions with a range of 0–16 scores. Perceived barriers will include time, deprivation of pleasure, fatigue, expenses, wife's taste, pica, or other pregnancy complaints (six questions). Three questions about following the food pyramid, obedience of healthy eating habits in all situations, and compliance with healthy cooking method with a score of 1–10 will form self-efficacy questions. Activity-related affects will be related to nutritional behavior in the case of feelings of happiness and unhappiness due to the obedience of educational tips (two cases). Questions of interpersonal influences will include one question about spouse support and one question about family support, each of their scores ranging from 0 to 4. The construct of situational influences with two questions about the importance of physical appearance and reading educational messages will be measured (ranging from 0 to 4). The structure of immediate competing demands and preferences will be assessed based on three questions that for them a 5-choice scale with scores from 0 to 4 and, totally, 0–12 will be considered. Those included the following: 1) It is more convenient to eat family's food with parents' or spouses' parents; 2) cooking methods such as frying make food tastier; and 3) spouse or other family members will be preferred unhealthy foods and snacks. The structure of commitment to nutrition education (three questions based on a 5-option scale) will be evaluated via providing a daily schedule for preparing food, buying healthy food as the first source of spending money, following training recommendations in any situations, and study of educational messages.^[5,6] Ten specialists in health education and health promotion, nutrition, and obstetrics verified the content validity of educational contents. Also, they commented on the level of difficulty, the degree of relevance, and ambiguity considering the main purposes of the study. In the next step, the item impact score index of each structure will be estimated to determine the appropriateness of each case for subsequent analysis, and all the structures got an impact factor of more than 1.5.^[17] To check the reliability and in order to ensure that the items are correct and being designed in the best way, the content validity ratio (CVR) and content validity index (CVI) were calculated, which were more than 0.71 and 0.79, respectively. The internal stability of the instrument was checked by determining Cronbach's alpha coefficient. It was 0.784 for the construct

of perceived benefits, 0.809 for perceived barriers, 0.824 for perceived self-efficacy, 0.840 for activity-related affects, 0.904 and 0.924 for interpersonal influences, 0.708 for situational influences, 0.770 for immediate competing demands and preferences, and 0.790 for commitment to education.

Educational intervention: Due to the distance, fear of being infected by COVID-19, hot and cold weather, and pregnancy complaints, the educational intervention was conducted on the Internet by uploading text messages, audio, images, and portable document format (PDF) files. First, the study goals will be explained to participants at 6–10 weeks of gestation, who will be recruited gradually in the virtual group. To manage stress, they will be told to put their questions in the group in the last 2 days, and if they are urgent, they should raise them in the private files. Next, the educational content will be adjusted based on the national comprehensive guideline for mothers,^[18] the book on food safety, health nutrition,^[19] and pretest results. Also, the desired content will be offered in accordance with Pender's HPM. We will try to devote 55% of total energy intake to carbohydrates (especially complex carbohydrate), 25–30% to fat (preferably unsaturated fats instead of saturated), and 15–20% to protein (contains plant and animal protein) until the end of pregnancy. Also, the principles of education will consist of obedience of balance and diversity by considering food groups, weighing correctly according to the IOM charts, healthy dietary habits, and healthy cooking methods. In the next stage, we will emphasize on limiting the consumption of fried foods, unhealthy snacks, and high-fat dairy products, and, moreover, using whole grain bread instead of white bread and vegetables instead of pickles. Then, the pre-pregnancy BMI of the participants will be calculated and each subject with her special code will be placed in one of the four groups of BMI to teach the distinct recommendations of each BMI group. The images containing these codes, key points of each BMI group, and weighing charts of each BMI group will be displayed on the virtual group. Also, participants will be told that if they are not able to copy the charts and draw their weight, declare their obtained weights in two different measurements in a private file, so that the special chart of each person will be drawn and displayed by her code in the group. Then, the explanations related to these charts will be described to the participants in the form of short text files to improve their self-efficacy. The pretest will be administered on Pender's HPM constructs over the phone via questionnaire. To measure the prior related behavior of participants, three 24-hour dietary recalls will be collected by responsible person through the virtual group. At first, the strategies used for perceived benefits will be to state the benefits of preventing excessive GWG for the mother and child,^[6] in the form of various scientific texts. Also, the results

of our previous study based on the lack of correct and standard receipt of 40 nutrients will be displayed to the participants.^[20,21] Another strategy used to increase self-efficacy included teaching the food pyramid with pictures and simple text files.^[5,18]

Then, ways to increase protein intake and reduce fat, sugar, bread, and grain group will be described in the text messages as easy and applicable tips to reduce perceived benefits.^[18] In order to improve the commitment construct, subjects will be asked to provide the daily intake of food portions. Considering the results of the pretest and the fact that reading the educational messages is one of the two items to measure the structure of situational influences,^[6] we will try to carefully prepare the messages for all tastes. For example, messages with mechanism of action and expression of biochemical and physiological properties will be presented for those interested in scientific material, messages with beautiful images for artists, and simple and short messages for women with a lower literacy level. It will also be tried to provide messages containing practical tips to increase compliance or sometimes attractive messages for everyone will also be presented among the messages, for example, messages that contain tips that affect the beauty of the fetus.

The next steps will be reviewing the self-efficacy promotion strategies, getting to know psychological factors and feelings related to nutritional behavior, and getting social support from others. The strategy used for activity-related affects will be group discussion and brainstorming to express emotions (feelings), which will help to facilitate the evaluation of these emotions. Also, participants will be instructed on how to deal with negative emotions and how to care for and deal with a baby in various aspects of nutrition, hygiene, clothing, and other matters, to strengthen positive feelings.^[22] In this regard, the group will be opened on the weekends and participants will be guided to share their experiences and obstacles to receive the correct portions of food groups with each other and to discuss the obstacles on the way to proper nutrition and overcome unhealthy eating, similar to the method of brainstorming and role-playing. Also, the learners will be asked to explain how to deal with negative emotions and to discuss their own and others' emotions about the points taught.^[6] Due to the limitations of using the virtual group and lack of experience, we cannot train husbands, mothers, or mothers-in-law, but it will be emphasized to the participants that it is necessary to follow the tips instructed at different times and places for the prevention of gestational diabetes, gestational hypertension, pre-eclampsia, and low birth weight. Also, it is necessary to take the support of the husbands, mothers, or mothers-in-law (if they eat at their parents' house).

Again, the obstacles and problems will be discussed with participants in group, and they were also asked to discuss the influence of others on nutritional self-care. In order to improve the commitment to nutritional behaviors, participants will be asked to prepare a daily schedule in order to record the number of food portions they receive and also write a letter to their child and promise that they will use recommended points as much as possible. About 16–20 weeks of gestation, pretesting of baking methods will be conducted. Furthermore, the considered strategy to reduce the perceived barriers will be to recommend the consumption of fresh vegetables and fruits to increase the nutritional value of the portions received and reduce costs. Moreover, obstacles to reduce the intake of fat, carbohydrates, and sugars, as well as increase protein intake, will be explained.^[18] In order to increase the structural score of preferences and immediate demands, how to prepare several healthy foods with good flavor will be presented using videos. In addition, proper cooking methods, proper cooking dishes, storage, and packaging of food^[19] will be taught through videos, voice messages, PDFs, images, and Word files because the practical demonstration of cooking and providing the possibility of tasting healthy food will not be practical in terms of facilities, space, and budget. At 31–34 weeks of gestation, the tables of daily received food portions will be checked to evaluate the used strategy, especially the commitment to implementation. Also, educational content will be provided through the mentioned strategies.

At 35–37 weeks of gestation, the posttest will be administered on Pender's HPM constructs over the phone through questionnaire for both groups, while the control group will receive nutrition training on the Internet by forming a group under the title "Nutrition training during breastfeeding." Also, a 3-day dietary record will be taken from the participants in two groups.

Ethical consideration

The Research Ethics Committee of Isfahan University of Medical Sciences approved this RCT (IR.MUI.MED.REC.1400.206). Also, the study goals will be explained to the participants, and they will be assured that their information will remain confidential. Moreover, intervention will be initiated after a written agreement.

Discussion

Previously published studies including nutrition education based on the Pender model demonstrated significant improvement in adherence to the food pyramid^[5] and the recommendations of the IOM to prevent excessive weight gain during pregnancy.^[6] This study describes the study protocol of a RCT investigating the effectiveness of nutrition education based on Pender's

HPM through the smartphone app on GWG in all BMI groups. We did not find any other virtual nutrition education based on Pender's model but Moshki *et al.*'s^[23] findings indicated that both multimedia package and group discussion approaches enhanced lifestyle scores in pregnant women. Likewise, Bijani *et al.*'s^[24] educational program based on Pender's model included face-to-face and online training that showed significant differences between the intervention and control groups in terms of self-efficacy, stress management, and quality-of-life scores among patients with multiple sclerosis. Sabooteh *et al.*'s^[25] web-based trial and educational software offering tailored message based on Pender's constructs enhanced students' physical activity scores compared to control which did not take any intervention.

This study protocol reports the need to survey the impact of new instructive methods to provide a comprehensive and consistent pregnancy self-management package, which can be used on a wide scale. We hypothesized that participants in the experimental arm will show improvements in maternal and child outcomes in comparison with the controls, which will also result in valuable effect on participants' long-term consequences.

This protocol provides a cost-effective intervention with easy access regardless of personal characteristics that can be implemented in anytime and anywhere. Also, considering the use of Pender's HPM, it will have large impacts on maternal and child health outcomes, especially the investigation in this field is still in its initial stages.

Limitation and recommendation

Not being use of mobile during pregnancy, lack of patience to follow the training points due to complaints of pregnancy, education, or work may limit the implementation of the protocol. Therefore, it is suggested that training tips be presented in the form of short video or audio messages, clear and vivid images, and very short videos. Also, daily training tips should be provided for less than 15 minutes so that pregnant mothers do not get tired and can follow the training despite pregnancy problems. Also, women who do not use the phone also devote a few minutes to study the educational material.

Conclusion

The constructs of Pender's model may provide a suitable approach for nutrition education to follow comprehensive nutrition guide and gain weight within the IOM range among pregnant women in such a way that higher scores of some constructs and lower scores of other constructs were most likely to manage GWG. Furthermore, in the training based on the model via Internet, researchers can design more effective

educational programs that are available anytime and anywhere, and provide online consultation and easy access regardless of personal characteristics.

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Conflicts of interest

There are no conflicts of interest.

References

1. Dalfrà MG, Burlina S, Lapolla A. Weight gain during pregnancy: A narrative review on the recent evidences. *Diabetes Res Clin Pract* 2022;188:109913.
2. Arnedillo-Sánchez S, de la Osa RM, Arnedillo-Sánchez I. Unhealthy gestational weight gain: Are we neglecting inadequate gestational weight gain? *Midwifery* 2022;107:103277.
3. Langley-Evans SC, Pearce J, Ellis S. Overweight, obesity and excessive weight gain in pregnancy as risk factors for adverse pregnancy outcomes: A narrative review. *J Hum Nutr Diet* 2022;35:250-64.
4. Parsons MA, Pender NJ, Murdaugh CL. *Health Promotion in Nursing Practice*. Pearson Higher Ed.; 2011.
5. Goodarzi-Khoigani M, Moghadam MH, Nadjarzadeh A, Mardanian F, Fallahzadeh H, Mazloomi-Mahmoodabad S. Impact of nutrition education in improving dietary pattern during pregnancy based on pender's health promotion model: A randomized clinical trial. *Iran J Nurs Midwifery Res* 2018;23:18-25.
6. Mazloomi-Mahmoodabad SS, Baghiani-Moghadam MH, Nadjarzadeh A, Mardanian F, Mohammadi R, Zare N, *et al.* The effect of nutrition education on gestational weight gain based on the Pender's health promotion model: A randomized clinical trial study. *J Isfahan Med Sch* 2020;37:1272-9.
7. Koeryaman MT, Pallikadavath S, Ryder IH, Kandala N. The effectiveness of a web-based application for a balanced diet and healthy weight among Indonesian pregnant women: Randomized controlled trial. *JMIR Form Res* 2023;7:e38378.
8. van Dijk MR, Koster MP, Oostingh EC, Willemsen SP, Steegers EA, Steegers-Theunissen RP. A mobile app lifestyle intervention to improve healthy nutrition in women before and during early pregnancy: Single-center randomized controlled trial. *J Med Internet Res* 2020;22:e15773.
9. Pouriayevali B, Ehteshami A, Kohan S, Saghaeiannejad-Isfahani S. Functionality of self-care for pregnancy mobile applications: A review study. *J Educ Health Promot* 2022;11:415.
10. Dahl AA, Dunn CG, Boutté AK, Crimarco A, Turner-McGrievy G. Mobilizing mHealth for moms: A review of mobile apps for tracking gestational weight gain. *J Technol Behav Sci* 2018;3:32-40.
11. Farzandipour M, Nabovati E, Anvari S, Vahedpoor Z, Sharif R. Phone-based interventions to control gestational weight gain: A systematic review on features and effects. *Inform Health Soc*

- Care 2020;45:15-30.
12. EL Sayed HA, Sarhan AE. Effect of health belief model-based educational intervention on COVID-19 preventive behaviors among pregnant women. *Tanta Sci Nurs J* 2022;24:305-35.
 13. Escobar MF, Echavarría MP, Gallego JC, Riascos N, Vasquez H, Nasner D, *et al.* Effect of a model based on education and teleassistance for the management of obstetric emergencies in 10 rural populations from Colombia. *Digital Health* 2022;8:20552076221129077.
 14. Shahshahani MS, Goodarzi-Khoigani M, Eghtedari M, Javadzade H, Jouzi M. Effectiveness of a web-based program on self-care behaviors and glycosylated hemoglobin in patients with type 2 diabetes: Study protocol of a randomized controlled trial. *J Educ Health Promot* 2023;12:284.
 15. Bogaerts AF, Devlieger R, Nuyts E, Witters I, Gyselaers W, Van den Bergh BR. Effects of lifestyle intervention in obese pregnant women on gestational weight gain and mental health: A randomized controlled trial. *Int J Obes (Lond)* 2013;37:814-21.
 16. Available from: <https://cran.r-project.org/web/packages/randomizeR/randomizeR.pdf>.
 17. Colton D, Covert RW. Designing and constructing instruments for social research and evaluation. John Wiley & Sons; 2007 Aug 13.
 18. Bakhshandeh M, Pooraram H, Torkestani F, Torabi P, Abedini MD. The National Comprehensive Guideline for Mothers: An Eating Guide with Practical Educational Points Specifically Developed to Promote Healthy Eating During Pregnancy and Breast Feeding. Tehran, Iran: Andishe Mandegar Publications; 2013. [In Persian].
 19. Alipour Birgani R. Food Safety, Health Nutrition. 1st ed. Isfahan, Iran: Isfahan University of Medical Sciences; 2008. p. 19-32. [In Persian].
 20. Mansourian M, Mohammadi R, Marateb HR, Yazdani A, Goodarzi Khoigani M, Molavi S. Comprehensive maternal characteristics associated with birth weight: Bayesian modeling in a prospective cohort study from Iran. *J Res Med Sci* 2017;22:107.
 21. Mardanian F, Goodarzi-Khoigani M, Mahmoodabad SS, Moghadam MH, Nadjarzadeh A, Feizi A, *et al.* The association between serum TSH concentration within the normal range and nutritional status in euthyroid pregnant women at the first trimester of gestation. *J Res Med Sci* 2021;26:93.
 22. Heslehurst N, Newham J, Maniopoulos G, Fleetwood C, Robalino S, Rankin J. Implementation of pregnancy weight management and obesity guidelines: A meta-synthesis of healthcare professionals' barriers and facilitators using the Theoretical Domains Framework. *Obes Rev* 2014;15:462-86.
 23. Moshki M, Gholamiyan Bajestani R, Hossein H, Bahri N. The effects of group discussion and multimedia package education interventions on healthy lifestyle among pregnant women: A field trial study. *J Res Health* 2023;13:4.
 24. Bijani M, Niknam M, Karimi S, Naderi Z, Dehghan A. The effect of peer education based on Pender's health promotion model on quality of life, stress management and self-efficacy of patients with multiple sclerosis: A randomized controlled clinical trial. *BMC Neurol* 2022;22:144.
 25. Sabooteh S, Feizi A, Shekarchizadeh P, Shahnazi H, Mostafavi F. Designing and evaluation of E-health educational intervention on students' physical activity: An application of Pender's health promotion model. *BMC Public Health* 2021;21:657.