Original Article

# Application of the Health Promotion Model to Predict Breakfast Consumption Among Adolescent Girls: A Structural Equation Modeling Approach

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### Abstract

**Background:** Healthy nutrition is necessary for normal growth and development. Although breakfast is considered the most important meal of the day, it is ignored by many adolescents. The purpose of this study was to apply the health promotion model (HPM) to predict breakfast consumption among adolescent girls using the structural equation modeling (SEM) approach.

**Methods:** A descriptive-analytical study was performed on 450 Iranian female high school students in 2019. Sampling was performed through a multi-stage method. The data collection instrument was a two-part questionnaire. The first part was about demographic information and the behavior of breakfast consumption. The second part was a questionnaire based on the HPM. Data were analyzed by SPSS (version 21) and AMOS (version 21) using the Chi-square test and the regression model.

**Results:** Based on SEM, the constructs of Pender's HPM explained approximately 0.47 of the variation in the breakfast consumption behavior. The highest total effects on breakfasting behaviors belonged to behavioral perceptions (0.833), prior related behaviors (0.800), perceived self-efficacy (0.677), activity-related affects (0.659), perceived barriers (-0.598), and commitment to planning (0.361).

**Conclusion:** HPM is a suitable theory for predicting commitment to the planning and behavior of breakfast consumption among Iranian adolescent girls. Accordingly, the impact of emotions and behavioral perceptions on a commitment to planning for breakfast consumption should be considered in designing nutritional interventions for female adolescents. Moreover, in planning educational interventions, pleasant experiences should be created to positively influence individual perceptions and effects related to the target behavior in order to enhance commitment to the breakfast consumption behavior.

**Keywords:** Adolescents, Breakfast, Health promotion, Structural equation modeling

## Introduction

Breakfast plays an important role in normal growth and development. Despite the positive attitudes of society toward breakfast consumption, it is common for children, adolescents, and women to skip it. Considering that most girls will become pregnant in the future, skipping breakfast may not only affect their health but also that of future children (1). The prevalence of skipping breakfast in the United States and Europe is 10%-30% (2-4). The prevalence of irregular breakfast consumption is estimated to be 8%-30% among Iranian children (5). Breakfast consumption can significantly affect health. School-age children consuming breakfast report better eating profiles than their peers who do not consume breakfast. Breakfast

consumption improves cognitive and social functioning and mood (1), while skipping it is associated with limited intake of essential nutrients, inadequate physical development, impaired cognitive functioning, and behavioral problems among children. Moreover, skipping breakfast and the subsequent increased rate of unhealthy snack consumption may increase the likelihood of obesity and chronic health conditions, as well as academic failure (5).

The habit of eating breakfast is affected by individual, social, and environmental characteristics such as age, gender, level of education, income, parental occupation, family structure, social context, and individual beliefs such as perceived benefits and barriers to health (2-4).

Therefore, the constructs of the health promotion model (HPM) are likely the best theoretical framework for determining the predictive factors of breakfast consumption. HPM is one of the concepts that is used in the field of behavioral changes. This model demonstrates the impact of factors that both directly and indirectly affect health-promoting behaviors. This model also describes individual and interpersonal factors, along with the health-related physical environment. Concepts incorporated in this model include individual factors, previous related behaviors, perceived benefits, barriers, and self-efficacy, as well as situational and interpersonal influences, positive and negative effects associated with conduct, commitment to planning, preferences, and immediate demands (6). Although HPM can be used to explain diverse adolescent health behaviors, only a handful of studies have applied this model in the field of nutrition. However, the findings of a study in Iran showed that the constructs of this model could predict 33% of the variance in breakfast consumption (7). Likewise, in a study by Rahimi et al, constructs such as prior related behaviors, perceived barriers, self-efficacy, competing demands, and preferences predicted 63% of the variance in breakfast consumption frequency per week among subjects (8). Similarly, Wu and Pender found that perceived self-efficacy as a construct of this model is the strongest predictor of physical activity among adolescents in Taiwan (9).

Many studies in Iran examined breakfast consumption patterns, as well as the effect of education on them. In a study by Rahimi and Dehdari, HPM was the theoretical framework for determining the predictors of breakfast consumption. In this study, Pender's HPM was used to study breakfast consumption behaviors in adolescent girls (Figure 1). However, it seems that the researchers failed to investigate multiple relationships among the constructs of this model in predicting breakfast consumption behaviors.

In the current study, the direct linear regression model was employed to assess HPM constructs in data analysis (8). Considering that breakfast-related health outcomes often have multiple causes, research in this field frequently involves the consideration of multiple variables and constructs, as well as the study of the complex interrelationships among them. Structural equation modeling (SEM) was applied as a comprehensive model through both direct and indirect approaches to predict the relationship between breakfast consumption and predictive factors. Therefore, the SEM was adopted as an appropriate approach for data analysis in the present study. Based on the assumptions about the relationships among variables, the general idea of these relationships is designed in the form of a pre-made model. In such situations, researchers are confronted with the fundamental question of whether the structure of the prefabricated model is supported by the data in real terms. The distinctive feature of this model is the ability to fit the relationships among the variables of the study in addition to categorizing and isolating measurement errors from other errors in the model. The correlations among errors, which is one of the limitations of many classic models, are also considered in this model (10,11). In the present study, two direct and indirect approaches were used to predict breakfast consumption based on the HPM among high school girls in the west of Iran.

## Materials and Methods

This analytical cross-sectional study was conducted on students of six girls' high schools in Khorramabad, Iran during 2018-2019. The inclusion criteria were being a female high school student and giving consent for participation in the study. On the other hand, the absence of students on the day of data collection and incomplete completion of the questionnaire were the exclusion criteria.

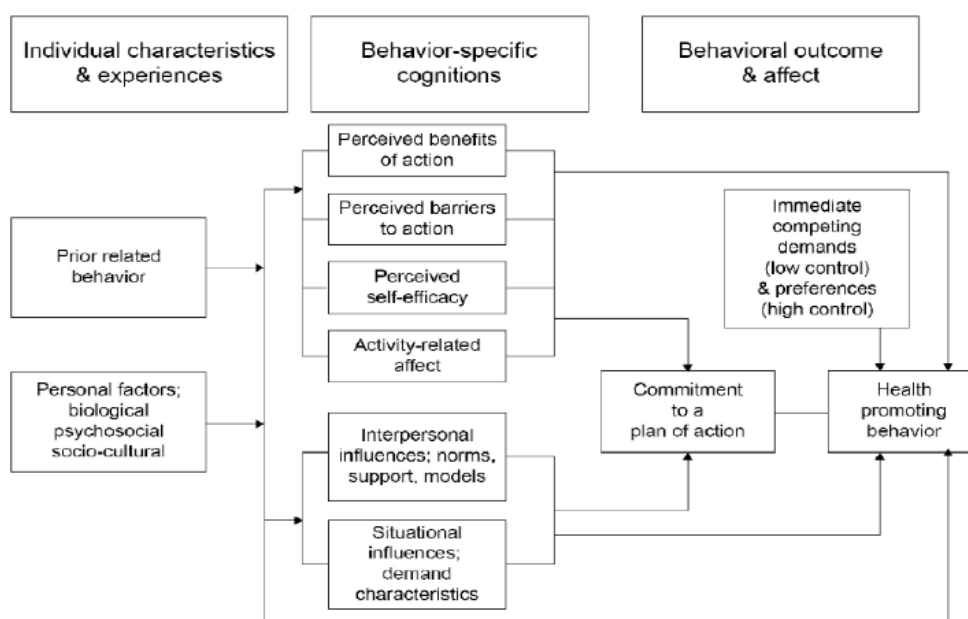The multi-stage cluster sampling method was employed



**Figure 1.** Pender's Health Promotion Model (6).

to increase the socio-economic coverage of the subjects. First, Khorramabad was divided into three upper, middle, and lower socio-economic areas, and in each cluster, two girls' schools and a total of six schools were selected by cluster sampling. Junior high schools and high schools were considered as separate classes. In the selected schools, the participants were enrolled into the study proportional to the size of each educational grade by systematic random sampling. The participants were informed about the study goals. The informed consent of the study participants was orally obtained because the subject of the study was not culturally sensitive, and the questionnaire was anonymous.

Regarding the use of SEM for data analysis, the sample size was estimated five times the number of free model parameters, which came up to 450 people (12).

The number of the free parameters of the model was 60. This figure multiplied by five gives 300. Considering the design effect as 1.5, the final sample size was calculated as 450.

The data for the present study were collected by self-reporting of the participants. The data collection instrument was a questionnaire containing two parts. The first part was about demographic variables and breakfast consumption behavior. The behavior was measured by the question "How many times a week do you eat breakfast?" The second part included prior related behaviors, perceived benefits of the target behavior, perceived barriers to the desired behavior, perceived self-efficacy, activity-related affects, interpersonal influences, situational influences, immediate competing demands, and commitment to planning.

Prior related behavior was enquired about in the form of two dimensions. "What have you done in the past to eat breakfast in a timely manner and what were the results of that effort?" Each dimension included five items. Perceived benefits were designated in the format of sixth formulations such as better learning, better mood, weight balance, general health, reduced use of nutritionally low-value snacks, and daily energy gain. Perceived barriers to the behavior were explained in the form of eight barriers such as not having appetite in the early morning, not having breakfast due to fear of getting overweight, having to hurry to go to school, and not having breakfast by family members, as well as repeated consumption of the same food at breakfast, family members' eating habits, unwillingness to have breakfast alone, and a tendency to get up late in the morning. Perceived self-efficacy was described in the form of seven items, including showing the degree to which a person has confidence in eating breakfast at a specific time, eating a light dinner, having a snack at night, having breakfast by oneself, eating breakfast despite the lack of such a habit in the family, having breakfast in spite of the haste to go to school, and suffering from excess weight. Activity-related affects were investigated in the form of four items, including enjoyment of breakfast, sense of being overweight after consumption, breakfast skipping due to the fear of being overweight, and repetitive and bad tasting breakfast foods. Interpersonal influences were measured in the form of four items including expectations, encouragements, behavioral role models (e.g., family members, teachers, and friends), incentives and behavioral patterns. Situational influences were clarified in the form of two items about the location and the appropriate situation for breakfast (i.e., an enjoyable environment). Immediate competing demands were formatted in five items such as staying more in bed in the morning, enjoying eating unhealthy snacks instead of having breakfast, getting up late around lunchtime, eating dinner and lunch instead of breakfast, and paying more attention to the time of arrival at school. Finally, commitment to planning was categorized into six terms, including representing the degree of commitment to planning breakfast, preparing school supplies from the night before, getting up early and having breakfast, eating a varied, healthy, and tasty breakfast, having breakfast in a quiet place, and encouraging oneself after having breakfast.

To score the variables of this study, a 5-point Likert-type scale was applied in which "never", "sometimes", "to some extent", "often", and "always" were scored 1 to 5, respectively. Likewise, variables such as perceived benefits, perceived barriers, and situational influencers were scored by the Likert scale. Completely "disagree", 'disagree', "have no opinion", "agree", and "strongly agree" were scored 1-5.

The measurement tool to assess the predictors of breakfast consumption among female adolescents based on the HPM was developed and tested by Dehdari et al, and its validity and reliability were confirmed (13). The reliability was evaluated using the internal consistency method. Thirty students were asked to complete the scale. The Cronbach's alpha values of the dimensions of the scale ranged from 0.562 to 0.908.

The frequency distribution, mean, and standard deviation were used to describe the data. The SEM was employed to predict breakfast consumption based on the constructs. In this model, the results of standardized regression coefficients, correlation coefficients, and standard factor loads were applied with a significance level of 0.05. In addition, minimum discrepancy function, goodness of fit, comparative fit index, incremental fit *index*, and root mean square error of approximation (RMSEA) indices were employed for model fit assessment. Sharma considers values higher than 0.9 in other fit indices as excellent fit, between 0.8 and 0.9 as a good fit, and between 0.7 and 0.79 as acceptable fit. Regarding RMSEA, values less than 0.1 and between 0.11 and 0.2 are considered as good to excellent fit and acceptable fit, respectively (14). In examining the adequacy of the SEM model, the target fit indices were chosen as the criteria. However, indices such as $R^2$, direct effects, indirect effects, and total effects were used to investigate the effects of exogenous variables on endogenous variables. Further, Mardia's coefficient was applied to evaluate the multivariate normality assumption. Finally, the multivariate normality assumption was confirmed since the value of this statistic was 1.44, and

IBM SPSS 21 and AMOS 21 were utilized for all data analyses.

## Results

Table 1 presents the mean age of the participants was $15.5 \pm 1.7$. The frequency distribution of the demographic characteristics and the behavior of breakfast consumption

**Table 1.** Frequency Distribution of Demographic Characteristics and Behavior of Breakfast Consumption in the past week

| Variable | Category | Frequency | Percent |
|----------|----------|-----------|---------|
| Age | <15 | 122 | 27.1 |
| | ≤15 | 328 | 72.9 |
| Educational level | First grade high school | 170 | 37.8 |
| | Second grade high school | 280 | 62.2 |
| Education major | Mathematics | 48 | 10.7 |
| | Experimental sciences | 155 | 34.4 |
| | Human sciences | 56 | .124 |
| | Technical and professional | 21 | 4.7 |
| BMI | Low weight | 21 | 4.7 |
| | Normal weight | 357 | 79.3 |
| | Excess weight | 72 | 16.0 |
| Household income | I>40 000 000 IRR | 21 | 4.6 |
| | IRR 40 000 000≤I<IRR 80 000 000 | 223 | 49.6 |
| | IRR 80 000 000≤I | 206 | 45.8 |
| Child's birth order | 1 | 203 | 45.1 |
| | 2 | 131 | 29.1 |
| | 3 | 50 | 11.1 |
| | ≤4 | 66 | 14.7 |
| Mother's employment | Employed | 113 | 25.1 |
| | Housewife | 337 | 74.9 |
| Breakfast preparation | Person himself | 158 | 35.1 |
| | Mother or father | 235 | 52.2 |
| | Other people | 57 | 12.7 |
| Sleeping time | 8-9 | 8 | 1.8 |
| | 9-10 | 19 | 4.2 |
| | 10-11 | 56 | 12.4 |
| | 11-12 | 212 | 47.1 |
| | After 12 | 155 | 34.4 |
| Waking time | 6 | 136 | 30.2 |
| | 6.30 | 175 | 38.9 |
| | 7 | 66 | 14.7 |
| | 7.30 | 24 | 5.3 |
| | Other | 49 | 10.9 |
| Breakfast consumption | Never | 36 | 8.0 |
| | 1-2 Times | 78 | 17.3 |
| | 2-3 Times | 29 | 6.4 |
| | 3-4 Times | 38 | 8.4 |
| | 5-6 Times | 44 | 9.8 |
| | Every day | 225 | 50.0 |

*Note.* BMI: Body mass index.

during the week prior to the study. Approximately 50% of the participants in this study ate breakfast every day of the week. Table 2 provides the means and standard deviations of the constructs of the HPM.

The confirmatory factor analysis was used to test the construct validity. The value of the chi-square statistic was 429.2429, which was divided by the degree of freedom (1785), 2.405, and 5%, respectively ($P < 0.001$). Fit indices were all acceptable or good (Table 3).

Figure 2 shows the behavior of breakfast consumption based on the HPM.

Activity-related affects ($\beta = -0.791$, $P < 0.001$), perceived self-efficacy ($\beta = 0.812$, $P < 0.001$), perceived barriers ($\beta = -0.717$, $P < 0.001$), perceived benefits ($\beta = 0.596$, $P < 0.001$), and prior related behaviors ($\beta = 0.690$, $P < 0.001$) could predict breakfast behavior indirectly through affecting behavioral perceptions. The above-mentioned variables explained about 48.7% of the variance of the behavioral perception.

Personal factors ($\beta = 0.328$, $P = 0.006$), interpersonal influencers ($\beta = 0.652$, $P < 0.001$), situational influencers ($\beta = 0.266$, $P < 0.001$), and prior related behaviors ($\beta = 0.502$, $P < 0.001$) indirectly predict breakfast behavior by influencing breakfast-related behavioral affects. The above variables justified about 36.0% of the variance of the behavioral effects.

Based on the results, breakfast-related behavioral perceptions ($\beta = 0.519$, $P < 0.001$), and breakfast-related behavioral affects ($\beta = 0.240$, $P = 0.022$) indirectly predict breakfast behavior through influencing commitment to planning. It should be noted that these variables could explain nearly 42.2% of the variance of the commitment to planning.

The direct effects of behavioral perceptions ($\beta = 0.65$, $P < 0.001$), behavioral effects ($\beta = 0.36$, $P < 0.001$), and commitment to planning ($\beta = 0.36$, $P < 0.001$) on breakfast consumption behavior were significant. However, the direct effect of immediate competing demands was insignificant ($\beta = 0.11$, $P = 0.15$). Overall, the HPM model predicted approximately 46.9% of the variance of the breakfast consumption behavior.

Table 4 presents the direct, indirect, and total effects of Pender's health belief model on breakfast consumption behaviors. Based on the data, the highest total effects on breakfasting behaviors belonged to behavioral perceptions, prior related behaviors, perceived self-efficacy, activity-related affects, perceived barriers, and commitment to planning.

## Discussion

The fit indices of the HPM in the current study were acceptable. Based on SEM, the constructs of Pender's health belief model predicted about 0.47 of the variations in breakfast consumption behaviors. The final SEM of this study demonstrated that behavioral perceptions, behavioral effects, and commitment to planning had direct effects on the behavior of breakfast consumption. Behavioral
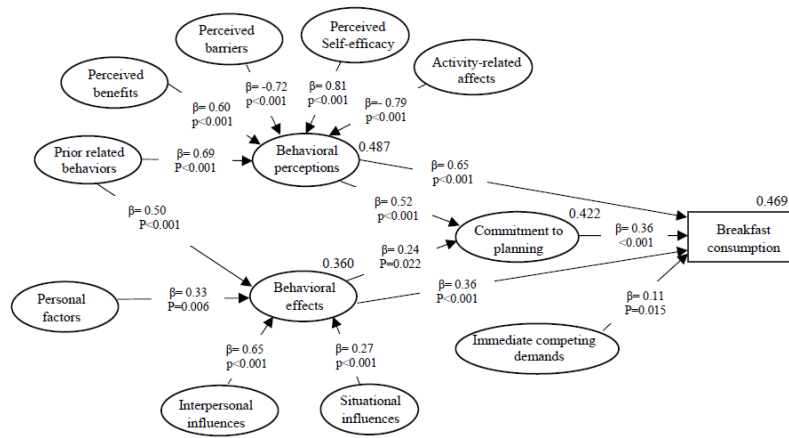
**Figure 2.** Structural Equation Modeling of Breakfast Intake Based on the HPM. *Note.* HPM: Health promotion model; Significance level at *P*<0.05.

perceptions and behavioral effects had direct and indirect relationships with the behavior of breakfasting as well and predicted the behavior of breakfast consumption by indirectly influencing commitment to planning. In line with previous studies, behavioral perceptions and behavioral affects are prominent variables that influence behaviors that contribute to health promotion (7). Beliefs such as perceived benefits, perceived barriers, perceived self-efficacy, and activity-related affects are behavioral perceptions that can facilitate or inhibit the motivation to change behavior (9). In the present study, these constructs could indirectly predict breakfast eating behavior.

According to a previous study, psychological indicators such as activity-related affects about breakfast intake may impact the regular habit of breakfast intake (15). Activity-related affects are emotions that occur prior to, during, and after a specific health-related behavior. Healthy food that is not tasty is one of the most important factors

preventing breakfast consumption behavior, because the most important criterion for choosing food in young people is the taste by preparing healthy foods based on children's interests, and the positive feelings about eating healthy breakfasts containing fruits and vegetables can be increased in adolescents.

Perceived self-efficacy means a person's confidence in his ability to achieve the desired goals (8). In the present study, perceived self-efficacy indirectly predicted breakfast consumption behavior.

After behavioral perceptions and prior related behaviors, the highest total effects on breakfasting behaviors belonged to perceived self-efficacy. In nutrition education studies, much emphasis has been placed on self-efficacy as a predictor of nutritional intent and behavior (16). Kothe et al examined the socio-cognitive factors of breakfast consumption using the theory of planned behavior in students. The results of this study showed that changes in behavioral beliefs such as attitude and perceived behavioral control accounted for 12.9% of the variance in breakfast consumption (17). Nutritional self-efficacy is the perceived ability of a person to choose a healthy breakfast, especially in difficult conditions when there are limitations in healthy food choices or when there is no incentive to choose them. In the current study, perceived self-efficacy for adjusting the daily schedule regarding breakfast consumption despite the existing barriers was assessed through questions.

Perceived benefits are beliefs about the usefulness of breakfast and the reduction of adverse effects caused by not eating breakfast. In the present study, perceived benefits could indirectly predict breakfast consumption behavior. A previous study revealed that informing people about the benefits of having healthy snacks will further motivate

**Table 2.** The Mean and Standard Deviation of the Constructs of Pender's Health Promotion Model

| Construct | Mean ± SD | Cronbach's Alpha Coefficient |
|---|---|---|
| Prior related behaviors | 61.351 ± 18.040 | 0.838 |
| Perceived benefits | 74.333 ± 15.769 | 0.806 |
| Perceived barriers | 77.416 ± 15.496 | 0.757 |
| Perceived self-efficacy | 57.194 ± 18.789 | 0.814 |
| Activity-related affects | 61.244 ± 13.180 | 0.712 |
| Interpersonal influences | 67.128 ± 22.627 | 0.908 |
| Situational influences | 57.851 ± 19.410 | 0.562 |
| Immediate competing demands | 50.177 ± 20.993 | 0.675 |
| Commitment to planning | 56.977 ± 19.013 | 0.640 |

*Note.* SD: Standard deviation.

**Table 3.** Indicators for Assessing Breakfast Consumption Prediction Fit Based on Pender's Health Promotion Model

| Index | RMSEA | | | CMIN | | NFI | IFI | GFI | CFI | PCFI |
|---|---|---|---|---|---|---|---|---|---|---|
| | Estimate | 95% CI | P Value | Estimate | P Value | | | | | |
| Amount | 0.056 | 0.058-0.054 | <0.001 | 2.405 | <0.001 | 0.702 | 0.803 | 0.762 | 0.8 | 0.756 |

*Note.* CI: Confidence interval; CMIN: Minimum discrepancy function; NFI: Normed fit index; IFI: Incremental fit *index*; GFI: Comparative fit index; GFI: Goodness of fit; PCFI: Parsimony comparative fit index; RMSEA: root mean square error of approximation.

**Table 4.** Direct, Indirect, and Total Effects Derived From Standardized Regression Coefficients of Structural Equation Modeling

| Variable | Breakfast Consumption | | |
| --- | --- | --- | --- |
| | Direct | Indirect | Total |
| Prior related behaviors | - | 0.800 | 0.800 |
| Perceived benefits | - | 0.497 | 0.497 |
| Perceived barriers | - | -0.598 | -0.598 |
| Perceived self-efficacy | - | 0.677 | 0.677 |
| Activity-related affects | - | 0.659 | 0.659 |
| Interpersonal influences | - | 0.293 | 0.293 |
| Situational influences | - | 0.119 | 0.119 |
| Immediate competing demands | 0.110 | - | 0.110 |
| Commitment to planning | 0.361 | - | 0.361 |
| Personal factors | - | 0.235 | 0.235 |
| Behavioral effects | 0.362 | 0.087 | 0.449 |
| Behavioral perceptions | 0.646 | 0.187 | 0.833 |

them to do it as a behavior (18). Some studies focused on investigating the relationship between perceived benefits and nutritional behaviors, especially breakfast (16, 18). Promoting the other positive outcomes of breakfast should be considered, including promoting psychosocial function, increasing awareness, improving the mood, and evaluating the effect of breakfast eating on the adequacy of the diet.

Perceived barriers about breakfast intake may include having morning anorexia, serving repetitive foods, having no diversity in the breakfast, being time-consuming, and being alone at breakfast time. In the present study, perceived barriers indirectly predicted breakfast consumption behavior. Reddan et al reported that reducing perceived barriers such as not having enough time to eat breakfast and not wanting to eat early in the morning was associated with increased breakfast consumption (19). The use of tangible incentives (e.g., having breakfast in a place where one wishes or having tailor-made breakfast) or mental encouragement (e.g., learning its positive impact on individual academic performance) increases the willingness of audiences to adopt the behavior of breakfast consumption. In addition, providing social support to increase participation and reduce perceived barriers is effective.

Interpersonal and situational influences, personal factors, and prior related behaviors indirectly predicted breakfast eating behavior by influencing behavioral affects. According to evidence, cultural and structural factors of the community (e.g., the existence of healthy food choices in the school buffet) affect the dietary habits of children (20). Situational influences are perceptions about the capacity of the living environment in facilitating a particular health-related behavior. Situational influences indirectly predict breakfast eating behavior by influencing behavioral affects. Situational influences increase personal access to healthy breakfast. Therefore, breakfast should be available so that children and adolescents can consume it, leading to a reduction in perceived barriers to breakfast intake among children and adolescents.

Interpersonal influences are perceptions about the behaviors and beliefs of others such as family members and friends regarding the performance of a specific health-related behavior. This factor has been investigated in a previous systematic review as a variable of subjective norms such as family and friends (21). Peer education is also an effective strategy for changing behavior. Peer groups have had the highest impact on the performance of children and adolescents in all domains, which can be positive or negative (21). In a study by Cheng conducted in Hong Kong on adolescents aged 10-14 years, parents' emphasis on breakfast turned out to be a significant predictor of reducing the prevalence of breakfast skipping among children and adolescents (22). A body of evidence exists on the encouraging effects of the family on improving the nutritional behaviors of children, confirming the role of mothers in developing appropriate and inappropriate nutritional behaviors among children. Interpersonal influences indirectly predict breakfasting behavior through influencing behavioral affects.

Prior related behaviors are indirectly related and predict breakfast intake. These behaviors influence the beliefs, affects, and regulation of performing health promotion behaviors (23) and indirectly predict breakfasting behavior through both influencing behavioral affects and behavioral perceptions. According to a study on the effects of sleeping habits on breakfast intake, children eating breakfast on a daily basis go to bed earlier than unborn babies. In addition, there is a positive relationship between the time a child has been inactive (e.g., watching television or gaming) with the frequency and type of consuming low-value snacks (24). In his study, Brickell et al noted that past behaviors and behavioral tendencies play a role in predicting the occurrence of the behavior, and described behavior as the strongest predictor of breakfast intake in the future (25). In fact, one of the strengths of Pender's HPM is that he considers previous related behaviors to be effective in the emergence of new behaviors. Past behaviors and acquired traits affect the beliefs, feelings, and routinization of health-promoting behaviors. However, this construct has been less discussed in other theories.

The final decision to conduct a behavior is largely influenced by personal factors. In the present study, personal factors such as age, household income, and grade point average indirectly predicted breakfast consumption behavior by influencing behavioral affects. Behavioral affects associated with breakfasting enhance by 0.235 units per 1 unit increase in the score of personal factors. The results of previous studies demonstrated that breakfast consumption behavior was associated with personal characteristics such as age and socioeconomic status (26-28).

Our study had a couple of advantages and a limitation as well. The advantages included the use of a relatively large sample size and the SEM for statistical data analysis. Nonetheless, we failed to collect information about a number of variables such as parental education and

cultural factors such as ethnicity that may have influenced our findings. In addition, divergent and convergent validity were not investigated in this study. It is recommended that these limitations be considered in future studies.

## Conclusion

Based on SEM, the constructs of Pender's HBM could explain approximately 0.47 of the variations in breakfast consumption behaviors. Based on the findings of the present study, the constructs of behavioral perceptions, prior related behaviors, perceived self-efficacy, activity-related affects, perceived barriers, and commitment to planning represented the highest total effects on breakfast consumption behaviors in descending order. In planning educational interventions, commitment to planning should be enhanced by creating enjoyable experiences that have a positive impact on behavioral perceptions and behavioral affects. It is recommended to focus on the predictive power of the constructs of Pender's HPM and model fit on breakfast consumption behaviors across communities in future studies.

## Authors' Contribution
MHIN, AA, and FB reviewed the literature, designed the research, collected and analyzed the data and approved the final manuscript. NC, ZAP, and FE collected and analyzed the data, and approved the final manuscript.

## Conflict of Interests
Authors declare that they have no conflict of interests.

## Ethical Permissions
The study was approved by the Ethics Committee of the Lorestan University of Medical Sciences (approval code: LUMS. REC.A-10-1556-2).

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