

Using the Extended Theory of Planned Behavior to Assess Adults' Intentions of Preventive Dental Care

Mona Talal Rajeh¹, Abdullah Rajeh Alutaibi², Abdullah Adnan Al-Badah², Ali Salem Alsubhi², Meshari Mohammed Alluhaybi

¹Department of Dental Public Health, Faculty of Dentistry, King Abdulaziz University, Jeddah, ²Faculty of Dentistry, Umm Al Qura University, Makkah, Saudi Arabia

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ABSTRACT **Objective:** The objective of this study was to test an extended theory of planned behavior (TPB) that includes attitudes, subjective norms and self-efficacy, sociodemographic variables, dental beliefs and insurance on the intention to seek preventive dental care among adults in Makkah, Saudi Arabia. **Materials and Methods:** This cross-sectional study was conducted on 397 Saudi adults living in Makkah. Data were collected through a self-administered online questionnaire. Structural equation modeling was performed to analyze the various factors that affect the likelihood of people seeking dental care. **Results:** The results of the study revealed that perceived norms (estimate = 0.14; $P = 0.004$) and self-efficacy (estimate = 0.22; $P < 0.001$) were associated with the likelihood of people getting preventive dental care. However, attitudes showed no effect on the likelihood of people seeking dental care. The study also explained that the relationship between the beliefs of people and the intention to receive preventive care was moderated by subjective norms and perceived behavioral control (indirect effect $t = 0.089$, $P < 0.001$). **Conclusion:** The study's results revealed that an integrative model of behavior prediction could be used to design effective interventions and strategies to enhance the likelihood of individuals seeking preventive dental care. In particular, these strategies should focus on enhancing subjective norms and self-efficacy.

KEYWORDS: *Intention, oral health, planning theory, preventive dentistry, Saudi Arabia*

INTRODUCTION

The field of oral health has advanced dramatically in recent years, but around 3.5 billion people globally are still affected by oral diseases, such as dental caries and periodontal disease.^[1] According to previous studies, the prevalence of these conditions varied significantly in different regions, such as Asia, Latin America, and the Middle East.^[1-3] Several studies have been conducted to assess the prevalence of oral diseases in Saudi Arabia. According to a review of the data collected from Saudi Arabia, there is a high prevalence of dental caries, which is between 50% and 90% among adults.^[4] Studies also indicated that the

prevalence of periodontal disease was high in various regions of Saudi Arabia, which was estimated to be up to 50%.^[3] This issue highlights the need to address the high burden of this condition.

Preventive dental care is regarded as a critical component in reducing the likelihood of developing dental caries and the need for more intensive treatments. In addition, regular dental visits are known to help

Address for correspondence: Dr. Mona Talal Rajeh, Department of Dental Public Health, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia. E-mail: mtrajeh@kau.edu.sa

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identify and prevent diseases. It can help prevent patients from experiencing adverse health effects. Unfortunately, many people do not follow a consistent schedule for seeking preventive dental care.^[5] In most cases, preventive care is only performed as an added service when an episodic visit is required. It is often considered a luxury to get this type of preventive dental care because no severe dental problems are involved. Preventive dental care is often recommended for all ages to maintain oral health; however, there is currently not enough evidence supporting the knowledge and practices of these visits among the adult population.^[5,6] Existing studies on preventive dental visits have focused on children.^[6]

However, there are various barriers that prevent adults from seeking preventive care such as access to dental care and lack of knowledge about health care systems. Other factors, such as education level, income, and the high cost of dental treatments, can also prevent adults from seeking preventive dental treatment.^[4,7,8] Hence, a comprehensive health behavior model should include these factors to better understand the barriers to receiving preventive dental care. In addition, the factors that influence the choice of preventive care in Saudi adults should be conceptualized and measured under a health behavior model that measures attitudes, behaviors, and subjective norms. A meta-analysis has revealed that the planned behavior theory is the most valid method for understanding and predicting oral health behaviors.^[9]

The concept of the TPB attempts to identify the factors that influence a given behavior [Figure 1]. To predict, change, or reinforce a particular behavior in a given

population, the TPB focuses on a small number of determinants.^[10] According to the theory, people are more likely to engage in a given behavior if they have a strong desire to do it, if they acquire the necessary skills and abilities, and if they are not constrained by the environment.^[10,11] The TPB claims that attitudes, perceived norms, and self-efficacy influence a behavior's intention.^[10,11] The positive or negative expectations of a person that influence behavior are referred to as attitudes.^[10,11] Perceived norms can be defined as what people believe about a given behavior.^[10,11] Self-efficacy is people's perceptions of their ability to control behavior due to environmental or individual factors.^[11-13] Additionally, the TPB is a flexible model that allows adding variables that can increase the explained variance.^[10,13-15] Therefore, the relationship between the model constructs and intentions can also be influenced by demographic variables.^[12,13] Based on the previous discussion, this study aimed to test the extended TPB model on Saudi adults' intentions to seek preventive dental care and determine if sociodemographic variables, dental belief and insurance mediated the relationship between the model constructs and the intention to seek care.

MATERIALS AND METHODS

A cross-sectional study was conducted to target people living in Saudi Arabia. The inclusion criteria for the survey participants were that they were at least 20 years old and lived in Makkah city, Saudi Arabia. Data collection was conducted from March 2022 to April 2022. Participants were recruited using a convenient sampling method. The study was approved

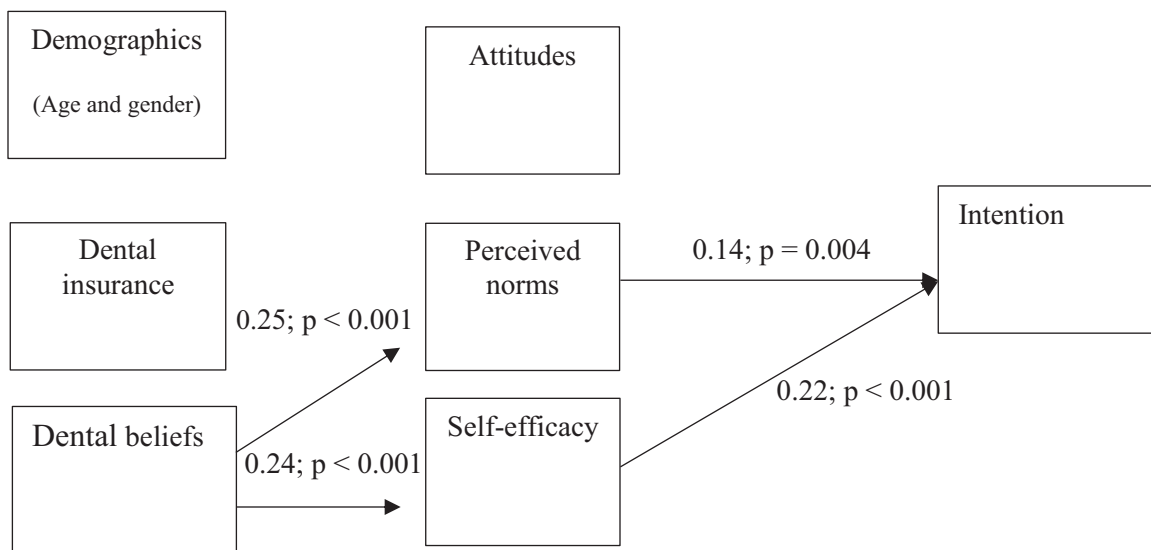


Figure 1: Path diagram of the structural equation model. Single-headed arrows indicate the hypothesized direction of causality. Numbers adjacent to arrows represent the standardized direct effect. 0.14; $P = 0.004$, 0.25; $P < 0.001$, 0.22; $P < 0.001$, 0.24; $P < 0.001$

by the Research Ethics Committee of Umm Al Qura University (IRB no. HAPO-02-K-012-2021-12-870). It was entirely voluntary to participate in the study and no personally identifying information was collected. The survey link included a cover page of the questionnaire that contained information about the aim of the study, duration to complete the survey, description of the data storage procedure (i.e., duration of storing data and researcher who has access to the data), and the contact details of the principal investigator for whom they can contact for any clarification. In the first question, participants were asked if they were older than 20 years and lived in Makkah. This was considered consent to participate and helped to exclude ineligible participants.

An online, self-administered anonymous questionnaire on Google Forms was used to collect responses. An electronic letter inviting the participants was embedded in the survey link. After clicking on the survey link, the participant was automatically added to the list of recipients. Various social media platforms were used for recruiting participants, such as Telegram, WhatsApp, and Twitter.

The questionnaire was derived from a previously published study that was valid and reliable.^[16] Based on backward forward translation, the English questionnaire was translated into Arabic. The questionnaire was composed of six sections. The first section included questions about the participant's sociodemographic data, such as age, gender, nationality, occupation, education, and area of residence. The second section is composed of two questions measuring intention. The questions that asked about people's intentions toward preventive care were: "I plan to visit a dentist for regular care" and "I am likely to visit a dentist for preventive care regularly."

In the third section, we assessed people's attitudes toward preventive dental care. They were asked to rate their various attitudes toward visiting the dentist for regular care as good or bad, pleasant or unpleasant, beneficial or harmful, and necessary or unnecessary.

The fourth section of the study assessed people's perceptions of perceived norms. The first two indicators were ranked from strongly disagreeing to strongly agreeing. The third indicator was then computed by considering the responses to three questions on a five-point scale that asked about people's intentions toward preventive care. It revealed that most of the respondents' friends and families believed that they should regularly visit the dentist (i.e., my family think that I should see the dentist for preventive care regularly).

The fifth section measured the level of self-efficacy that people have when it comes to seeking preventive dental care, from strongly disagree to strongly agree. They were asked if it was their own choice whether they would go to a dentist regularly, if they were confident to get preventive care on a regular basis, and if they understood the importance of regular preventive visits to a dentist.

The last section of the study measured the beliefs of the participants as latent variables. They were then asked to rate their beliefs on a five-point Likert scale (i.e., strongly disagree to strongly agree). Some of these included the belief that most children will eventually have cavities or other oral health issues, as well as the extent to which people will have to get immediate treatment.

The content and face validity were done by two professors from Umm Al Qura University. They were asked to evaluate the questions and provide suggestions to improve the accuracy and clarity of the questionnaire, and further corrections were made accordingly. A pretest was also conducted with 15 adults to test the Google Form and to confirm the reliability and face validity of the questionnaire. A total of three pages were used for the 20-item questionnaire with no randomization of items. It was estimated to complete the questionnaire in 10 minutes. There was no password protection for the present survey. To ensure all questions were answered, each question in the Google Form was set as compulsory. Participants were allowed to change their answers as long as the form had not been submitted. Incomplete questionnaires were not included in the analysis. No incentives were offered in this study.

STATISTICAL ANALYSIS

Epi Info software version 2.1 was used to calculate the sample size, using a 95% confidence interval, level of significance as 5%, and population of approximately 8,557,766, according to the General Authority for Statistics of Saudi Arabia 2017.^[17]

Data cleaning and checking was performed before the analysis. The results of the study were then analyzed using a structural equation model (SEM) to test the relationship between the variables and the intention of Saudi adults to seek preventive dental care. The four background variables that were analyzed were age, gender, dental insurance, and belief. It is hypothesized that background variables indirectly affect intention through attitudes, perceived norms, and self-efficacy.

Then, the direct relationship between the various model variables and the intention of Saudi adults to seek

dental care was tested. Data analysis was done using Stata 23 statistical software (StataCorp, LLC., College Station, TX, USA). An SEM tool, IBM SPSS AMOS 24, was used to test the study's hypotheses.

RESULTS

According to sample size calculation, the minimum number of participants required was 384. The study included 397 participants. The mean \pm SD age was 31.9 ± 12.6 years. [Table 1] presents the demographic characteristics of the study participants.

The model showed a good fit, with $\chi^2 = 4.746$ ($P = 0.448$), Tucker–Lewis index (TLI = 1.009), root mean square error (RMSE = 0.0001), and goodness of fit index (GFI = 0.947). The results of the SEM analysis are presented in [Figure 1]. The demographics of the model constructs are presented in [Table 2].

Regarding the demographic variables tested in the model, only dental beliefs were significantly correlated

with perceived norms and self-efficacy [Figure 1]. Regarding the constructs of the IMBP models, the perceived norms and self-efficacy of people when it comes to seeking preventive dental care were significantly associated with their intentions to do so ($P < 0.001$).

The results revealed that the link between people's desire to receive preventive dental care and their beliefs about it was mediated by the perceptions of self-efficacy and perceived norms (indirect effect $t = .0089$, $P < 0.001$). There was no significant direct association between the demographic variables—age, gender, and dental insurance—and intention.

DISCUSSION

Perceived norms and self-efficacy were significantly associated with the intent to seek dental visits for preventive care using SEM, an advanced statistical technique. However, there was no association between attitudes and intentions regarding seeking preventive dental care. The findings of this study are concurrent with previous studies that support the idea that the TPB plays a role in predicting oral health behavior intentions.^[11,18]

The self-efficacy control component was the strongest predictor of this study's intention to seek preventive dental treatment. A meta-analysis has confirmed this result, which indicated that self-efficacy is the most important factor influencing oral health behavior.^[19] A similar study on Mexican immigrants revealed that self-efficacy is the most favorable factor that affects their dental care-seeking intentions.^[16] Therefore, it is believed that a high level of self-efficacy is also important for adults to improve their intention to seek preventive dental care. According to researchers, individuals who can improve their self-efficacy through knowledge enhancement are more likely to perform better in their oral health and would be more likely to seek preventive treatment.^[20,21] This is because they are more capable of handling the demands of maintaining their oral health. Skills-based health education should focus on self-efficacy as an essential component when planning effective oral health promotion programs.

In the current study, perceived norms were considered predictors of intention. Whether or not perceived norms were influential varied across different studies. Studies similar to our findings were conducted in Iran, and Indonesia found that perceived norms had a strong influence on behavioral intention in different oral health domains.^[22,23] Compared to our findings, however, a study in by Badri *et al.*^[24] revealed that

Table 1: Demographics characteristics

Variable	N	%
Gender		
Male	220	55.42
Female	177	44.58
Nationality		
Saudi	333	83.88
Non-Saudi	64	16.12
Level of education		
High school of less	113	28.46
Bachelor	263	66.25
Master	13	3.27
PhD	8	2.02
Marital status		
Single	209	52.64
Married	172	43.32
Divorced	16	4.03
Monthly Income (SAR)		
< 10,000	288	72.54
10,000–20,000	92	23.17
> 20,000	17	4.28
Dental insurance		
Yes	47	11.84
No	350	88.16

Table 2: Descriptive statistics of the model variables

Variables	Cronbach alpha	Mean	SD
Intention	0.53	3.81	1.09
Attitudes	0.69	3.78	1.24
Subjective norms	0.68	3.72	1.12
Perceived behavioral control	0.71	3.79	1.09
Dental beliefs	0.61	4.39	0.88

subjective norms do not influence the behavior of individuals when it comes to dental visit attendance. Another study revealed that perceived norms do not influence Mexican immigrants' intentions to seek preventive care.^[16] The inconsistency in the findings of these studies might be because the subjects differed sociodemographically. For example, in the Middle East, people tend to sustain strong family bonds compared to Western countries. The study revealed the importance of subjective norm-based expectations when it comes to preventive dental care.

Attitudes, contrary to our expectations, were not predictors of the other detrimental factors of intention. This finding contradicts previous studies conducted in the context of oral health.^[16,23,25] Sutton suggests that the link between these two factors is not strong because of a causal lag.^[26] Due to the scarcity of data, it was difficult to compare our results with the available literature. In the future, more studies are required to confirm the relationship between these two factors and the likelihood of people seeking preventive dental care.

Although it is well documented in the literature that demographics are associated with the utilization of dental services our results showed that demographic variables did not directly affect intention.^[27-29] Our results showed that demographic variables did not directly affect intention. This is consistent with the findings of a previous research.^[16] However, these findings conflict with an earlier study conducted in Kuwait that showed older adults, females, and those with a low level of education were less likely to see a dentist for preventive dental care.^[30] That could explain this contradiction; we only included some demographic variables (i.e., age and sex), and other background variables should be considered, such as level of education and income. The results showed that the association between dental beliefs and intention was moderated by perceived norms and self-efficacy. Hence, messages that promote the importance of preventive dental care can be delivered to the population by enhancing self-efficacy or by shedding light on the influence of relatives to encourage each other to receive preventive dental treatment.

It is the first novel study to utilize the IMBP framework to address the various factors contributing to oral health disparities among adults in Saudi Arabia. In addition, it enriched the existing literature by focusing on preventive dental care among adults, as most of the available studies have focused on children. Furthermore, the study was conducted on a cross-sectional basis, which allowed us to capture a snapshot of the population, including the theoretical constructs,

demographic variables, and intention simultaneously. Also, it allows us to identify the clinical implications and helps us understand dental care utilization. There are limitations that should be considered. First, the study design was nonexperimental, which prevented solid conclusions from being drawn regarding causalities and did not allow us to identify potential bidirectional relationships. Second, the sample size of the study was relatively small. However, it was able to identify significant theoretical relationships between the constructs. Third, the use of a convenient sampling strategy and the self-selection bias associated with online surveys may have affected the generalizability of the results. Fourth, we only included adults from a single city in Saudi Arabia. Future studies should consider incorporating both individual-level and system-level factors, as well as longitudinal samples, to overcome these limitations.

The study suggests that policymakers should encourage more positive behaviors toward the importance of preventive care among adults. This could help improve the availability of services and increase the likelihood of individuals seeking proper dental care. Decision-makers should also consider providing adequate financial resources and shifting the resources to preventive dentistry. Besides establishing effective and efficient dental clinics, policymakers should also consider promoting alternative services, such as mobile dental clinics, to offer preventive oral health care and to help promote the population's oral health status.

CONCLUSION

The findings of this study suggest that effective interventions should also be focused on increasing the level of self-efficacy and the influence of others on people's desire to receive preventive dental care. Using interventions to influence dental beliefs was also found to be effective. It is important that the government and private sectors work together to establish a comprehensive primary dental care system to facilitate access to preventive dental care for adults in Saudi Arabia.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

AUTHORS' CONTRIBUTIONS

MR: Substantial contributions to design the study, acquisition of data analysis and interpretation of data, drafting the article, revised the manuscript and approved the final version of the manuscript. AU: Substantial contributions to conception and design of, collection of data, drafting the article, final approval of the version to be published. AB: Substantial contributions to conception and design of, collection of data, drafting the article, final approval of the version to be published. AS: Substantial contributions to conception and design of, collection of data, drafting the article, final approval of the version to be published. MA: Substantial contributions to conception and design of, collection of data, drafting the article, final approval of the version to be published. All authors read and approved the final manuscript.

ETHICAL POLICY AND INSTITUTIONAL REVIEW BOARD STATEMENT

The ethical review board of Umm Al Qura University approved the study protocol (IRB no. HAPO-02-K-012-2021-12-870). An informed consent was obtained from all participants. All participants were asked for permission to publish the study finding and assured of anonymity and confidently. It confirmed that all methods were carried out in accordance with relevant guidelines and regulations.

PATIENT DECLARATION OF CONSENT

Not applicable.

DATA AVAILABILITY STATEMENT

Not applicable.

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