Research Article

Determinants of Dental Health Behaviors of Iranian Students Based on the Health Belief Model (HBM)

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Abstract

Background: Several factors affect oral and dental hygiene and therefore general health.

Objectives: This study used the health belief model (HBM) to explore factors influencing dental health behaviors of students in Teheran, Iran.

Methods: A cross-sectional study design was used. The participants were 400 male high-school students in district 5 in Tehran selected through multistage stratified random sampling. A self-administered questionnaire was used to collect the data, which included the following measures of the HBM: perceived severity, perceived susceptibility, perceived benefits, perceived barriers, cues to action, and self-efficacy. A multiple regression analysis and Pearson's correlation were run to detect potential correlations between the independent variables and dependent variable.

Results: All 400 students completed the study. The results of the linear regression analysis showed that perceived barriers, self-efficacy, and cues to action accounted for the highest percent of total variance observed in dental health behaviors. The total HBM constructs and demographic variables explained 29% of the variance in dental health behaviors.

Conclusions: The current study provides evidence that oral and dental hygiene can be promoted by reducing perceived barriers and enhancing oral and dental hygiene self-efficacy.

Keywords: Perception, Oral Health, Health Behavior

1. Background

Oral health is an essential component of an individual's general health status. Several studies argued that there was a significant relationship between oral health and quality of life (1, 2). Research also reported an increment in the prevalence of oral diseases in developing countries, in which community-based oral care programs were not established (2). Oral disease has been shown to have a major impact on people's lives (both physical and psychological) due to the experience of pain, problems eating and chewing, and communication (3-5). Research also pointed to an association between periodontal disease and coronary heart disease (6).

According to estimates, 52% of the Iranian population is younger than 20 years (7). Adolescence is considered a critical period in life, where health behaviors can be ac-

quired and consolidated over the long term (8). A pervious study showed that Iranian adolescents had poor oral health (9). Research also demonstrated that adolescence was marked by involvement in high-risk health-related behaviors, including use of tobacco and alcohol, both of which are known risk factors for oral disease (10). Furthermore, researchers argued that patterns of oral health-related behavior exhibited during adolescence (11, 12).

Several studies showed that perceived oral health beliefs and attitudes influenced oral health-related behavior (13, 14). Therefore, attempts to change oral health behavior should be based on an understanding of an individual's perceived beliefs. The health belief model (HBM) is a belief-based theory of health-related behaviors that is used to predict and provide suitable dental health interventions (15).

The HBM was developed in the 1950s with the aim of understanding why some people use but others do not use

health services. The model consists of the following constructs (16): perceived sensitivity, perceived intensity, perceived barriers, perceived benefits, self-efficacy, cues to action, behavior, and knowledge. The model assumes that various factors, such as the perceived severity of a health problem, perceived benefits, and perceived barriers preventing individuals undertaking preventive actions, affect health-related beliefs and behaviors (17, 18). The HBM has been used to study a variety of long- and short-term health behaviors, including weight-control behavior (19), hearing health behaviors (20), and self-care behaviors (21).

2. Objectives

The aim of the current study was to investigate the relationship between constructs of the HBM and oral health behaviors among a group of male students in Tehran, Iran.

3. Methods

3.1. Design and Participants

This was a cross-sectional study carried out in Tehran, Iran. The participants were male students recruited from three high schools in district 5 in Tehran. There are 19 schools in this district. Using multistage stratified random sampling, three schools were selected. In addition, classes were selected randomly. In total, 400 questionnaires were distributed.

3.2. Ethics

Written informed consent forms were obtained from all the participants involved in this study. The study protocol was approved by the institutional review board at Baqiyatallah University of Medical Sciences.

3.3. Questionnaire

A validated 50-item self-reported measure was used to collect the data (22). Demographic characteristics and knowledge related to oral health behavior were covered by 16 items (6 and 10 items, respectively).

The questionnaire contained four behavior-related items concerning flossing and using fluoride toothpaste. Thirty of the items were designed to measure the HBM constructs, including perceived severity, perceived susceptibility, perceived benefits, perceived barriers, cues to action, and self-efficacy. Each of these constructs had five items, which the respondents rated on a 5-point Likert scale, ranging from 1 to 5.

The questionnaires were self-administered. Prior to completing the questionnaires, the participants were informed about the research project. All the questionnaires

were returned. A panel of experts checked the validity of the questionnaire. Using Cronbach's alpha, the reliability of the questionnaire was found to be between 0.6 and 0.7. Method was mentioned in the another paper (23).

3.4. Statistical Analysis

The data were analyzed using SPSS, version 18. A Kolmogorov-Smirnov test was used to determine whether the data were normally distributed. A multiple regression analysis and Pearson's correlation were run to detect potential correlations between the independent variables and dependent variable. The significance level was set at 0.05.

3.5. Sample Size

Using the following formula, the required sample size was calculated as 370 subjects, considering $\alpha = 5\%$, a statistical power of 90%, P = 0.5, and d = 0.085:

$$n = \frac{\left(Z_{\frac{\alpha}{2}} + Z_\beta \right)^2 P \left(1 - P \right)}{d^2} \tag{1}$$

Considering a 10% drop-up rate, 37 subjects were added to obtain an optimal sample size. The final sample consisted of 407 subjects.

4. Results

All 400 students completed the study. The mean age of the participants was 16.02 years (SD = 0.90). Most of the participants' parents had attended higher-level education (i.e., an academic degree). Eighty-four (47.5%) of the participants always used a toothbrush. Nineteen (4.9%) of the participants did not brush their teeth before bed. Eighty-five (22%) of the participants had never used dental floss. One hundred forty-six (37.7%) of the participants always used toothpaste containing fluoride. Of the participants, 98 (26.8%) reported that sugary foods, such as chocolates and sweets, were the main perceived barrier to dental health behavior. Other perceived barriers were fear of visiting the dentist and dental injections (n = 40, 10.9%). The most common cues to action as regards dental health behaviors were comments by family members and close friends (46% and 26%, respectively).

The results showed that the participants had only moderate knowledge of the HBM constructs (perceived barriers, self-efficacy, and cues to action), although the scores for perceived susceptibility, perceived severity, and perceived benefits were high (Table 1).

Table 2 shows the correlations among the constructs of the model for oral health behavior and descriptive statistics for the various variables for the theoretical constructs.

Table 1. Characteristics of the Study Sample (N = 400)

Variables	Level	No. (%)
Age	$\leq$ 15	99 (28.9)
	16	152 (44.3)
	17 $\geq$	92 (26.8)
Grade	Primary	209 (52.5)
	Secondary	143 (35.9)
	Higher	46 (11.6)
Education fields	Mathematics	132 (40.1)
	Experimental	143 (43.5)
	Humanities	46 (14.0)
	Other	8 (2.4)
Father's education level	Lower diploma	73 (18.3)
	Diploma	126 (31.7)
	Academic degree	199 (50.0)
Mother's education level	Lower diploma	83 (20.9)
	Diploma	143 (35.9)
	Academic degree	172 (43.2)
Knowledge	Low	97 (24.5)
	Moderate	174 (43.9)
	High	125 (31.6)
Behavior	Low	100 (25.8)
	Moderate	180 (46.5)
	High	107 (27.6)
Perceived susceptibility	Low	31 (8.1)
	Moderate	114 (29.7)
	High	239 (62.2)
Perceived severity	Low	48 (12.9)
	Moderate	148 (39.7)
	High	177 (47.5)
Perceived benefits	Low	60 (16.1)
	Moderate	153 (41.1)
	High	159 (42.7)
Perceived barriers	Low	147 (40.2)
	Moderate	148 (40.4)
	High	71 (19.4)
Self-efficacy	Low	64 (17.5)
	Moderate	192 (52.5)
	High	110 (30.1)
Cues to action	Low	116 (31.8)
	Moderate	173 (47.4)
	High	76 (20.8)

Most of the items were correlated with each other. In Table 3, the results of the regression analysis of the association between the oral health behaviors of the students based on the HBM constructs and selected demographic predictors are presented.

Perceived barriers, self-efficacy, and cues to action showed a positive relationship with dental health behaviors. The constructs of the HBM and demographic variables predicted 29% of dental health behavior.

5. Discussion

This study aimed to identify factors influencing the oral health behaviors of male high-school students based on the HBM. The findings revealed that perceived barriers influenced oral health behaviors. The most commonly cited perceived barrier to health behaviors was sweet food and candy. Previous research showed that 84% of Thai youth consumed sweet foods. Other studies of an Australian population reported that 75% of young people ate sweet foods (24, 25). Therefore, eating sweet foods is common among young populations in almost all societies, something that needs to be addressed. Currently, the rate of dietary counseling in dental clinics is low across the globe, including Iran (26, 27).

In the present study, high costs (10%) and fear of injections (9.3%) were mentioned as barriers to oral health behavior. In a study of a minority group, high costs, fear of dentists, and service and time limitations were cited as the most important barriers to oral health services (28). In the present study, the study population was middle class (socially and economically). Thus, cost was the most important factor.

The next most important factor predicting oral health behavior was self-efficacy with respect to nutrition, brushing, flossing, and visiting dentists. Among the aforementioned factors, flossing self-efficacy was the highest. Previous studies reported that self-efficacy predicted a range of health behaviors, including oral self-care behavior, and that it promoted the predictive efficacy of the HBM (29). Research also showed that self-efficacy was an important predictor of brushing and flossing behaviors (30) and that dental self-efficacy played a key role in oral and dental health hygiene. In addition, tooth-brushing self-efficacy was shown to be more important than dental visiting self-efficacy and cleaning self-efficacy (31). The results of the present study revealed a moderate level of dental health behavior self-efficacy among all the participants. Thus, strategies seem to be needed to promote self-efficacy related to dental health behavior.

The third most important factor predicting oral and dental hygiene was perceived susceptibility. Although this item received high scores, it had less predictive power than that of the other constructs in the model.

In the present study, cues to action were moderate predictors of dental behavior. The families of the participants were most commonly cited as the primary cue to action. Therefore, by educating families and parents, especially women, oral and dental hygiene can be promoted.

The model accounted for 29% of the variance in oral and dental behavior. To maintain the oral and general health of societies, comprehensive dental hygiene plans and appropriate training programs are required. Given the findings of the study, educational programs should be put in place to familiarize students with oral and dental hygiene and teach them that they can implement oral and dental hygiene, even in the presence of barriers.

5.1. Limitations of the Study

The participants in this study were students, which limits the generalizability of the findings of the study. Given the exploratory nature of the study, the relationship among variables could not be investigated. In addition, the study suffers from the limitations that affect all cross-sectional and self-report studies.

Table 2. Pearson's Correlation Matrix Between Oral Health Behavior (Dependent Variable) and the Independent Variables Studied (N = 400)

Variables	Sensitivity	Intensity	Barriers	Benefits	Self-Efficacy	Cues to Action	Behavior	Awareness
Perceived susceptibility	1.00							
Perceived severity	0.51[a]	1.00						
Perceived barriers	-0.04	-0.10*	1.00					
Perceived benefits	0.52[a]	0.65[a]	-0.05	1.00				
Self-efficacy	0.35[a]	0.40[a]	0.12*	0.42[a]	1.00			
Cues to action	0.26[a]	0.35[a]	-0.07	0.38[a]	0.43[a]	1.00		
Behavior	0.29[a]	0.21[a]	0.32[a]	0.18[a]	0.41[a]	0.21[a]	1.00	
Knowledge	0.40[a]	0.24[a]	0.11*	0.23[a]	0.21[a]	0.10	0.29[a]	1.00
Mean	21.07	20.11	16.72	19.5	18.78	17.47	11.93	6.45
SD	3.43	3.61	4.36	3.49	3.76	3.9	2.62	1.98

[a] P value lower than 0.01.

Table 3. Regression Analysis to Predict the Oral Health Behaviors of Male Students Based on Selected Demographic Predictors and the HBM Constructs[a,b]

Parameter	B	Std. error	t	P Value
High-school grade				
First	-0.211	0.587	-0.359	0.720
Second	-0.054	0.495	-0.110	0.912
Third	Reference category			
Education fields				
Mathematics	0.009	0.959	0.010	0.992
Experimental	-0.647	0.977	-0.662	0.508
Humanities	-0.732	1.016	-0.720	0.472
Other	Reference category			
Mother's education level				
Lower diploma	-0.260	0.393	-0.662	0.509
Diploma	-0.947	0.327	-2.899	0.004
Academic degree	Reference category			
Perceived susceptibility	0.149	0.053	2.800	0.006
Perceived severity	0.024	0.059	0.402	0.688
Perceived benefits	-0.100	0.061	-1.633	0.104
Perceived barriers	0.166	0.033	5.021	< 0.001
Self-efficacy	0.194	0.048	4.067	< 0.001
Cues to action	0.088	0.044	1.989	0.048
Age	0.144	0.217	0.662	0.508
Knowledge	0.159	0.085	1.878	0.062

[a] R^2 = 0.292, Adjusted R^2 = 0.277.
[b] Dependent variable: oral health behavior.

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