



Weight Management Promotion among Preschoolers: a Protocol for a Pilot Study using Mixed Methods

ARTICLE INFO

Article Type

Protocol

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How to cite this article

Hamzavi Zarghani N, Ghofranipour F, Mohammadi E, Haeri Mehrizi A.A, Cardon G. Weight Management Promotion among Preschoolers: a Protocol for a Pilot Study using Mixed Methods. Health Education and Health Promotion. 2021;9(3):221-227.

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Article History

Received: April 26, 2021

Accepted: May 24, 2021

ePublished: September 05, 2021

ABSTRACT

Aims This protocol aims to design and evaluate an educational program to promote weight management among preschoolers.

Designed Methods This study has a sequential mixed-methods approach in two phases: qualitative and quantitative. In the first phase, epidemiological, educational, and ecological factors of the PRECEDE-PROCEED model influencing weight management promotion among Tehranian preschoolers will be explored. Seventeen preschoolers' parents and two preschool principals were interviewed by the researcher in the preschool setting. After data analysis through directed content analysis, a one-group pre and post pilot study will be performed in phase two. Fifteen mother-children dyads will be enrolled, and mothers will be asked to complete four questionnaires and measure children's weight and height. Then an educational program will be designed to promote weight management among preschoolers based on the results of the qualitative phase and a pre-test stage. Post-test will be performed immediately and three months after the intervention.

Expected Findings In phase one, we expect facilities and barriers of preschoolers' weight management to be identified based on social-cultural conditions and the structures of the model. According to the qualitative study results, an educational program will be developed and evaluated in phase two, and it is anticipated that the educational program will positively influence children's weight management.

Conclusion In the various communities, cultural and social differences have a critical effect on obesity in preschoolers; therefore, examining these factors can help understand individuals' views and interventional design programs to solve this problem.

Keywords Mothers; Model; Obesity; Pilot Study; Preschool Children; Qualitative Research

CITATION LINKS

[1] Quality of life in overweight and ... [2] Impaired parent-reported health-related ... [3] Prevalence and sociodemographic ... [4] Overweight and obesity in eastern ... [5] First nationwide survey ... [6] Prevalence of overweight and obesity ... [7] Childhood obesity, a threat to ... [8] Prevalence and risk factors of ... [9] Report of the commission on ending ... [10] The effects of a community ... [11] Screening for obesity and intervention ... [12] Effect of the children's ... [13] Time 2b healthy—an online ... [14] Time 2b healthy—an online ... [15] Effects of a kindergarten-based ... [16] Effect of a behavioral intervention ... [17] Sustainability of effects ... [18] Designing and implementing ... [19] Childhood obesity prevention ... [20] Prevalence of overweight ... [21] Prevalence of underweight ... [22] Childhood obesity, overweight ... [23] Demographic determinants ... [24] Influence of lifestyle factors on ... [25] Children with obesity ... [26] Contributors to childhood obesity ... [27] A healthy school start plus for prevention ... [28] The complexities of childhood ... [29] Factors facilitating the implementation ... [30] Theoretical foundations of ... [31] Health program planning: An ... [32] Research design, qualitative ... [33] Three approaches to qualitative ... [34] Study protocol-indigenous ... [35] Reliability and relative validity of ... [36] Validity and reliability of Persian version of children's ... [37] Preventing childhood obesity in early care ... [38] How to motivate childcare workers to engage ... [39] Inventory of determinants of obesity-related ... [40] The toybox-study obesity prevention programme ...

Introduction

The prevalence of obesity and overweight among children has raised public health concerns over the last few decades [1]. Worldwide this prevalence among preschool children was 6.7% in 2010, and it was predicted to reach 9.1% by 2020 [2]. As shown further in the European ToyBox-study, there was a high prevalence of overweight and obesity in preschoolers, especially in Southern and Eastern Europe [3]. According to the results of a systematic review conducted in the Eastern Mediterranean Region, the overweight rate was 1.9% to 21.9% among children less than five years of age [4]. Additionally, the first nationwide survey among Iranian preschoolers revealed that 17% were overweight/obese [5]. Moreover, the overweight rate among children aged 5-6 years in Tehran, Iran was 11.51% and 7.36%, and the prevalence of obesity obtained 10.99% and 4.73% in girls and boys, respectively [6].

Obesity and overweight in childhood are the main indicators of an unhealthy lifestyle, resulting in non-communicable diseases, such as diabetes, cancers, and cardiovascular diseases in adulthood [7, 8]. In addition, other adverse effects of overweight are psychological disorders, including low self-esteem, depression, weak socialization, educational achievement, and quality of life can be affected by obesity in childhood [8, 9].

Behavior change interventions are effective in weight management and to prevent relevant health problems in childhood and future life [10, 11]. Various educational interventions have been implemented on different groups such as parents, teachers, parents, and children at home or in preschool

environments to prevent overweight and obesity in children [12-18]. In addition, a systematic review of controlled trials of childhood obesity prevention interventions reported an improvement in dietary behaviors and physical activity levels, and adiposity [19].

Many studies conducted on weight status in Iranian preschoolers have focused on the prevalence of overweight and obesity [20-22]. Also, some of them reported an association between overweight and obesity with some variables such as parental obesity and demographic variables, and screen time in children [20, 22-24]. However, mentioned studies had a cross-sectional design, and no qualitative study has been conducted on weight management in Iranian preschoolers. Besides, individuals' attitudes, beliefs, and views to prevent childhood obesity have mostly been examined among Iranian adolescents and primary school-aged children [25, 26]. On the other hand, findings show that different cultures and social disparity may play a crucial role in the appearance of obesity, and focusing on these factors can help to understand the subjects' perspective on obesity and to improve strategic planning and to develop interventions for this problem [4, 27]. Furthermore, mothers' perception of their children's weight status has important effects on weight management and the prevention of childhood obesity [28].

In studies, conceptual models can be used as a framework of the study [29]; therefore, the PRECEDE-PROCEED as a common model in health education and health promotion [30] is considered a guideline for this research. The model has eight phases which are displayed in Figure 1 [31].

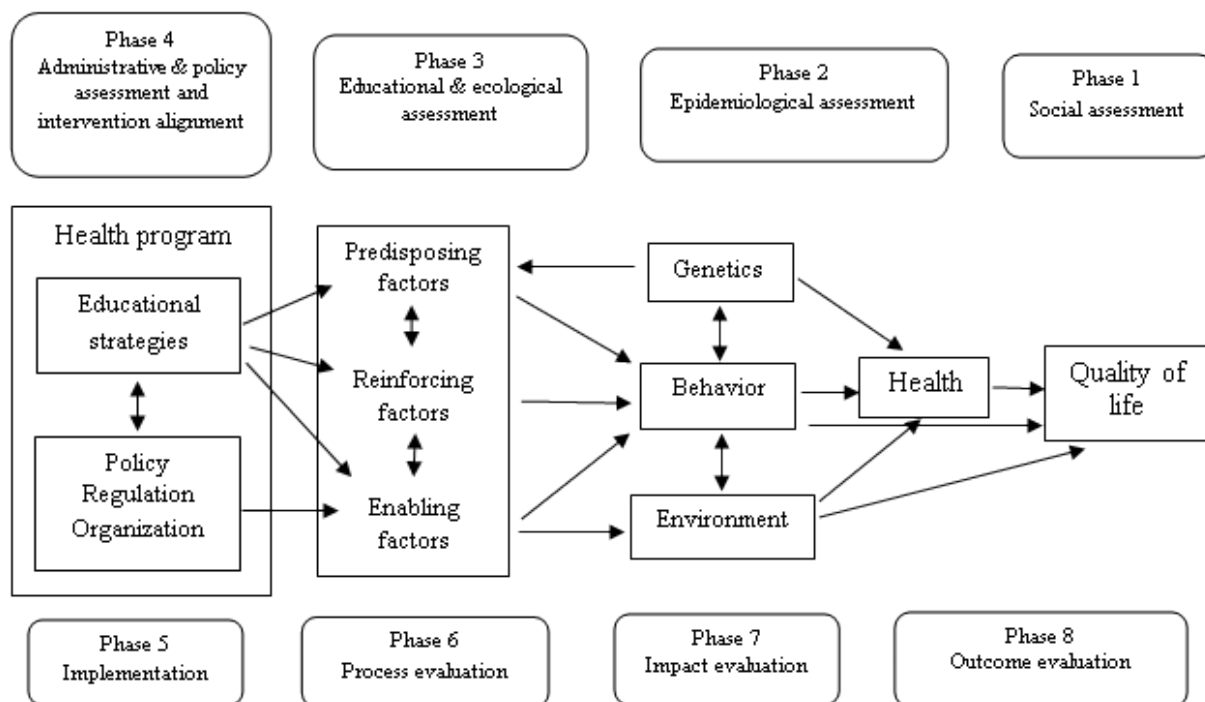


Figure 1) The PRECEDE-PROCEED model framework

This study aims to design and evaluate an educational program to promote weight management among preschoolers based on the PRECEDE-PROCEED model.

In this study, children's Body Mass Index (BMI) changes at the three-month follow-up are the primary outcome. In contrast, the secondary outcomes are changes in quality of life and dietary, physical activity, and sedentary behaviors in children three months after implementing the educational program.

Designed Methods

This study had an exploratory sequential mixed-methods approach, starting in 2019. This approach has a two-phase mixed methods design that begins with a qualitative study and is followed by a quantitative study, and the results of the first phase will be used in the second phase [32]. Also, both phases of the study have been carried out based on the PRECEDE-PROCEED model. The epidemiological, educational, and ecological structures of the PRECEDE-PROCEED model were utilized to design the interview questions and data analysis in the qualitative phase. The purpose of this directed content analysis is to explore behavioral and environmental determinants (phase two) and to predispose, enabling, and reinforcing factors (phase three) based on the model to promote weight management in preschoolers and also to validate or extend the theoretical framework, conceptually [33]. Then, in phase two, the findings from the first phase will be utilized to build into the quantitative phase, which has two parts: 1) designing an educational program and 2) implementation and evaluation of the educational program. Sampling in two phases is different because, in the qualitative study, the number of participants is smaller than the quantitative study to generalize the study results to a population; however, samples for both phases are from a similar population [32]. A flow diagram of the mixed methods study protocol is shown in Figure 2.

Qualitative Phase

This phase was accomplished in preschools of six areas divided by Tehran municipality in Tehran, Iran, in 2019. The preschools are supervised by the Tehran welfare organization, although they are private. In this phase, purposive sampling with maximum variation was performed in preschools of Tehran, and data collection was continued to reach data saturation and add further data revealed no new codes. The participants included 17 parents of 3-5-year-old children and two preschool principals who agreed to participate in this study and share their experiences regarding weight management in

their preschoolers.

This stage explores the behavioral, environmental, predisposing, and enabling, and reinforcing factors that affected weight management among Tehranian preschoolers. Data collection was done through a triangulation method including semi-structured interviews, observation of the preschool play equipment, and applying documents such as existing dietary and activity plans in preschools. The triangulation method increases the study's validity and understanding of the different aspects of weight management [34].

Structured questionnaires are not used as a data collection method in qualitative studies, so an individual semi-structured in-depth interview was performed with children's parents and principals of the preschools. Following open-ended questions based on behavioral and environmental determinants and predisposing, enabling and reinforcing factors and the participants' answers, the researcher used probes to explore hidden layers. Therefore, some questions, such as "Please explain more about ...? Could you give an example?" [33] were asked by the researcher. All interviews were recorded with participants' permission and transcribed word by word by one researcher. In addition, the researcher observed the preschool play equipment and applied documents such as a list of dietary and physical activity plans from principals to a deeper understanding of these behaviors in preschoolers.

The purpose and methodology of the study will be explained to the participants, and written informed consent will be obtained by the researcher. Also, the questionnaires will be stored without identifying information and names. The Ethical Committee Board of Faculty of Medical Sciences of the Tarbiat Modares University has approved this study protocol.

Data were analyzed manually through directed content analysis based on constructs in phases two and three of the PRECEDE-PROCEED model, simultaneously with data collection. First, each interview was read several times to understand the concept by two researchers. In the next step, the researchers coded sentences related to weight management promotion based on determined constructs of the model. The codes were placed in categories of the PRECEDE-PROCEED model, such as behavioral, environmental, predisposing, enabling, and reinforcing factors. The first matrix of coding was designed based on the structures of the model and was embedding the codes in them to distinguish which categories were confirmed by the interviewees mostly. Data that could not be classified in the coding system were given a new code.

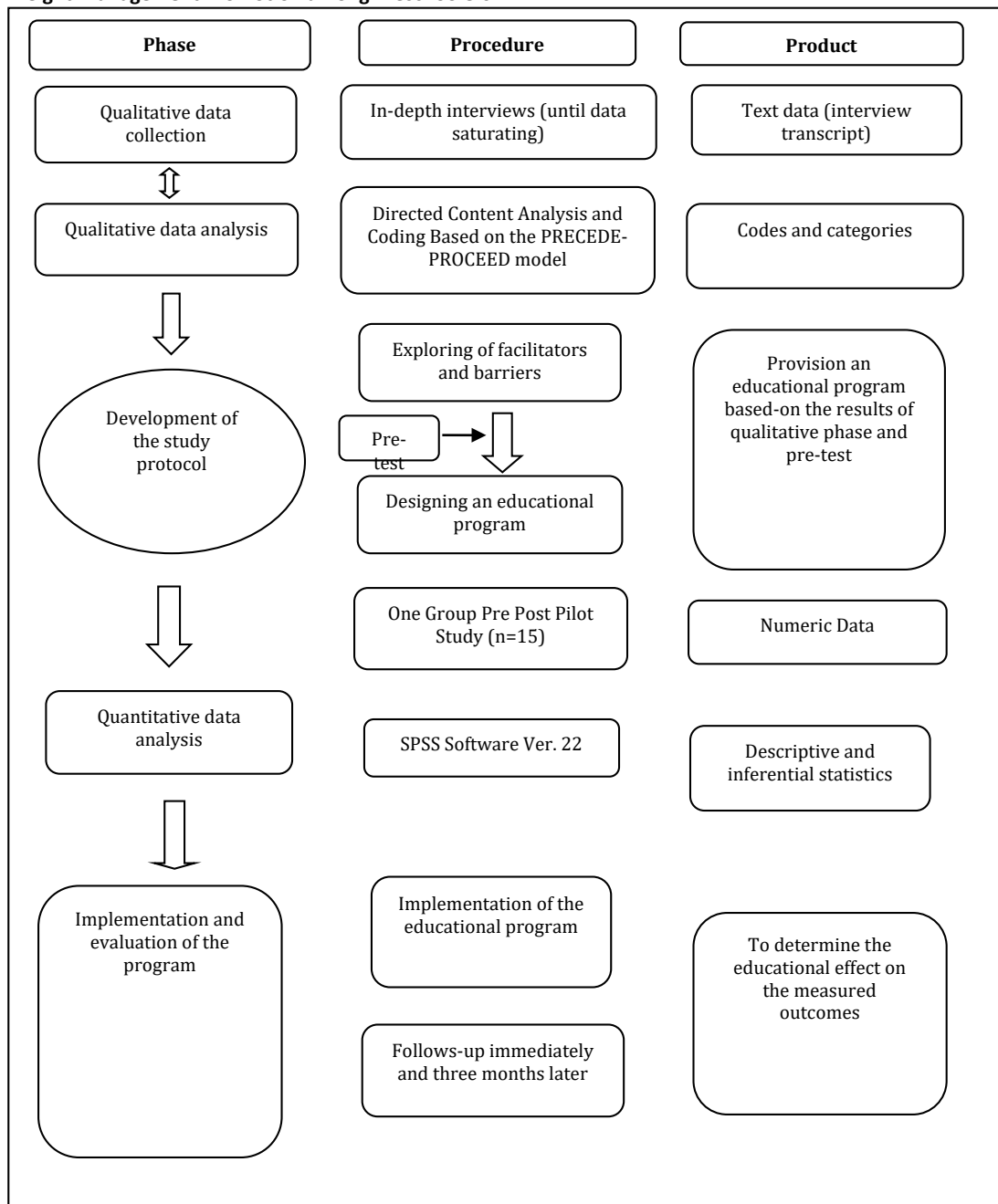


Figure 2) Sequential mixed methods research design

Quantitative study

Designing an educational program

An educational program is designed based on the results of the qualitative phase and information obtained from a pre-test stage. The pre-test stage includes completing four questionnaires and measuring the children's weight and height by mothers to determine participants' features and lifestyle behaviors in children due to the difference in sampling in both qualitative and quantitative phases. Questionnaires contain the food frequency questionnaire (FFQ), [35] the child health questionnaire (CHQ) [36], and Children's physical activity and sedentary behaviors checklist as well as demographic characteristics of parents and their preschoolers designed by the researchers. FFQ

includes 168 food items concerning the frequency of dietary in one year. According to the mean energy, the mean reliability coefficients change from 0.48 to 0.65 in individuals aged 35 or younger and participants aged over 35, respectively [35]. The Persian version of children's health-related quality of life contains 22 items, and its internal consistency is reported to be $\alpha = 0.68-0.85$ [36]. Children's physical activity and sedentary behaviors checklist includes eight designed by the research team. Behavioral and environmental factors to be targeted to promote weight management are developed for those behaviors and environments identified as being more changeable and important [34] based on the results of the first phase and the pre-test. Also, predisposing, enabling, and reinforcing factors

influencing behavioral and environmental determinants will be based on the results of the qualitative phase. According to these results indicating the needs, problems, resources, and constraints in weight management among preschool children aged 3-5 years in Tehran, the content of the educational program will be prepared by the research team.

The educational program will consist of six weeks program presented to mothers via WhatsApp, a well-known and widely used application among Iranian people to share educational videos and messages and discuss participants' questions. Therefore, the researcher will establish a WhatsApp group. The content of the educational program contains educational videos and messages with an emphasis on the most important behaviors and factors identified based on the results of the qualitative phase and the pre-test stage. The research team will prepare all educational messages and videos based on the existing healthy lifestyle guidelines. Furthermore, strategies will be considered to overcome barriers that mothers may face to change their children's lifestyles.

Behavior change theories help develop educational interventions and recognize and choose the best methods for improving health behaviors [30]. Therefore, according to the results of the qualitative phase and the pre-test stage in this study, we will use an appropriate educational theory as a guideline. In this regard, previous studies designed based on the change theories and models to prevent obesity in children suggest using theories of change to promote the results of studies [37, 38].

Implementation and evaluation (a pilot study)

In this one-group pre and post-pre-experimental study, convenience sampling is utilized to select preschools in Tehran. Fifteen mothers will receive the designed educational program. This sample size is adequate for the primary analysis. The results will be compared before and after the intervention to assess the effectiveness of the educational program on preschoolers' weight management.

In the current study, mothers are eligible to participate if they have children 3-5 years old who spend at least four days in a week in the preschool and have an active cell phone with text-messaging ability. The exclusion criteria include unwillingness to continue participating in the study and being unable to participate due to illness.

At baseline, mothers are asked to fill out the FFQ, CHQ questionnaires, Children's physical activity and sedentary behaviors checklist, and demographic characteristics of themselves and their preschoolers. In addition, the mothers are asked to measure their children's weight and height via a weight scale and a stadiometer. Immediately and three months after implementation of the intervention post-test will be performed.

In the quantitative phase, frequency distribution, mean, standard deviation or median will be used according to the type of study variables. The Chi-square test will be employed for qualitative variables. To compare the values obtained from the baseline and follow-up phases, the Friedman test as a non-parametric statistical test will be applied to study the effect of education on the measured outcomes. Data analysis is performed using SPSS statistics version 22, and the p-value of less than 0.05 will be considered significant.

Expected Findings

We started data collection in the qualitative phase in January 2019. The researcher interviewed nineteen participants, containing 17 parents and two preschools principals in the preschool setting. Upon conclusion of the first phase, we will start to collect data in the pre-test stage, and the results will be used to design the educational program. After implementing the educational program, we will evaluate and compare the effectiveness of the educational program before and after the intervention.

In the first phase of this study, directed content analysis will be used based on the PRECEDE-PROCEED model, so it is expected that predisposing, enabling, and reinforcing factors affecting children's weight management will be identified. In phase two, we anticipate that the designed educational program will positively influence children's weight management concerning the first phase results. It is expected that the study results will be published in the first half of the year 2022.

Discussion

This study aims to design and evaluate an educational program regarding weight management promotion among Tehranian preschoolers based on a qualitative study and a pre-test stage. As social-cultural factors influence Iranian children's weight management [39], the integrated qualitative and quantitative approaches can provide an in-depth understanding of participants' experiences on this concept and help design an educational program based on a culturally sensitive approach. Additionally, the findings may help health promoters and educators, and policy makers develop culturally adapted interventional strategies to improve weight management in early life.

Preschool children are a more critical target group for addressing weight management and obesity prevention programs than those in their late childhood due to the easier behavior change over these years [6, 40]. Therefore, it is expected that the results of this study are effective for weight management promotion among preschoolers and contribute to preventing non-communicable

diseases since prevention and control of risk factors of non-communicable diseases, such as obesity and overweight, have been identified as a priority through the Sustainable Development Goals (SDG) [9].

The main strength of this study is the use of a mixed-methods approach, which can lead to making a profile from determinants of preschoolers' weight management promotion, and as a result, develop an educational program. However, in this study, one major limitation is the lack of designing a questionnaire based on the results of the qualitative phase to evaluate the effectiveness of the developed educational program on children's weight management in the quantitative phase. Another limitation of the study may pertain to the method of data collection (i.e., self-reporting), which could have resulted in social desirability bias.

Conclusion

The first phase results can explore factors in the second and third phases of the PRECEDE-PROCEED model that should be targeted to design an educational program to promote weight management in Tehranian preschoolers. Cultural and social differences have an important effect on the appearance of obesity in children, so determining these factors can help understand individuals' views and interventional design programs for this problem. Therefore, designing and evaluating an educational program among preschoolers based on the results of the qualitative phase provides an insight into the social-cultural context to improve weight management in Tehranian preschoolers.

Acknowledgments: The authors are grateful to the Tehran Welfare Organization, preschools principals, the children's parents, and other participants in advance for their invaluable participation in this study.

Ethical Permissions: This study protocol has been approved by the Ethical Committee Board of Faculty of Medical Sciences of the Tarbiat Modares University (Approval code: IR.MODARES.REC.1397.034).

Conflict of Interests: The authors declare that they have no conflict of interest.

Authors' Contribution: Hamzavi Zarghani N. (First Author), Introduction Writer/Assistant Researcher/Discussion Writer (25%); Ghofranipour F. (Second Author), Introduction Writer/Methodologist/Main Researcher (30%); Mohammadi E. (Third Author), Introduction Writer/Methodologist/Assistant Researcher (20%); Haeri Mehrizi A.A. (Fourth Author), Statistical analyst (5%); Cardon G. (Fifth Author), Methodologist/Discussion Writer (20%).

Funding/Support: No funding was obtained for this study.

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