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Seeking Dental Healthcare in the Context of COVID-19 Pandemic: A Study Examining the Health Belief Model

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Abstract

Background and Objectives: The main purpose of the study was to examine the factors influencing older adults' seeking dental care, in the context of coronavirus disease 2019 (COVID-19) pandemic, based on the Health Belief Model (HBM).
Research Design and Methods: Phone interviews were conducted using a structured questionnaire, among 200 older adults aged 65 and above, who are members of the Israeli largest sick fund Clalit Health Services, that were sampled through a systematic random sample. The data were collected between January 2022 and March 2022 and during September 2022.
Results: Our findings indicate that since the outbreak of COVID-19 in Israel, 61.5% and 55% of the participants reported visiting a dentist and a dental hygienist, respectively, and about a fifth of the participants have foregone care at both. Seeking dental care was associated with an increase in perceived threat, benefits, willingness to seek care, and with a decrease in perceived barriers. The HBM was found to be a suitable framework for illuminating older adults' dental behavior, which explains 43% of the variance.
Discussion and Implications: The results of the study provided first-hand findings regarding seeking dental care during the COVID-19 pandemic. These findings emphasize the importance of providing dental services with clear recommendations about dental care and appropriate protective equipment, even under conditions of health concern, to enhance oral health services utilization.
Keywords: Health service utilization, Oral health behavior, Theoretical framework

> **Translational Significance:** Examining the factors influencing dental healthcare-seeking behavior during a pandemic, among people aged 65 and above, is a significant challenge. However, no study has yet explored this topic, from a theoretical framework perspective. In this study, we present a novel model that identifies factors influencing older adults' dental care-seeking behavior during a pandemic. Our findings reveal that foregone care, willingness to visit a dentist, and threat perceptions are the main predictors influencing seeking dental care. These insights contribute to the development of evidence-based interventions aimed at enhancing the utilization of oral health services among older adults.

The World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19) a global pandemic on March 11, 2020 (WHO, 2020). Consequently, countries worldwide, including Israel, implemented measures to control its spread (Dong et al., 2020). In Israel, the pandemic emerged in mid-February 2020, leading to 691,216 infections and 5,175 deaths by February 7, 2021, alongside three lockdowns. During these lockdowns, the Ministry of Health has released guidelines to the public emphasizing social restrictions, maintaining distance, handwashing, and mandatory mask-wearing (Israeli Ministry of Health, 2020a). While these guidelines aimed at public safety, they also carried potential negative consequences for health services utilization. Indeed it was found that fears of contracting the COVID-19 virus might

lead some individuals to delay or forego seeking medical care (Werner & Tur-Sinai, 2021).

Globally, older adults face a higher risk of contracting the virus, experiencing severe complications, and even mortality upon infection (Damayanthi et al., 2021). Given the various transmission routes, including coughing, sneezing, droplets, and aerosols containing microorganisms generated from an infected individual, dental practices present a potential source of COVID-19 transmission, exposing individuals to an amplified risk of infection (Peng et al., 2020). Thus, it can lead to delaying or forgoing dental care, as observed in a study among adults aged 18–64 years, where dental care was the most commonly delayed or foregone due to the COVID-19 pandemic (Gonzalez et al., 2021). Such behavior among older

individuals can exacerbate their health conditions, potentially leading to local and systematic complications (León & Giacaman, 2020).

In Israel, there are guidelines that emphasize proactive oral health management for older individuals. During routine periods, the Ministry of Health advises individuals aged 72 and above to undergo regular dental examinations at least once a year (Israeli Ministry of Health, 2020b). Additionally, Clalit Health Services, the largest Israeli sick fund insuring more than half of the Israeli population (more than 4.5 million patients), recommends dental hygienist treatments twice a year (Clalit Smile, 2020).

In the initial month of the pandemic (March 2020), the ministry advised dentists to defer elective dental procedures and prioritize only emergency treatments. Later (April 2020), updates were made to reopen dental clinics, encompassing protective measures within the dental setting (Israeli Ministry of Health, 2020c). Concurrently, the Israeli media, which plays a crucial role in enabling vital capabilities during a health emergency such as the COVID-19 pandemic (Shomron, 2023), released guidelines and updated information about elective and emergency health procedures for the lay public that is, to postpone elective health procedures at the beginning of the pandemic and later on to seek health care while adhering to precautionary measures.

One of the concepts associated with increasing the likelihood of forgone general care or dental care is fear of contracting COVID-19 (Nguyen et al., 2022; Werner & Tur-Sinai, 2021).

To address this fear, individuals apply coping strategies to deal with the pandemic and its consequences (Kim et al., 2022). These strategies often involve defensive strategies against recurring and novel threats, like the flight response, aiming to distance oneself from perceived danger (Mobbs et al., 2015).

Several studies investigated seeking dental care during the COVID-19 pandemic (Choi et al., 2023; Guo et al., 2020; Wu et al., 2021), but none of them was guided by any theoretical framework. However, one study examined forgone care for various health conditions based on Andersen's Behavioral Model of Health Care Utilization (Andersen, 1968). This study, conducted in Israel between May 15 and May 24, 2020, among participants aged 40 and above, did not evaluate dental health care (Werner & Tur-Sinai, 2021). Moreover, an extensive literature review revealed numerous studies conducted during the COVID-19 pandemic that were based on the Health Belief Model (HBM) (Rosenstock, 1974). Most of them examined preventive health behaviors such as adhering to social distancing, wearing masks, maintaining hand hygiene, and receiving vaccination against the COVID-19 virus (Zewdie et al., 2022). In addition, one study evaluated adult perceptions regarding professional dental services in the initial stages of the pandemic based on the HBM (Moffat et al., 2021). Nevertheless, none of these studies evaluated seeking dental care among older adults, during advanced stages of the pandemic.

In light of the above and to the best of our knowledge, no study to date has examined the factors influencing seeking dental health care of people aged 65 and above in the context of the COVID-19 pandemic in Israel, based on a theoretical framework. Therefore, the aim of the current study was to address this gap.

Theory

The chosen theoretical framework for this study is the HBM, developed in the 1950s by psychologist I.M. Rosenstock (1974), which is widely recognized for its applicability in health psychology, particularly in behavioral changes and preventive measures. The HBM provides strategies to deal with various health threats and has demonstrated success in predicting a wide range of health behaviors including general and dental health behaviors (Abraham & Sheeran, 2005), as well as health preventive behavior during the COVID-19 pandemic (Zewdie et al., 2022).

The HBM framework focused on two aspects of individuals' representations of health behavior: threat perceptions and behavioral evaluation.

Threat perceptions depend upon two beliefs:

1. perceived susceptibility to illness or health problems.
2. perceived severity of the consequences of illnesses.

Behavioral evaluation depends upon two distinct beliefs:

1. perceived benefits or efficacy of a recommended health behavior.
2. perceived barriers or costs associated with enacting the behavior.

In addition, the model presents two other concepts that can trigger health behavior:

1. cues to action, which included a diverse range of triggers for individuals to act.
2. health motivation, or "readiness to be concerned about health matters" (Abraham & Sheeran, 2005).

Based on the above review, the purpose of the study was to test a comprehensive path model (Figure 1) using structural equation modeling. We hypothesized that a higher level of perceived susceptibility, severity and benefits, and lower perceived barriers would be associated with a higher rate of visiting a dentist and dental hygienist. We also expected that a higher rate of forgone care due to fear, would be related to a lower rate of dental care visits. Finally, a higher level of willingness and knowledge would be related to a higher rate of dental care visits.

Method

Design and Procedure

The present study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of Meir Medical Center which Clalit Health Services was affiliated with (Reference No. COM1-0151-21; date of approval January 23, 2022).

The first author conducted phone interviews with participants, who were sampled through a systematic random sampling. All participants received full information about the study purpose and willingly provided verbal informed consent. After obtaining verbal consent, the interviews were carried out in Hebrew using a structured questionnaire.

A total of 357 potential participants were contacted: 157 refused to participate due to a lack of interest or difficulties in hearing and answering the phone questionnaire. A total
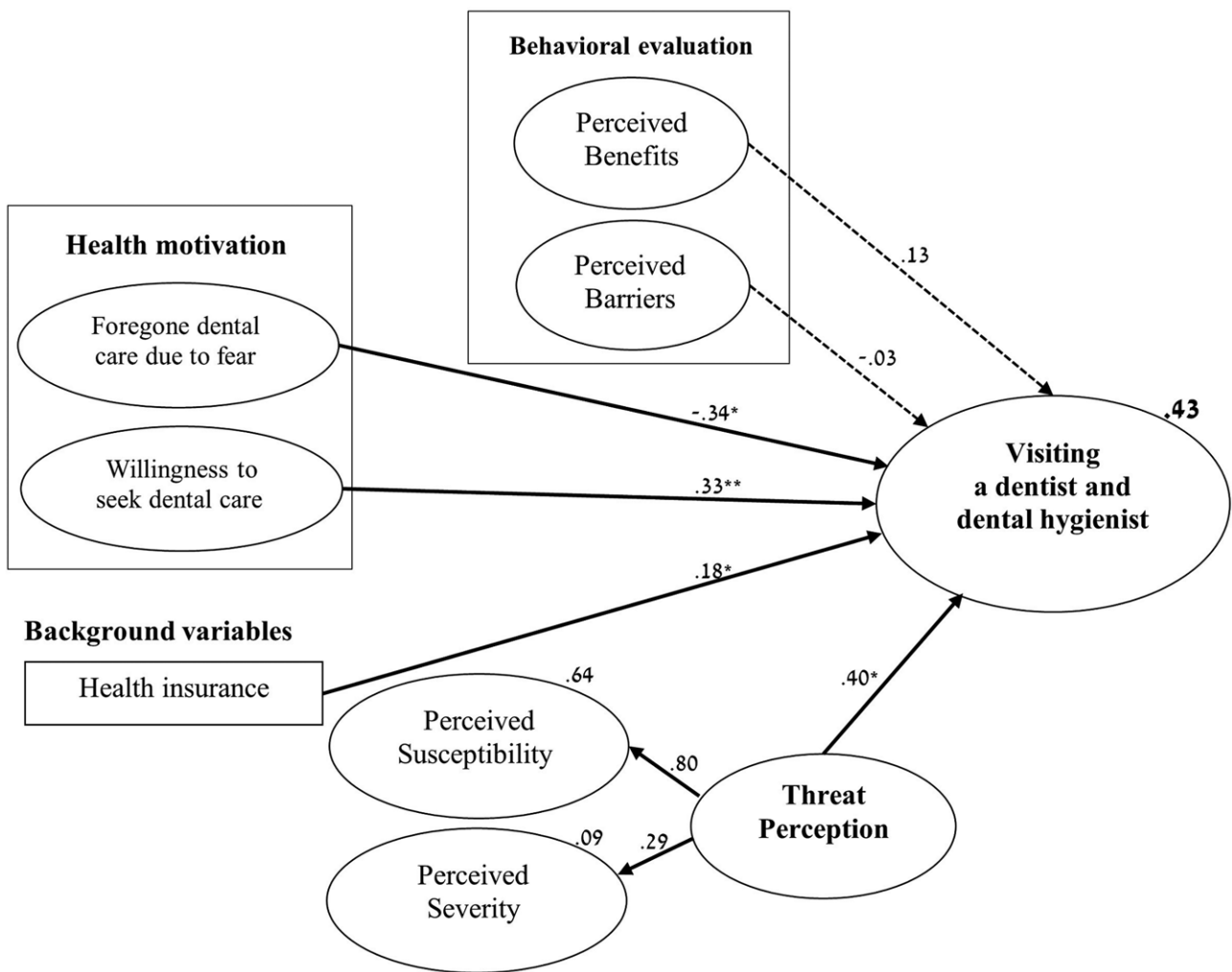
Figure 1. Path analysis for health motivation, treat perception, perceived benefits, perceived barriers, health insurance, and health behavior. The solid lines indicate paths statistically significant at $p < .05$. The dashed lines indicate nonsignificant paths. Values on arrows—β standardized values, values on the variable—R^2 represents the portion of explained variance. *$p < .05$. **$p < .01$

of 200 people participated in the study; hence, the response rate to participate in the study was 56%. The study was conducted after three lockdowns in Israel. The data were collected between January 2022 and March 2022 and during September 2022. Most of the interviews ($n = 130$) were conducted when the lay public was compelled to wear masks in closed places (Israeli Ministry of Health, 2020a). Since no statistically significant differences were found in the *t*-tests among the groups (interviews during a period of: (a) being compelled to wear masks. (b) not being compelled to wear masks) regarding these variables: foregone care, willingness to seek care, and visiting a dentist and a dental hygienist, the research analyses were conducted based on the entire sample ($n = 200$; see Supplementary Material Section 1 for details).

Participants

The participants were 200 persons aged 65 and above. The inclusion criteria were being a member of Israel Clalit Health Services, 65 years old and above, and a Hebrew speaker.

Measures

We measured the dependent variable—visiting a dentist and dental hygienist since the outbreak of the COVID-19

pandemic using items that were developed for the current study.

The independent variables—perceived susceptibility, severity, benefits, and barriers were adapted from the framework of Abraham and Sheeran (2005) and from other researchers (Lee et al., 2018). Cues to action, specifically, knowledge about COVID-19 was assessed based on a previous study (Zhong et al., 2020). Health motivation was assessed by two aspects: foregone dental care due to fear of contracting COVID-19 virus, which was developed for this study and willingness to seek dental care in the coming year, based on Conner and Sparks (2005). Assessment of general health and oral health status was based on Survey of Health, Ageing, and Retirement in Europe (SHARE) questionnaire (SHARE, 2022). Furthermore, perceptions regarding the likelihood and fear of contracting COVID-19 were based on the previous study (Werner et al., 2013). Lastly, we examined sociodemographic characteristics (see Supplementary Material Section 2 for details).

Statistical Analysis

Data were analyzed using SPSS-25 (Arbuckle, 2017). An Exploratory Factor Analysis with Varimax rotation assessed

factors based on the Health Behavior Theory (HBM; Abraham & Sheeran, 2005) to examine the structural validity of the questionnaire. Descriptive statistics and correlations between variables were calculated. Next, Structural Equation Modeling was conducted to test the theoretical model with AMOS program (Arbuckle, 2017). Finally, multiple indices of fit were used to assess the fit of the data to the model. A chi-square test was chosen as the statistical test of model fit. Lower values indicate a better fit to the model. Additional model fit indices were used to evaluate the model fit, including the Normed Fit Index (NFI >90), the Tucker–Lewis index (TLI >0.90), Comparative Fit Index (CFI >0.90; Bentler, 1990), and Root-Mean-Square Error of Approximation (RMSEA <0.08; Byrne, 1998). In case of a low fit, items were omitted, and the fit was re-examined. Then betas were determined as indicators of path size.

Ethical Considerations

The study's protocol was approved by Helsinki Committee of one hospital with which the Clalit Health Services was affiliated (Reference No. COM1-0151-21).

Results

Sociodemographic Characteristics

As can be seen in Table 1, the study included 200 participants with a mean age of about 74 years, most of them were female and married, and about 45% were born in Israel, with a mean of three children on average, having a high school education or higher and more than half (54.2%) have an average to high income, according to their perception. The mean score for subjective general and oral health and for likelihood and fear of contracting COVID-19 was relatively moderate, and the majority of them were never diagnosed with COVID-19. Finally, most of the participants had Perfect Gold or Platinum insurance (extra insurance with the Clalit sick fund) and did not have other private medical insurance.

Exploratory Factor Analysis

Regarding the Exploratory Factor Analysis, it was found that the classic variables of the HBM questionnaire (perception of susceptibility, severity, benefits, and barriers) are a reliable tool for examining health behavior in the context of dental care, explaining 67.0% of the variance (see Supplementary Material Section 3: Exploratory Factor Analysis for details).

Descriptive Statistics of the Study Variable

Descriptive statistics of the study variables are presented in Table 2. As can be seen, participants' perceptions regarding the susceptibility and severity of oral and dental diseases were relatively high. Perception regarding benefits associated with seeking a dental care was high and significantly higher than the perception of barriers associated with seeking a dental care which was low ($t_{(199)}$ = −37.48, p < .001). Additionally, more than half of the participants have visited a dentist or dental hygienist, and about a fifth of the participants have foregone care at a dentist or a dental hygienist due to fear of contracting COVID-19. Participants reported moderate willingness with a positive tendency to seek care at a dentist in the coming year. Finally, participants had a relatively high level of knowledge about COVID-19.

Table 1. Participants' Characteristics (n = 200)

Characteristic	M (SD)	%	Range
Age in years	74.18 (5.94)		66–88
Gender			
Female		63.5	
Male		36.5	
Place of birth			
Israel		44.6	
Europe/America		23.6	
Asia/Africa		31.8	
Marital status			
Not married		35.1	
Married		64.9	
Number of children	3.0 (1.4)		0–9
Education			
Primary		10.1	
High school		54.0	
Bachelor's degree		18.7	
Master's degree or higher		17.2	
Family monthly income in NIS			
<12,000		30.7	
About 12,000		25.6	
>12,000		28.6	
Didn't answer		15.1	
Health insurance			
Basic		12.0	
Perfect gold		20.0	
Perfect platinum		51.5	
Gold and private		8.0	
Platinum and private		8.5	
Subjective general health[a]	2.77 (0.9)		1–5
Subjective oral health[a]	2.49 (1.1)		1–5
Likelihood of contracting COVID-19[b]	2.53 (0.7)		1–5
Fear of contracting COVID-19[c]	2.42 (1.3)		1–5
Diagnosed with COVID-19			
Yes		31.0	
No		69.0	

Notes: COVID-19 = coronavirus disease 2019; SD = standard deviation.
[a]1 = bad to 5 = excellent.
[b]1 = not at all likely to 5 = very likely.
[c]1 = not worried at all to 5 = very worried.

Correlations Between Study Variables

Correlations between the study variables are shown in Table 3. As can be observed, statistically significant results were found between all the independent variables of the HBM and visiting dentist and dental hygienist behavior, except cues to action (knowledge). This behavior was associated with greater perceived threat, perceived susceptibility and perceived severity, greater perceived benefits, and with lower perceived barriers; as well as with greater willingness to seek care and with lower forgone care. We also found that better subjective general health status was associated with more visiting dentist and dental hygienist behavior. Additionally, the greater perceived threat was associated with lower age, higher income, better subjective general health status and better subjective oral health status, higher perceived benefits, lower perceived

Table 2. Means, Standard Deviation, and Range of the Variables (*n* = 200)

Variable	*M*	*SD*	%	Range
Classic HBM variables				
Perceived susceptibility[a]	4.16	1.28		1–5
Perceived severity[a]	4.06	0.97		1–5
Perceived threat[a]	4.10	0.86		1.20–5
Perceived benefits[a]	4.33	0.70		1.75–5
Perceived barriers[a]	1.57	0.70		1–3.67
Cues to action				
Knowledge about COVID-19[b]	3.85	1.57		0–5
Health motivation				
Forgone care[c]	0.39	0.66		0–2
Dentist			21.5	
Dental hygienist			17.5	
Willingness to seek care	3.52	1.60		1–5
Visiting a dentist and a dental hygienist[c]	1.16	0.80		0–2
Dentist			61.5	
Dental hygienist			54.5	

Notes: COVID-19 = coronavirus disease 2019; HBM = Health Belief Model; *SD* = standard deviation.
[a]1 = strongly disagree to 5 = strongly agree.
[b]Summative index from 0 to 5.
[c]Summative index from 0 to 2.

barriers, greater knowledge about COVID-19 and more visiting dentist and dental hygienist behavior. Greater perceived benefits were associated with lower age, higher income, better subjective oral health status, and greater knowledge about COVID-19. Greater perceived barriers were associated with lower income and lower education, and with worse subjective oral health status. Greater knowledge about COVID-19 was associated with higher income, higher education, and better subjective health status. Greater forgoing care was associated with higher subjective oral health status and higher fear of contracting COVID-19 virus. Finally, higher age was associated with lower subjective general and oral health status.

Model Testing

The research models are presented in Figures 1 and 2.

The measurement model of the components affecting dental care behavior shows an acceptable fit ($\chi^2_{(156)}$ = 281.513; *p* = .001; CMIN/DF = 1.805; NFI = .853; TLI = .901; CFI = .926; RMSEA = .064). Structural Equation Model was conducted to assess the structural model. As presented in Figure 1, the first run of structural equation analysis showed a reasonable fit of the data ($\chi^2_{(163)}$ = 311.084; *p* = .001; CMIN/DF = 1.908; NFI = 0.833; TLI = 0.897; CFI = 0.912, RMSEA = 0.068), with the model explaining 43% of the explained variance of the behavior. The strongest path in this model was threat perception, followed by foregone dental care, then willingness to seek dental care, and finally the path of type of health insurance. However, the perceptions of benefits and barriers were not significantly associated with visiting dentist and dental hygienist behavior; therefore, they were removed from the second model. A second rerun of the structural equation analysis of the model was performed (Figure 2) showing a very good fit of the data ($\chi^2_{(60)}$ = 80.938; *p* = .037; CMIN/DF = 1.349; NFI = 0.942; TLI = 0.980; CFI = 0.984, RMSEA = 0.042), with the model explaining 50% of the explained variance of the behavior. The strongest path in the model was threat perception, followed by foregone dental care and willingness to seek dental care to the same extent, and finally, the path of type of health insurance presents only a tendency to significance (Figure 2). However, it is important to note that this second model doesn't contain all the variables of the HBM. Rather, it bears a closer resemblance to the Protection Motivation Theory (Norman et al., 2005) due to its construct that explicitly focuses on risk perceptions as displayed in Figure 2.

Discussion

Seeking dental care in general and during the COVID-19 pandemic is a stressful health behavior, which may lead to foregone dental care. Moreover, delaying dental care has long-term detrimental repercussions on older adults' oral health. However, little is known about older adults' dental health behavior during the COVID-19 pandemic (Yuan et al., 2023), especially based on a theoretical framework. Therefore, the aim of the present study was to examine the factors influencing seeking dental health care of people aged 65 and above, in the context of the COVID-19 pandemic, based on the HBM.

Overall, our findings indicate that since the outbreak of COVID-19 in Israel in March 2020, the participants' rates of dental care visits were moderate; 61.5% and 55% of the participants reported to have visited a dentist and a dental hygienist, respectively. Similar findings have been reported in an earlier study carried out at the beginning of 2020 in Israel, evaluating referral to dental care in the last year, among 512 people aged 65 and above. This study also found a moderate level of visiting a dentist in the last year (53% visited a dentist) (Berg-Warman et al., 2021). We might expect a larger difference between these studies' percentages, since our study was evaluating visits during the span of 2 years, and the other study for 1 year.

An explanation to the finding could be related to the time of conducting the research.

While our study was conducted in the advanced stages of the COVID-19 pandemic (almost 2 years after the pandemic outbreak in Israel), the other study was conducted before this outbreak. So, our participants' behavior could be accompanied by fear of contracting the virus, which might increase the likelihood of foregone dental care. An alternative explanation is that the rate of dental care visits remained unaffected by the COVID-19 pandemic. This perspective aligns with findings from Spitzer et al. (2022), which revealed that a significant proportion of older adults did not adhere to the recommended preventive behaviors during the pandemic. It is possible that many older adults continued their routines, including dental visits, as they had before the pandemic, without significant changes in behavior despite the public health guidelines. These findings are worrisome for several reasons. First, the participants' behavior in our study is not compatible with the findings demonstrated in the literature about the harmful consequences of foregone care on oral health. For example, a systematic review indicates that oral health conditions (i.e., taste impairment, oral mucosal changes, and dry mouth) are common in people with COVID-19 infection (Farid et al., 2022). Another example, a multi-participant study (*n* = 431,509) in the United States shows that as a result of COVID-19, patients received more invasive dental procedures due to delayed treatment and experienced a higher risk

Table 3. Correlations Between Variables (*n* = 200)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Age	–														
2 Income	-0.08	–													
3 Education	-0.08	0.44**	–												
4 General health	-0.25***	0.12	0.08	–											
5 Oral health	-0.22***	0.24***	0.16*	0.42***	–										
6 Likelihood	0.05	-0.05	0.05	-0.10	-0.01	–									
7 Fear	0.07	-0.04	-0.04	-0.15*	-0.07	0.39***	–								
8 Susceptibility	-0.15*	0.18**	0.17*	0.22**	0.25***	0.06	-0.02	–							
9 Severity	-0.18**	0.07	0.05	0.21**	0.24***	0.06	-0.02	0.23***	–						
10 Threat	-0.21***	0.16*	0.13	0.28***	0.31***	0.08	-0.03	0.80***	0.82***	–					
11 Benefits	-0.17*	0.15**	0.06	0.12	0.15*	-0.09	-0.08	0.20**	0.51***	0.47***	–				
12 Barriers	-0.06	-0.32***	-0.30***	-0.14	-0.17*	-0.07	0.05	-0.28***	-0.04	-0.04	-0.12	–			
13 Knowledge	-0.13	0.14*	0.20**	0.14*	0.17*	0.07	-0.10	0.14*	0.28***	0.28***	0.27***	-0.11	–		
14 Forgone	-0.02	0.09	0.03	0.06	0.16*	0.03	0.15*	0.06	0.04	0.06	0.06	0.06	-0.03	–	
15 Willingness	-0.13	0.18*	0.13	0.13	-0.12	-0.00	0.05	0.13	0.01	0.15*	0.03	-0.06	-0.01	0.08	–
16 Visits	-0.13	0.08	0.09	0.20**	0.13	0.04	-0.01	0.29***	0.18*	0.29***	0.15*	-0.21**	0.04	-0.16*	0.20**

***p < .001. **p < .01. *p < .05.

of psychological stress-related dental conditions (Choi et al., 2023). Second, this health behavior is not compatible with the instructions of the Israeli Ministry of Health, about returning to treatment when there has been a sufficient reduction in the COVID-19 virus transmission rates while taking precautions against its spreading (Israeli Ministry of Health, 2020c), especially, among older adults who are in a high-risk group for general and oral health complications (Gasparro, 2022).

Hence, it is possible that this behavior reflects the participants' lack of awareness to the negative effects of foregone dental care for older adults and lack of knowledge or inaccessibility to the instructions released during the COVID-19 pandemic. Indeed, evidence from a literature review showed that it is difficult for older adults to understand and manage health information because of its complexity (Creber et al., 2016), and despite their higher vulnerability, a significant proportion of them did not follow the recommended guidelines on preventive behaviors during COVID-19 pandemic (Spitzer et al., 2022).

Health prevention is defined by the WHO as "approaches and activities aimed at reducing the likelihood that a disease or disorder will affect an individual, interrupting or slowing the progress of the disorder or reducing disability" (WHO, 2004). Therefore, it is very important to examine the preventive behavior and the factors affecting the dental health behavior of individuals aged 65 and above in the context of the COVID-19 pandemic.

Our results showed that all the concepts of the HBM, except cues to action, affect dentist and dental hygienist visits. The study findings indicate that threat perceptions (susceptibility and severity) and benefits perceptions were positively related to visiting dentist and dental hygienist, and barriers perceptions were negatively related to this behavior. This is consistent with findings of an extensive literature review that examined other health behaviors during the COVID-19 pandemic and found that people will be more motivated to act in healthy ways if they believe they are susceptible to a particular negative health outcome. Second, if they perceive the severity of the consequences of the illness as damaging. Third, if they perceive that the target behavior will provide strong positive benefits. However, if they perceive that there are strong barriers preventing them from adopting the preventive behavior, they will unlikely do so (Zewdie et al., 2022). Yet, our findings differ from study findings, that examined preventive health behavior in oral health, such as brushing teeth and using dental floss, which found positive relationships between the perception of susceptibility, severity and barriers, and the health behavior, but not between the perception of benefits and the health behavior (Xiang et al., 2020). A possible explanation for this finding is that the participants of the above-mentioned study were younger and might have focused on the coping strategy "here and now," rather than long-term health planning and its benefits. This is a known strategy for coping with stress, in which a person has a desire to live a full life and enjoy it here and now, instead of thinking about the future (Bolotova & Hachaturova, 2013). Moreover, it is possible that older adults participants had a wealthy life experience that raised their awareness to the effectiveness of future health planning, including dentist and dental hygienist visits.

The participants also reported two kinds of fear. On the one hand, fear of deterioration of dental health as reported in the threat perceptions, which leads to visit dentist and dental hygienist. On the other hand, fear of contracting COVID-19
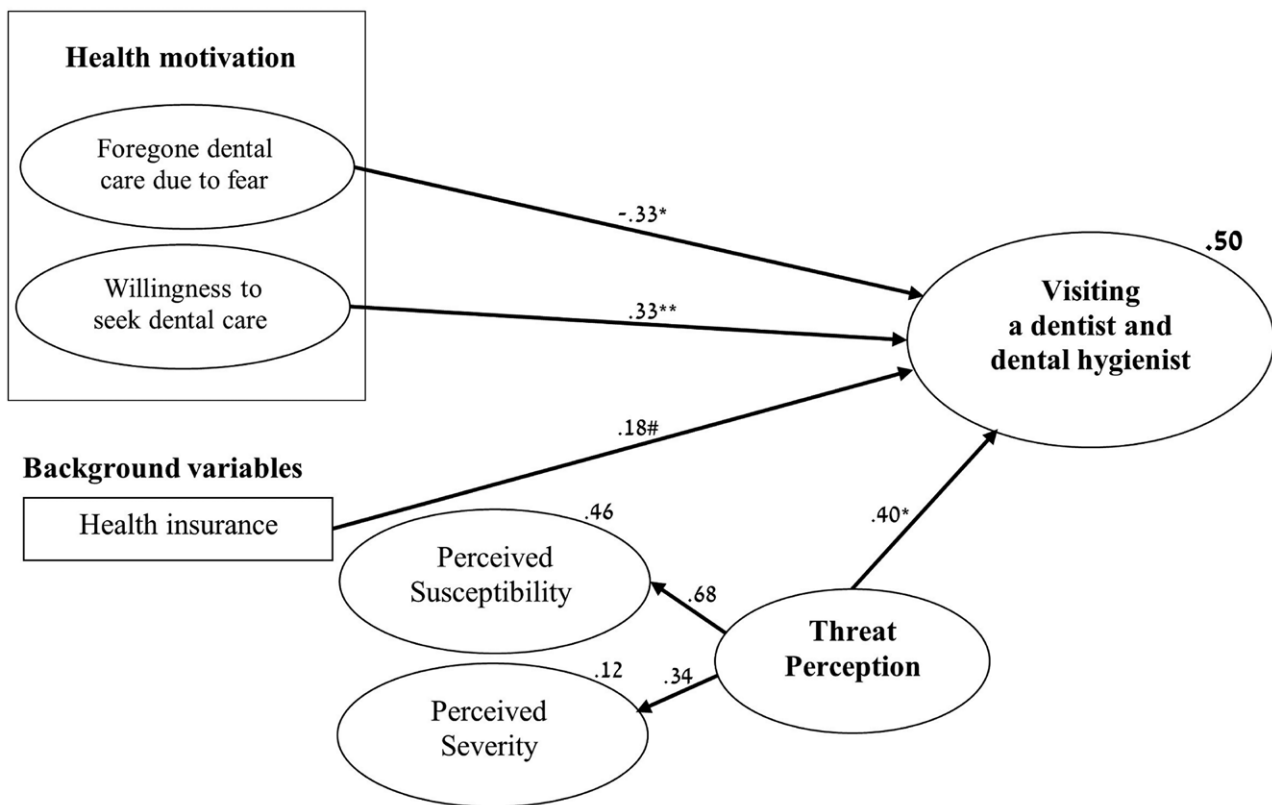
Figure 2. Path analysis for health motivation, treat perception, health insurance, and health behavior. The solid lines indicate paths statistically significant at $p < .05$. The dashed lines indicate nonsignificant paths. Values on arrows—β standardized values, values on the variable—R^2 represents the portion of explained variance. *$p < .05$, **$p < .01$, tendency to significance #$p < .057$.

leads to foregone dental care. A possible cause to the fear of contracting COVID-19 is the participant's exposure to the Israeli media, which released guidelines about precautionary behavior for older adults that might have evoked higher levels of fear (Werner & Tur-Sinai, 2021). Hence, if the fear becomes strong enough, the individual may be rendered incapable of thinking objectively and behaving rationally (Rosenstock, 2005), which can lead to forgone dental care. Indeed, the participants in our study reported a moderate rate of likelihood and fear of contracting COVID-19 and a fifth of the participants have foregone dental care due to this fear. These findings regarding foregone dental care are alarming because good oral health is an important aspect of general health and well-being, which contributes to self-esteem, dignity, social integration, and nutrition (Fabiola Díaz-García et al., 2022).

Regarding the willingness of seeking dental care, it is important to note that one of the study goals was to examine the intention to seek dental care. Considering the recommendation of the Israeli Ministry of Health to renew dental services soon after the outbreak of the pandemic (about a month later), the public got the opportunity to seek dental care. Therefore, this goal changed to examining the association between future behavior (willingness of seeking dentist care) and past behavior (visiting dentist and dental hygienist). Namely, we were privileged to test both the willingness and the actual behavior. Thus, an interesting finding of our study is that participants reported moderate willingness with a positive tendency to seek care at a dentist in the coming year; and the greater willingness to seek care was associated with a higher rate of dental care visits in practice. These findings

may be an example of people's behavior that is based on past behavior and are supported by social psychology theories which show that people tend to engage in behaviors they intend to perform (Mark Conner & Sparks, 2005), based on past behavior (Abraham & Sheeran, 2005; Gibbons et al., 1998). These findings may reflect peoples' need to be consistent in their behavior and decisions to reduce the need to process all the relevant information in future similar situations and rely on earlier decisions and respond consistently (Cialdini, 2001), in order to enhance perceptions of control (Mark Conner & Sparks, 2005). Hence, these findings about the future willingness might reflect the participants' past willingness to seek dental care. Future studies should examine the association between these factors, in addition to factors influencing willingness to seek dental care such as attitudes, subjective norms, self-efficacy, and control perception (Mark Conner & Sparks, 2005), in order to shed further light on the willingness to seek dental care during pandemics.

Our results indicate that knowledge about COVID-19 was not significantly associated with visiting dentist and dental hygienist. These results are contrary to the study's findings that higher levels of knowledge about COVID-19 were associated with precautionary behavior (Shinan-Altman & Levkovich, 2020). These findings are important since it doesn't match the health literacy definition which stresses the importance of people's knowledge in the process of judging and making decisions in everyday life concerning health care, disease prevention, and health promotion to maintain or improve quality of life during their life course (Sørensen et al., 2012). This finding might imply that health decision about

dental care during the COVID-19 pandemic relies mainly on emotional factors like fear rather than on cognitive factors like knowledge.

Regarding health insurance, a positive correlation was found between the type of health insurance and seeking dental care, so having better insurance associated with an increased seeking dental care. This finding is in accordance with another study about dental insurance and dental treatment, which shows that dental insurance is an important factor in making decisions to seek and use dental care services. The study hypothesized that maybe, people with dental insurance perceive the price of dental care to be lower than people without dental insurance and subsequently seek care at higher rates (Manski & Cooper, 2007). Therefore, it is important to raise the awareness of older adults to plan their health insurance.

Additionally, no significant associations were found between sociodemographic variables and visiting dentist and dental hygienist. These findings are consistent with a study conducted among adults that examined the factors influencing intention to seek cognitive status, based on HBM (Werner, 2003).

Lastly, as stated previously, to the best of our knowledge the present study is the first to evaluate an expanded model of the health behavior theory by incorporating cause for action, health motivation, and background variables to the classic variables of the HBM for understanding the factors influencing dental care behavior of persons aged 65 and above during the COVID-19 pandemic.

Examining the suitability of the model variables of the HBM to predicting health behavior, our study showed that threat perceptions and health motivation significantly predicted the behavior. Despite a clear significant correlation between perception of benefits and perception of barriers with dental health care behavior in a bivariate examination, they did not significantly predict this behavior. These findings are similar to other studies that examined preventive health behavior during the COVID-19 pandemic which found that only some of the HBM variables predict the behavior (Mehanna et al., 2021; Shmueli, 2021). More specifically, in a study including 680 persons in Sudan and examining willingness to adhere to COVID-19 precautionary measures (Mehanna et al., 2021) and a study including 398 persons in Israel, which evaluated intention to receive COVID-19 vaccine (Shmueli, 2021) only perception of severity and perceptions of benefits significantly predicted the behavior.

A possible explanation for these diverse findings can be related to the model developers and other researchers who claim that the weight and influence of the theory components may change in different behaviors (Abraham & Sheeran, 2005; Rosenstock, 2005), such as in the COVID-19 pandemic (Zewdie et al., 2022). Namely, in some behaviors, the perception of threat (perception of susceptibility and perception of severity) has greater value in predicting the behavior, while in others the weight of perception benefits and the perception of barriers will increase. However, it is important to note that while the weight and influence of the theory's components may vary with different behaviors, relying on the theory without specifying in advance how these components will be changed, leads to rendering the theory unfalsifiable. Finally, it is recommended that future studies examine dental health behavior based on the Protection Motivation Theory because it contains a construct that explicitly focuses on risk perceptions (Norman et al., 2005) as displayed in Figure 2.

Limitations of the Study

Our study has several limitations. First, the cross-sectional design of the study limits our ability to deduce causal relationships between variables. Second, only Hebrew speakers participated in the study, future studies will have to examine dental care behavior also among speakers of other languages such as Arabic, Russian, and Amharic. Third, in a telephone interview, we cannot rule out that there was a social desirability bias to the responders. Therefore, in each instance, the interviewer explained that the questionnaire is anonymous, and the data is confidential. Fourth, the scales of the study were developed using exploratory factor analysis. Other than having face validity and internal reliability, they have not been validated.

Theoretical and Practical Implications

Despite these limitations, the present study has theoretical and practical implications.

Theoretically, the HBM was found to be a suitable framework in explaining the dental behavior of people aged 65 and above in the context of the COVID-19 pandemic. Our results showed that visiting dentist and dental hygienist during the COVID-19 pandemic was based mainly on emotional factors (threat perceptions) and cognitive factors (health motivation). These findings strengthen the recommendation to add to the classic variables of HBM additional concepts which explain the factors influencing people aged 65 and above in visiting a dentist and a dental hygienist during pandemics.

Practically, the study provided empirical findings regarding seeking dental care during the COVID-19 pandemic. These findings emphasize the importance of developing interventions aimed at increasing knowledge, information, and access to dental care, reducing foregone care and fear of COVID-19 contamination, and creating ways to consume dental services during pandemics. Policy-makers must adopt ways to provide the service regularly, with clear recommendations about dental care and appropriate personal protective equipment, even under conditions of health concern.

Conclusion

The COVID-19 pandemic confronted the health sector with great challenges. One of them was the implementation and promotion of older adults' oral examinations and dental treatment during the COVID-19 pandemic. Here we present a novel model, which consists of cognitive and emotional factors, explaining older adults' seeking dental care behavior in the context of the pandemic. The present study enhanced our understanding of comprehensive predictors of dental care behavior among older adults. Our findings showed that foregone care, willingness to visit a dentist, and threat perceptions were the main predictors of seeking dental care during 2 years after the COVID-19 outbreak in Israel. These findings stress the central role of emotional and cognitive factors among older adults seeking dental care and provide a new insight to the development of evidence-based interventions to enhance oral health services utilization.

Supplementary Material

Supplementary data are available at *Innovation in Aging* online.

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Conflict of Interest

None.

Data Availability

The data are not publicly available due to privacy and ethical restrictions. However, deidentified data used in this paper can be requested by appropriate researchers from the last author H.S. upon reasonable request.

Author Contributions

Conceptualization: A. Goldstein and H. Slutzky; Designing, gathering the data, performing the statistical analyses, leading the interpretation of the data, and writing of the manuscript: A. Goldstein; Supervising the study and critically reviewing the manuscript for important intellectual content: H. Slutzky; S. Matalon, and N. Fridenberg. All authors have read and agreed to the published version of the manuscript.

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