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Measurement of Health Belief Model Constructs in Relation with the Oral Health Practice of Female Students in Tehran

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Abstract

Aim: Oral hygiene must start at a young age. Childhood is the perfect time to start the conversion of knowledge into creative thinking and subsequent health care activity. This study aimed to measure the constructs of the Health Belief Model (HBM) in relation to the oral health practice of female students in Tehran.

Methods: A cross-sectional descriptive study was conducted on 416 grade five female students of elementary schools in the school year of 2016-2017 in Tehran, Iran. Data were collected using an author-designed questionnaire based on the constructs of the HBM. The validity of the questionnaire was confirmed using face validity while its reliability was approved using Cronbach's alpha statistics. Data were analyzed using Pearson's correlation and regression analysis at 0.05 level of significance.

Findings: According to the findings, the mean age of the participants was 10.88±0.628 years. Pearson's correlation showed that four the HBM constructs of Self-efficacy, Cues to action, Perceived benefits, Perceived barriers were significant predictors for oral health practices ($P < 0.05$). In addition, the variables of knowledge and socio– economic conditions (mother's educational level, father's educational level, mother's job, father's job and family income) had significant relationship with performance ($P < 0.05$).

Conclusion: Our study shows that for improving the beliefs related with oral health behaviors, designing educational programs with emphasis on increasing self-efficacy and perceived benefits, and overcoming the barriers to promote oral health behaviors is essential.

Keywords: Health belief model, Student, Oral health, Behavior

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Introduction

Despite great achievements in the oral health of populations globally, problems still remain in many communities all over the world, particularly among the under-privileged groups in the developed and developing countries. Dental caries and periodontal diseases have historically been considered the most important global oral health burdens [1, 2]. At present, the distribution and severity of oral diseases vary among different parts of the world and within the same country or region. Oral hygiene must start at a young age. Childhood is the perfect time to start the conversion of knowledge into creative thinking and subsequent health care activity [3].

Health care professionals should feel compelled to rededicate their educational and instructional efforts to the development of a realistic and effective curriculum of care, aimed at improving oral health for all [4]. Although, in recent decades, an overall progress has been made in the dental health of children, dental caries has still high prevalence in children [5, 6]. In some developing countries, it has increased due to dietary changes [7]. Thus it is fundamental problem in public health in all countries so that 60 to 90% of the Children are involved in school age [8]. Habits, lifestyle and behavior of people are influential creation of dental caries [9]. The Health Belief Model (HBM) is among the important models that shows the relationship in between health beliefs and behaviors. Contextual concept of HBM is that beliefs or perceptions of a person about a patient and solutions available for reducing event rate determine his/her health behavior [10]. Based on this model, motivation of person in adopting a behavior depends on the perceptions of the individual of being at risk (perceived susceptibility), and its seriousness (perceived severity), his/her belief on understanding the usefulness of measures designed to reduce the risk rate of disease or understanding the benefits of health measures (perceived benefits), and perceived barriers and believe in the real or imagined costs of the proposed behavior. Guide for action facilitates the adoption of healthy behavior [11]. Self-efficacy perceived is confidence of people to their ability to learn a new behavior [12]. The six constructs of HBM provide a useful framework for designing both short-term and long-term behavior change strategies [13]. When applying HBM to planning health programs, practitioners should ground their efforts in making the target population sensitive to the health problem, believe in its seriousness and then act accordingly to reduce the threat at an acceptable cost. Attempting to effect changes in these factors is rarely as simple as it may appear [14]. The researches, which examine the oral hygiene beliefs in

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dental field are in contradiction with the predictive power of its constructs [15-23]. In the study of oral health behaviors, different results are obtained from the effects of these structures; some of them reported the predicting power of perceived susceptibility [15, 17, 18, 20]. Perceived severity [9, 15, 19], perceived benefits [15, 19, 23] and perceived barriers [15, 16, 18-22] have predicting power in oral health behaviors, while the others suggest that these are not significant constructs of predicting these behaviors. Since the researcher intends to design an educational intervention for these participants, therefore, the aim of this study was the measurement of the constructs of HBM in relation to oral health practice of female students in Tehran, Iran.

Methods

The Medical Ethics Committee of Tarbiat Modares University confirmed this study. This cross- sectional study was conducted on the grade five female students (11 years old) in Tehran (Capital of Iran) in 2016. Applying the statistical estimation, the sample population was determined to be 416 who were selected from10 regions using Cluster sampling method. Nearly 40 students were selected from each region using simple randomized method. The researcher was present while completing the questionnaire to help the students. The inclusion criterion was being grade five female student, and the exclusion criterion was dislike to participate in the study. Data collection instrument was a researcher- made questionnaire prepared based on the previous studies [16, 19, 23, 24]. The questionnaire had eight items in relation to the demographic variables, and 30 items to the oral hygiene beliefs (HBM constructs) based on the dichoto scale. The items were related to perceived susceptibility with four questions (0-4), perceived severity with five questions (0-5), perceived benefits with four questions (0-4), perceived barriers with seven questions (0-7), cues to action with six questions (0-6), and self-efficacy with four questions (0-4). The performance measurement was conducted based on five questions (1-20), related to healthy behavior including frequency of brushing and use of dental floss daily, procurement of tooth brush, the best time to brush and the number of visits to the dentist in a year. Knowledge was assessed with 14 questions (0-14). Socio-economic factors including, parents' occupation (1-4) (unemployed or housewife, worker or private, employee, doctor and engineer), parents' education (1-9) (uneducated, primary, secondary school, high school, diploma, associate degree**,** bachelor of art, master of art and doctorate), and family income (1-5) (low, appropriate, well, very well and excellent). The

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total score of socioeconomic status (0-31) was gained for each individual. The performance measurement was conducted based on the score of oral health behavior (0-5). The questionnaire was presented to four health education experts, five school health teachers and five dentists who have worked on administered oral health in the Ministry of Health in order to evaluate its validity, and their opinions were considered. Then Cronbach's alpha coefficient was used to evaluate the questionnaire's reliability. The values for the constructs were as follows: perceived susceptibility (78%), perceived severity (79%), perceived benefits (80%) and perceived barriers (80%). For data collecting in each school, the personnel were assured that this project is just an academic study and it has not related to school evaluation and controlling the health care staffs' activities. Then at each school, 20 minutes were spent to get the students' confidence and their participation to answer the questions honestly.

The students were explained that if they answer honestly, this will help the researchers achieve proper information and improve knowledge. Data analysis was conducted using the SPSS software (ver. 16) and descriptive statistics including frequency, mean, median and standard deviation, as well as analytical tests including Pearson's correlation coefficient and logistic regression.

Results

In this study, 416 fifth grade girl students who had the inclusion criteria were examined. Demographic variables showed that the average age of the participants was 10/88 ±0/628 years, and 219 (52/6%) students were the first child of the family. The education level of 43/5% of the mothers was diploma, and 41/8% of the fathers had the diploma. 229 (55%) students had 4-persons in their family. 76.2% of the mothers were housekeepers, and 58.9% of the fathers were workers or had private job. Socio-economic status of 45.2% of the participants was well. Table 1 shows the results of demographic variables.

The mean performance score of the students and the HBM structures about the prevention of tooth decay are shown in Table 2. In this study, cues to action had the highest (4.66±1.33) and performance had the lowest score (1.79±0.97).

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Table 1: Demographic characteristics of the studied students (n=416)

Variable	Level	Rate	Percent
Mother's educational level	Uneducated	9	2.2
	Primary	42	10.1
	Secondary school	21	5.0
	High school	17	4.1
	Diploma	181	43.5
	Associate degree	34	8.2
	Bachelor of Arts	64	15.4
	Master of Arts	41	9.9
	Doctorate	7	1.7
Father's educational level	Uneducated	6	1.4
	Primary	40	9.6
	Secondary school	31	7.5
	High school	21	5.0
	Diploma	174	41.8
	Associate degree	31	7.5
	Bachelor of Arts	58	13.9
	Master of Arts	46	11.1
	Doctorate	9	2.2
Mother's job	Housekeeper	317	76.2
	Worker/private	37	8.9
	Employee	56	13.5
	Doctor/Engineer	6	1.4
Father's job	Unemployed	9	2.2
	Worker/private	245	58.9
	Employee	133	32
	Doctor/Engineer	29	7
Family income	Low	23	5.5
	Appropriate	188	45.2
	Well	114	27.4
	Very well	59	14.2
	Excellent	32	7.7

Table 2: Mean performance score of the students and the Health Belief Model structures about prevention of tooth decay

Variable	Mean	SD	Minimum	Maximum	Scores range
Perceived susceptibility	3.43	0.78	0	4	0-4
Perceived severity	3.30	1.15	0	5	0-5
Perceived benefits	3.57	0.69	1	4	0-4
Perceived barriers	2.08	1.15	0	7	0-7
Cues to action	4.66	1.33	0	6	0-6
Self-efficacy	3.32	0.94	0	4	0-4
Performance	1.79	0.97	0	5	0-5
Knowledge	3.08	1.61	0	8	0-14
Socio–economic conditions	17.02	4.39	6	30	0-31

Table 3 shows the relationship between HBM structures and performance of the students. Self-efficacy, cues to action and perceived benefits showed positive and significant correlation with

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the students' performance. Perceived barriers showed negative and significant correlation with the students' performance. Statistically, correlation of performance with other structures was not significant. This study evaluated the relationship between knowledge and socio-economic conditions (mother's educational level, father's educational level, mother's job, father's job and family income) with the students' performance. Multivariate linear regression model was used in order to predict the behavior using HBM structures by controlling the effect of knowledge and socio–economic conditions (Tables 4 and 5).

Table 3: The relationship of the Health Belief Model structures, knowledge and socio-economic conditions with performance of students

Performance		
Variable	**Pearson's correlation**	**P-value**
Perceived susceptibility	0.55	0.2
Perceived severity	-0.15	0.7
Perceived benefits	0.14**	0.04
Perceived barriers	-0.11*	0.01
Cues to action	0.10*	0.02
Self-efficacy	0.25**	0.00
Knowledge	0.101*	0.03
Socio–economic conditions	0.187**	0.00

Table 4: Regression analysis to predict structures of the oral health performance of students

Criterion variables	**Predictive variables**	**Correlation coefficient R**	**Coefficient of determination R^2**	**Adjusted coefficient of determination R^2**
Performance of students	**Self-efficacy**	0.258	0.066	0.064
	Self-efficacy and socio- economic conditions	0.309	0.095	0.091
	Self-efficacy, socio– economic conditions and perceived benefits	0.340	0.116	0.109

Table 5: Stepwise regression coefficients for the predictor variables of student performance

Step	**Criterion variables**	**Non-standard coefficient (B)**	**Standard coefficient (Beta)**	**t**	**P-value**
1	**Constant amount**	0.16	-	0.674	0.5
	Self-efficacy	0.331	0.258	5.423	0.00
2	**Constant amount**	0.016	-	0.667	0.5
	Self-efficacy	0.317	0.247	5.260	0.00
	Socio– economic conditions	0.126	0.171	3.647	0.00
3	**Constant amount**	0.18	-	0.773	0.440
	Self-efficacy	0.213	0.166	3.058	0.002
	Socio– economic conditions	0.125	0.171	3.669	0.00
	Perceived benefits	0.149	0.109	2.191	0.02

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Discussion

Health belief is important since it predicts health behavior. It not only helps understand health behavior but also guides interventions by identifying potentially modifiable antecedents of health behavior. The present study was designed to investigate the predictors of oral and dental health behavior among female students within the framework of HBM. The findings from this study showed that there was a moderate level of severity, benefits, cues to action and self-efficacy structures, indicating that students are sensitive to oral health. These results are consistent with the findings of a similar study [25]. The findings of the structures of the cues to action, self-efficacy, and perceived benefits according to appropriate action in the prevention of dental caries showed that the students' understanding of the structures is higher than average; this finding is consistent with the results of Kasmaee et al. [26], maybe because of the age range of the audience that is in adolescents age. In fact, their attendance as guide to action (cues to action and perceived benefits) guaranteed the effectiveness and sustainability of healthy behavior. This approach can result in their further participation in the healthcare field. Perceived benefits gained the highest score with a mean of 0.96±0.193 to the item "Brushing can prevent smelly mouth", and the lowest score with a mean of 0.78±0.416 to the item "If I use dental floss, my teeth will have longer life". The results showed that the students' education can be effective in promoting perceived benefits. The mean score of perceived barriers was less than average that is inconsistent with the study of Mahmoodabad [27]. It seems that this similarity is due to similar lifestyle and oral health culture in both studies. In section of perceived barriers, the highest score was assigned with a mean of 0.73± 0.445 to the item "I do not know the correct method of using of dental floss", and the lowest score was assigned with an average of 0.06±0.242 to the item "Brushing is time-consuming". This indicates that oral health programs in schools must contain the correct way to use dental floss.

In part of cues to action, most of the students said they receive their information from their parents. In a previous research conducted in Iran, it has been revealed that the most important sources of oral health information were dentists and parents [28]. Self-efficacy gained the highest score with a mean of 0.94±0.247 to the item "I can brush my teeth correctly", and the lowest score with a mean of 0.86±0.352 to the item "I can brush regularly, even if no one reminds me".

In this study, the students' performance was higher than average (13.71±2.582). Using the correct methods of brushing and flossing of

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teeth is essential in order to preserve children's oral health. Students' knowledge in this study was lower than the average (3.08±1.61) that is inconsistent with the study of Mirzaee and Goodarzi [29 ،30]. This difference may be due to the fact that in our study, the students were in close age range (11 and 12 years old), while Mirzaee and Goodarzi evaluated a group of students with variable age ranges. Perhaps one of the reasons is that this randomized study's population was selected from all districts of Tehran, while other studies have been conducted on smaller samples because the correlation azmoon (test) showed a significant association between knowledge and behavior. The students had little knowledge about oral health; however, they had a relatively good performance. This sheds doubt on the applicability of HBM in preventing oral diseases [31]. The above average score of performance in relation to knowledge indicates that although students had a good performance, their knowledge level was not appropriate; this likely had a negative effect on their performance. In spite of the frequency of behavior, oral hygiene behavior does not have a good quality according to oral and dental health index. In this study, there was no significant relationship between perceived susceptibility and behavior that is consistent with the study of Keykhaee [32]; however, it is inconsistent with the study of Solhi and Shojaeezadeh [19] and Ramezankhani [17]. In the above studies, perceived susceptibility was a powerful factor in oral health behavior. The main reason for this structure in our study is that girls at this age are more likely to focus on the benefits of the behavior and that they are seeking for attracting more attention. In the study of Ramezankhani, the target group consisted of boys, and in the study of Solhi, the target group had not yet reached adolescence. In this study, there was no significant relationship between oral health behavior and perceived severity that is consistent with the study of Keykhaee and Mehri [32,33]. This result shows that perceived severity and sensitivity in this age group are not important for oral health behaviors. In this study, there was a significant relationship between self-efficacy and behavior; it means that as the self-efficacy and abilities of students increase, their oral health behavior improves, which is consistent with the findings of Badri, Keykhaee, and Mehri [2,32,33]. Therefore, for improving behaviors related to oral health in school age, empowering the individual is more important in comparison to perceived severity and sensitivity. Thus with appropriate educational intervention and also with an emphasis on the correlation obtained between self-efficacy and behavior, we can achieve positive results in improving children's oral health. In this survey, there was a negative and

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significant relationship between perceived barriers and performance, which is consistent with the findings of Vakili, Shamsi, and Boglar [16,20, 34]. One of the best strategies to promote oral health is reduced perceived barriers [16], while most of the time, it is not possible to influence the perceived barriers. Educational interventions should target the process of reducing barriers together with identifying the real barriers with due attention on their importance [12]. In our study, the lack of specific programs, time of teeth brushing, and not knowing the correct way of using dental floss and teeth brushing were barriers of affecting the students' performance. In the study of Kasmaee, fatigue, laziness, and lack of patience were the most important perceived barriers [35]. One of the reasons for this difference in the perceived barriers in these two studies is probably the students' age in the study of Kasmaee, which was lower than that of our study. Educational programs in this age group should be considered in order to remove perceived barriers (lack of specific programs, not knowing the correct way of using dental floss and teeth brushing). In this study, perceived benefits included longer life of teeth, beautiful face, and fine smell of the mouth. Since perceived benefits has significant relationship with performance, then as they increase, the performance of oral health will be higher, which is consistent with the study of Shamsi [20]. It is recommended that the educational programs provided for students of this age group should include these three benefits. In this study, the average of socio-economic status scores was 17.02±4.39, which is inconsistent with the study of Goodarzi and Mirzaee [29, 30]. Because in our study, the samples were selected randomly from all districts of Tehran City while Mirzaee and Goodarzi carried out their study in a unique area. Finally, the results showed that benefits, self-efficacy, cues to action, awareness and socio-economic conditions have a direct relationship with students' performance, and barriers have an indirect relationship with their performance. Several studies have confirmed these results [27, 24, 34].

Future studies are required to assess factors affecting oral hygiene in different populations in accordance with HBM structures for educational intervention. As most of the participants in this study were female students in a metropolitan city, cautious interpretation is needed in generalizing the findings to male students or other populations. Further studies with similar age groups are necessary for confirming the findings.

Conclusion

The findings suggest that perceived benefits and barriers, self-efficacy, cues to action, awareness and socio-economic conditions play

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important role in adopting a desirable health behavior among young adolescents.

Competing interests

The authors declare that they have no competing interests.

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