Breakfast Eating in Elementary School Students in Jiroft, Iran: An Application of Transtheoretical Model

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Abstract

Background: Breakfast is a very important meal. It can either make or break your day, and it can be a daunting task.
Objectives: We used the transtheoretical model (TTM) to assess the trend of breakfast eating among elementary school students in Jiroft city, Iran.
Methods: In this descriptive-analytic research, 290 elementary school students in Jiroft city were selected using stratified sampling. Data were collected using a questionnaire to assess breakfast eating trends according to TTM. The data were analyzed using SPSS version 16.
Results: Approximately 9.3% of the participants were in the precontemplation stage, 21.7% in the contemplation stage, 7.2% in the action stage, 53.4% in the preparation stage, and 8.3% in the maintenance stage. There was a significant relationship between TTM constructs and stages of change in breakfast consumption 2 or more times a week. Moving from the precontemplation stage to the maintenance stage was associated with an increase in decisional balance, processes of change, and self-efficacy (P < 0.05).
Conclusions: It is suggested to emphasize the importance of perceived benefits and greater self-efficacy in the design of educational interventions based on this model, increase the use of change processes, and decrease the perceived barriers as much as possible to establish correct behaviors.

Keywords: Breakfast, Decisional Balance, Processes of Change, Transtheoretical Model, Self-efficacy

1. Background

Breakfast provides energy to our brains needed to focus and function better on tasks during the day. No matter what we are going to do, by eating a healthy breakfast, we feel more concentrated for the coming day, either make or break it. Regular breakfast consumption affects social and mental health. In the early years of life, due to the high growth rate, proper nutrition has a great impact on one's cognitive function (1, 2). Scientific evidence shows high levels of vitamins A, B1, B2, B6, B12, and riboflavin and minimal fat absorption in students eating breakfast regularly (3). Adolescents eating breakfast have a better quality of life and academic progress. Studies have shown that avoiding breakfast is linked to negative health consequences, such as obesity, overweight, type 2 diabetes, and metabolic syndrome (4-6).

The prevalence of skipping breakfast ranged from 10% to 30%, with an increased trend in adolescents (7) Breakfast skipping is a common behavior among European adolescents, with a prevalence ranging from 3% to 34% (8). A study in Iran showed that 21% of students went to school without breakfast (9, 10). Growth studies have revealed that breakfast skipping has a negative effect on alertness, memory, understanding complex processes, problem-solving, and math comprehension (11).

The etiology and potential factors are needed to design an intervention to improve breakfast consumption (12). The transtheoretical model (TTM) is one of the best models to design an interventional study on behavior determinants. This model has several components: stages of change, decisional balance, self-efficacy, and processes of change (13). Consequently, people can move

from one stage to another or rebound to the preceding stage. Stages of change include pre-contemplation, contemplation, preparation, action, and maintenance. In the pre-contemplation stage, people are not motivated to change their unhealthy behaviors within the next 6 months. In the contemplation stage, people are beginning to recognize that their behavior is problematic, and start to look at the pros and cons of their continued actions. In the preparation stage, people tend to change their behaviors in the next month. In the action stage, a person has made changes in his/her lifestyle behaviors to achieve a goal. In the maintenance stage, a person has changed over time; this stage is usually considered for 6 months or more. Decisional balance changes personal behavior of eating breakfast. Self-efficacy assures that a person has a certain ability to follow a specific behavior. Eating breakfast has positive effects on students' physical health and improves the learning process in the early hours of the day.

2. Objectives

This study aimed to examine breakfast consumption at least 2 times or most of the week based on TTM among elementary school students in a city in southern Iran.

3. Methods

3.1. Study Design

This descriptive-analytical study followed the Declaration of Helsinki and was approved by the Ethics Committee of Hormozgan University of Medical Sciences (code: IR.HUMS.REC.1395.85). Written informed consent was obtained from all participants.

3.2. Data Collection

The participants of this study were elementary school students. In the study by Mohammadi Zeidi and Pakpour (14), the frequency of regular breakfast consumption was 40%; thus, P = 0.40, q = 0.60, and z = 2 were included in the following formula.

$$N = \frac{Z^2 \; pq}{d^2}$$

$$n = \frac{2^2 \; \times 0.40 \; \times 0.60}{\left(0.3 \times 0.4\right)^2}$$
$$= 66.66$$
$$\approx 67$$

$$n' = n \; \times \; Design \; effect$$
$$= 67 \; \times \; 4$$
$$= 268$$

$$n'' = \frac{n'}{1 - m}$$
$$= \frac{268}{1 - 0.10}$$
$$= 297.77$$
$$\approx 300$$

Since we did not have an accurate estimate of d value (precision), we set it equal to 0.3 p, which by placing in the above formula, the sample size was 66.66 people; however, since the sampling method in the present study was cluster sampling, the value of 4 = design effect was considered, and the final sample size for the study was 268 = 67 × 4. However, considering that about 10% of the questionnaires may be incomplete (m=incomplete questionnaires), the appropriate number of participate to recruit for this study was considered to be 300. After collecting the data, 10 questionnaires were incomplete; thus, the analysis was performed with 290 samples.

Sampling was performed using a multistage method; first, all of the elementary schools (n = 36) were stratified into 2 classes of boy and girl layers. Next, 2 elementary schools were randomly chosen from each layer, and then 4 elementary schools were selected. Finally, 1 grade was randomly selected from each school, and some students who met the inclusion criteria were selected.

The inclusion criterion was elementary students of both sexes who volunteered to participate in the study. According to paragraphs 7, 25, and 26 of the Declaration of Helsinki, to respect the research units, it was not necessary to write the name and surname of the research units when completing the questionnaire, and the results of the research were generally provided to the research units respectively.

The data collection tool was a questionnaire that was previously used by Mohammadi Zeidi and Pakpour (14). The test-retest method was used to evaluate the reliability of the current population, as well as the reliability of the questionnaire participants. In one of the schools, 20 students were randomly selected and completed the questionnaire. Two weeks later, the same students were asked to complete the questionnaire again. The scores obtained from the first questionnaire (test) and the scores obtained from the second questionnaire (retest) were calculated, and the correlation coefficient was 0.83 between these 2 questionnaires.

The questionnaire included demographic information (age, gender, parents' educational status, parents'

employment status, and economic status), stages of change in breakfast consumption, decisional balance (perceived barriers and benefits), self-efficacy, and processes of change toward breakfast consumption. To determine stages of change for breakfast at least 2 or more times a week, a questionnaire was used with yes/no responses. It examines the condition or intention of eating breakfast twice a week or more over the next month or 6 months. By answering one of these questions, people were in one of the stages of change. Do you eat breakfast?

☐ No, I do not have a tendency to eat breakfast in the following 6 months (precontemplation)

☐ No, but I want to eat breakfast in the following 6 months (contemplation)

☐ No, but I want to eat breakfast in the following 30 days (preparation)

☐ Yes, I have been eating breakfast for < 6 months (action)

☐ Yes, I have been eating breakfast alternately for > 6 months (maintenance)

The answers will fall into one of the precontemplation, preparation, contemplation, action, or maintenance stages.

The Perceived Benefits Questionnaire for breakfast consumption contained 15 questions. The answer choices were on a 5-point Likert scale (ranging from 1, not important, to 5, infinitely important) (5). The score of perceived benefits was summed and then divided by 15. Therefore, the perceived benefits score of breakfast consumption ranged between 1 and 5.

The perceived barriers questionnaire for breakfast consumption contained 7 questions. The answer choices were on a 5-point Likert scale; "not important" (1) to "infinitely important" (5). The score of perceived barriers was summed and then divided by 7. Therefore, the perceived barriers score of breakfast consumption ranged between 1 and 5.

The perceived benefits score minus the perceived barriers score to calculate the decisional balance. The internal consistency of this scale determined using Cronbach α was 0.81. The retest coefficient of the test in a sample of 20 subjects was 0.79 weeks.

The Perceived Self-efficacy (PSE) questionnaire for breakfast consumption consisted of 10 items scored on a 5-point Likert scale (ranging from 1, completely incorrect, to 5, completely correct). Cronbach α was 0.92, and the test-retest was 0.82 after 2 weeks.

Change processes include cognitive and behavioral processes. Cognitive processes are empirical processes that emphasize cognitive thoughts, feelings, and experiences and usually occur in the early stages of change and include self-evaluation, dramatic relief,

consciousness-raising, re-evaluation of the environment, and social liberation. Behavioral processes focus on behaviors and reinforcers, are more used in the stages of action and maintenance of behavior, and include helping relationships, self-release, mutual conditioning, stimulus control, and strengthening management.

The cognitive processes questionnaire had 12 items scored on a 5-point Likert scale (ranging from 1, never, to 5, regularly). Their scores are added up, followed by dividing by 12. Cronbach α was 0.79, indicating an acceptable internal consistency, and the test-retest was 0.88 after 2 weeks.

The behavioral processes questionnaire had 12 items scored on a 5-point Likert scale (ranging from 1, never, to 5, regularly). Their scores are added up, followed by dividing by 12. Cronbach α was 0.83, indicating an acceptable internal consistency, and the test-retest was 0.87 after 2 weeks.

Before distributing the questionnaires, all necessary notifications were given to the education officials and school administrators, and the students' identities were kept confidential.

3.3. Statistical Analysis

Data analysis was performed using SPSS version 16 (SPSS Inc, Chicago, IL, USA). P values less than 0.05 were considered statistically significant. One-way analysis of variance (ANOVA) was used to indicate the relationship between the processes of change in breakfast consumption behavior and the structures of decisional balance, self-efficacy, and processes of change. Considering that the questions of the structures had a Likert spectrum, the normality study used skewness and elongation indices, and if these 2 indices were in the range (2 + 2), it would indicate the establishment of a normality assumption. The Leaven test was used to check the equality of variances.

4. Results

4.1. Descriptive Statistics

The age range of participants was 12 - 16 years, with an average of 13.74 years (SD, 0.387). As shown in Table 1, 51.7% of the students were male, and 48.3% were female. Also, as shown in Table 2, 53.4% of students (the highest percentage) were in the preparation stage, and 7.2% of students (the lowest percentage) were in the action stage (Table 2).

There was a significant relationship between stages of change and self-efficacy, decisional balance, and processes of change (P < 0.05). By moving from the

Table 1. The Demographic Characteristics of Students

Variables	No. (%)
Gender	
Female	150 (55)
Male	140 (45)
Father's educational status	
Illiterate	52 (18)
Low literacy	128 (44)
High school diploma and more	95 (32.8)
University graduated	15 (5.2)
Mother's educational status	
Illiterate	53 (18.3)
Low literacy	114 (39.3)
High school diploma and more	102 (32.8)
University graduated	21 (7.2)
Father's employment status	
Jobless	9 (3)
Freelance job	196 (67.06)
Worker	41 (14.2)
Civil servant	30 (10.4)
Retired	14 (4.8)
Mother's employment status	
Homemaker	238 (82)
Freelance job	20 (7)
Worker	16 (5.5)
Civil servant	16 (5.5)
Economic status	
High income	21 (7.2)
Average income	250 (86.2)
Low income	19 (6.6)

Table 2. Stages of Change of Breakfast Consumption 2 Times or More a Week

Stages of Change	No. (%)
Precontemplation	27 (9.3)
Contemplation	63 (21.7)
Preparation	155 (53.4)
Action	21 (7.2)
Maintenance	24 (8.3)
Total	290 (100)

precontemplation stage to the maintenance stage, an increasing trend was detected in self-efficacy, decisional balance, and processes of change (Table 3).

A significant relationship was found between stages of change and TTM constructs in breakfast consumption (P < 0.05; ie, moving from the precontemplation stage to the maintenance stage, showing an upward trend in all constructs.

The 1-way ANOVA results indicated a significant linear trend between decisional balance, self-efficacy, cognitive process, and behavioral process (P < 0.001). To determine which TTM constructs were significantly different from others, Tukey B tests were used (Table 4).

After performing a post hoc test using the Tukey B test in the decisional balance structure, it was determined that in two-by-two comparisons, the precontemplation and contemplation stages (P = 0.801), precontemplation and preparation stages (P = 0.861), precontemplation and action stages (P = 0.425), and preparation and action stages (P = 0.714) were not statistically significantly different, unlike the other two-by-two comparisons of breakfast change. A significant relationship was found between the pre-contemplation and maintenance stages (P < 0.001), contemplation and preparation stages (P = 0.019), contemplation and action stages (P = 0.025), contemplation and maintenance stages (P < 0.001), preparation and maintenance stages (P < 0.001), and action and maintenance stages (P = 0.021). The post hoc test using the Tukey B test showed that mean score difference of self-efficacy in two-by-two comparisons of the pre-contemplation and contemplation stages (P = 0.311), and action and maintenance stages (P = 0.461) was not significant. Other comparisons among pre-contemplation and also contemplation with preparation, action and maintenance, preparation with action and maintenance in pairs were statistically significant (P < 0.001).

There were statistically relationship between the cognitive and behaviour processes and stages of change (P < 0.001). To determine which TTM constructs were significantly different from others, Tukey B tests were used. After performing a post hoc test using the Tukey B test in the cognitive process structure, in two-by-two comparisons, no significant difference was found in the precontemplation and contemplation stages (P = 0.243) and action and maintenance stages (P = 0.999), unlike the other two-by-two comparison in the step of breakfast consumption changes. There was a statistically significant relationship between precontemplation and preparation stages, action and maintenance stages in pairs (P < 0.001), contemplation and preparation stages (P = 0.038), contemplation, action, and maintenance stages in pairs (P < 0.001), and preparation, action, and maintenance stages in pairs (P < 0.001). After performing a post hoc test using the Tukey B test in the behavior process structure, it was determined that in two-by-two comparisons, in the

Table 3. Relationship Between the Transtheoretical Model Constructs and Stages of Change in Consuming 2 or More Breakfasts a Week

TTM Constructs	Precontemplation	Contemplation	Preparation	Action	Maintenance	F	P Value
Cognitive process	2.5 ± 0.52	2.75 ± 0.35	2.97 ± 0.47	3.86 ± 0.42	3.82 ± 1.05	38.66	< 0.001
Behavior process	3 ± 0.48	2.8 ± 0.54	2.94 ± 0.42	3.72 ± .44	3.73 ± 1.08	22.29	< 0.001
Self-efficacy	2.18 ± 0.47	2.38 ± 0.40	2.67 ± 0.45	3.69 ± 0.38	3.91 ± 0.49	86.64	< 0.001
Decisional balance	2.98 ± 0.46	2.86 ± 0.45	3.08 ± 0.47	3.21 ± 0.43	3.64 ± 0.45	12.80	< 0.001

Abbreviation: TTM, transtheoretical model.

Table 4. The Results of the Post Hoc Analysis of Variance Test, Tukey B Tests, Transtheoretical Model Constructs

TTM and Stages of Change	Contemplation		Preparation		Action		Maintenance	
	Mean Difference	P Value	Mean Difference	P Value	Mean Difference	P Value	Mean Difference	P Value
Cognitive process								
Precontemplation	-0.249	0.243	-0.473	< 0.001	-1.362	< 0.001	-1.323	< 0.001
Contemplation			-0.224	0.038	-1.113	< 0.001	-1.074	< 0.001
Preparation					-0.889	< 0.001	-0.850	< 0.001
Action							0.039	0.999
Behavior process								
Precontemplation	0.202	0.482	0.059	0.984	-0.712	< 0.001	-0.726	< 0.001
Contemplation			-0.142	0.397	-0.915	< 0.001	-0.929	< 0.001
Preparation					-0.772	< 0.001	-0.786	< 0.001
Action							-0.013	> .99
Decisional balance								
Precontemplation	0.118	0.801	-0.095	0.861	-0.232	0.425	-0.655	< 0.001
Contemplation			**-0.214**	0.019	-0.350	0.025	-0.774	< 0.001
Preparation					-0.136	0.714	-0.559	< 0.001
Action							-0.423	0.021
Self-efficacy								
Precontemplation	-0.196	0.311	-0.489	< 0.001	-1.506	< 0.001	-1.727	< 0.001
Contemplation			-0.292	< 0.001	-1.309	< 0.001	-1.530	< 0.001
Preparation					-1.017	< 0.001	-1.238	< 0.001
Action							-0.221	0.461

Abbreviation: TTM, transtheoretical model.

precontemplation and contemplation stages (P = 0.482), precontemplation and preparation stages (P = 0.984), and contemplation stage, there was no statistically significant difference between the preparation (P = 0.397) and action and maintenance stages (P > 0.99). Other two-by-two comparisons of the breakfast consumption changing stages were statistically significantly different. Between the contemplation and action stages in pairs (P < 0.001) and the maintenance stage in pairs (P < 0.001), there was a statistically significant relationship between the preparation, action, and maintenance stages (P < 0.001; Table 4).

Self-efficacy, decisional balance, cognitive process, and behavioral process with ignorance of some fluctuations all had an increasing trend. In other words, the participants were more likely to move from the pre-contemplation stage to the maintenance stage; during this process, self-efficacy, decisional balance, cognitive process, and behavioral process all showed an increasing linear trend (Figure 1).
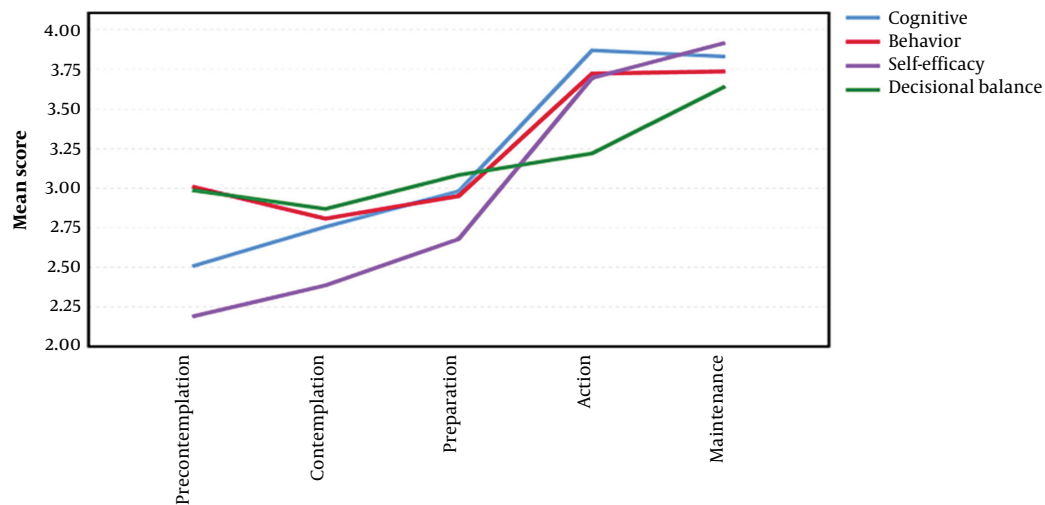
Figure 1. Stages of change in eating breakfast

5. Discussion

Our results indicated that 9.3% of the students were in the precontemplation stage of breakfast consumption; they did not intend to eat breakfast for the next 6 months. Further, 21.7% of them were in the contemplation stage (meaning that they were planning to eat breakfast for about 6 months), 53.4% were in the preparation stage (meaning that they were planning to have breakfast in the next month), 7.2% were in the action stage (meaning that they had breakfast but did not consume it in the last 6 months), and 8.3% were in the maintenance stage. Mohammadi Zeidi and Pakpour (14) examined the status of breakfast and unhealthy snacks based on the transnational model on students, showing that 50% of the subjects were in the precontemplation stage, 34% in the contemplation stage, 16% in the preparation stage, and 0% in the action and maintenance stages. This difference could be due to the populations studied and their socioeconomic characteristics or the expected behavior. In our study, it was the behavior of breakfast consumption, and some students were in the action and maintenance stages, while in the above study, in addition to breakfast consumption, there was a behavior of eating unhealthy snacks such that no participant was in the action and maintenance stages.

A positive relationship was observed between stages of change and decisional balance. In other words, by going through the stages of change, the decisional balance also showed an increase, though this trend decreased between the contemplation and precontemplation stages. In other stages, it showed an increasing trend. Since the nature of decisional balance tends to change behavior,

this change is based on a person's understanding of the benefits of behavior change, which, if understood, highlights the benefits of change and the likelihood of a change in behavior. Given that decisional balance is based on the outcome of perceived benefits and obstacles, the results of the analysis of the individual infrastructure of decisional balance also confirm the final outcome because it was revealed that moving from the precontemplation stage to the maintenance stage reduced the breakfast consumption barriers by increasing the perceived benefits of breakfast. These results are consistent with TTM because understanding more benefits and fewer obstacles leads to behavior stabilization (15-20). Self-efficacy is defined as the probable estimate of a person's confidence in the proper conduct of a certain behavior or some special behaviors to control and manage imaginary situations (21). Other researchers have shown that self-efficacy can predict a person's performance and change as a result of learning, experience, and feedback (22-24). Self-efficacy plays a key role in behavior change (25).

Our results indicated a significant relationship between the stages of change and self-efficacy; thus, with moving from the precontemplation stage to the maintenance stage, self-efficacy also increases. This result is consistent with the results of other researchers who worked on different behaviors, such as the consumption of fruits and vegetables and less fat using TTM (26, 27).

One of the reasons for the similarity of the present study with other studies is that in higher stages of change (action or maintenance), people will try harder to remove obstacles and stabilize their behavior, while removing

obstacles is associated with their understanding of the benefits. Applying strategies to simplify complex behaviors, performing encouraging and motivating activities, and reducing stress in connection with taking on a new role all can help increase a person's belief in his/her capability to continue a particular behavior.

A change process has 2 cognitive and behavioral subsets; both are equally important and used in interventions. In this study, the mean scores of behavioral and cognitive processes in the developmental stages of change were different, and the trend had fluctuations; this fluctuation was more in the behavioral process than in the cognitive process. In the behavioral process, each step had a decreasing/increasing trend with the next step, and in the maintenance stage, it had the highest value. The action and maintenance stages, with a slight difference, had the highest value in the cognitive process; what is important is that this trend is necessary to stabilize the behavior. In other words, by entering the action stage, a person replaces unhealthy behavior with healthy behavior, and in the maintenance stage, a person tries to create a new behavior and does not turn back to unhealthy behavior. The increasing trend of the average values of behavioral and cognitive processes in the current research was higher than in the early stages, like in other studies (28-30). This is because, in the precontemplation and contemplation stages, people do not have a specific motivation and program to change their behavior. In this way, the person will not replace his/her healthy behavior and later will return to previous unhealthy behavior. In other studies on vegetable and fruit consumption, the average scores of behavioral and cognitive processes were higher in the preparation, action, and maintenance stages than in the precontemplation and contemplation stages (29, 31).

5.1. Strengths and Weaknesses of the Study

Our research has limitations in data collection technique and self-rating design. Another limitation is the lack of generalizability of the results. Moreover, this study is a cross-sectional study, which is another limitation of this research. The questionnaires did not evaluate specific compositions of breakfast or the amount of each nutrient and food used. Also, the assessment was performed verbally, which can result in bias. Moreover, these data were collected from participants who participated in the study voluntarily, which increases the probability that the participants have been in the preparation stage for behavior change.However, our study has some strengths, such as various cognitive tasks for computing cognitive scores. This is the first research on the relationship between breakfast consumption and behavior and cognitive processes in adolescents in Jiroft, Iran.

5.2. Suggestions

According to the results, there is a positive relationship between stages of change and the balance of decision-making and self-efficacy and the behavioral process compared with the cognitive process of the levels of change. It is recommended that interventions used to change behavior focus more on improving self-efficacy in carrying out the behavior, understanding the advantages of carrying out the right behavior, and lowering the obstacles in carrying out the wrong behavior.

5.3. Conclusions

It is suggested to emphasize the importance of perceived benefits and greater self-efficacy in the design of educational interventions based on this model, increase the use of change processes, and decrease the perceived barriers as much as possible to establish correct behaviors.

Footnotes

Authors' Contribution: L. H. and R. P: conceptualized and designed the study; T. A: responsible for data collection; L. H., S. M., and S. N: drafted the manuscript and necessary corrections; S. N. and L. H: English revision.

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Informed Consent: All students/parents signed written informed consent.

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