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Could the Content Preferences for Dental Apps Vary Among Patients with Diverse Approaches to Oral Health Problems?

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Abstract

Aim: Patient empowerment strategies are important component of oral-health literacy and oral health outcomes. From this perspective, this study aimed to assess whether patients' differing approaches to oral health problems were associated with variations in their dental app content preferences.

Methods: In this cross-sectional study, 284 dental patients who applied to the Faculty of Dentistry at a public university in Istanbul, Turkey, were included. Data were collected using a questionnaire covering sociodemographic profile, dental treatment needs, approaches to oral health problems, information-seeking behaviour before visiting a physician and preferred features of a dental mobile application.

Results: When faced with an oral health problem, more than half of the dental patients (60.1%) reported seeing a dentist; others were waiting (14.4%) or searching social media (20.9%). "Educational videos on preventive oral care" was prioritized by patients who visited dentists (59.88%)". Moreover, "Appointment planning tools" was identified as desirable content for the same group (54.49%)". However, the most preferred features for a dental application among patients who searched dental health information via social media (65.52%) and those who waited before seeking care (52.5%) were "Information about oral health and treatments". These results provided valuable insights for developing patient-empowerment strategies and oral-health policy.

Conclusion: Although dentists should be the primary source of information for patients, dental applications could be useful tools for accessing reliable information, education materials, improving oral health and supporting the utilization of dental care within the framework of patient empowerment strategies.

Keywords: Oral health, dental application, mobile health, patient education, patient empowerment, oral health policy

INTRODUCTION

Oral health is a significant global health issue as well as an important component of individuals' overall health status. As is well known, oral health problems impact daily life, social relationships, quality of life and economic productivity (Kassebaum et al., 2017; Peres et al., 2019; WHO, 2022). They may also lead to unplanned dental care due to pain, chewing difficulties, aesthetic concerns and functional limitations (Listl et al., 2015). At that point, patient empowerment strategies related to oral health behaviors and oral health literacy are recognized as important domains for improving of oral health and reducing the need for emergency dental care. From this perspective, a holistic approach based on the patient's unmet needs, values and circumstances (Böhme Kristensen et al., 2023) is also critical for the development of oral health policies (Lee et al., 2018; Malekmahmoodi et al., 2020; WHO, 2024).

Nowadays, digital health (eHealth) and mobile health (mHealth) applications are recognized as powerful tools for developing patient empowerment strategies. They provide oral hygiene education, reminder systems to improve oral health and encourage dental visits for the early diagnosis of oral health problems (Väyrynen et al., 2023). Moreover, they may also decrease both direct treatment costs and indirect costs related to absenteeism and presenteeism (Chatterjee et al., 2024; Ho, Chai, Luo, et al., 2025; Saini et al., 2025).

Digital platforms enable patients to feel more connected and informed in managing their oral health. They also facilitate the shift from passive recipients of care to active partners in disease prevention and management. With the increasing integration of digital health technologies into dental care, well-designed dental applications may play a critical role in guiding users toward timely clinical consultations, supporting early diagnosis and detection, and preventing the progression of oral health conditions (Bhuyan et al., 2016; Pascadopoli et al., 2023; Stein et al., 2016; Tiffany et al., 2018; Väyrynen et al., 2023). As can be seen, this area is becoming an increasingly important issue for both dental patients and health managers. Moreover, gaining a comprehensive understanding of patient behavior and perspectives is essential for informing approaches that support patient empowerment (Chen et al., 2022; Fernández-Luque & Bau, 2015; Fitzpatrick, 2023; Hamberger et al., 2022; Kim & Xie, 2017).

Despite the increasing attention of dental applications, their effectiveness depends on how well they align with patients' expectations, and problem-solving approaches (Bhuyan et al., 2016; de Oliveira Júnior et al., 2025; Kaczmarczyk et al., 2021; Khehra et al., 2021). Dental patients do not always decide to seek care although they have normative treatment needs. Patients' options may be seeking professional care, delaying treatment or independently searching for information from internet. While addressing this gap, a digital oral health tools should be relevant, patient-centred, and responsive to diverse needs (Fitzpatrick, 2023; Väyrynen et al., 2023). Therefore, this study aimed to assess whether patients' differing approaches to oral health problems were associated with variations in their dental app content preferences.

1. RESEARCH METHODOLOGY

1.1. Material and Methods

In this cross-sectional study, 284 patients (F/M: 237/47; mean age: 37.39±16.94 years) who were receiving treatment at the Faculty of Dentistry at Marmara University, a public institution in

Istanbul, Turkey, were included. Approximately 1200 new patients apply monthly to the Dentistry Faculty where the study was conducted. Due to the homogeneous structure of the patients, a simple random sampling method was used. A sample of 272 (n) patients were selected from this population in accordance with power analysis via G-Power Software. Using the free software program G-Power 3.1, the sample size of the study was determined to be 272 (power of the test: 0.95, effect size (d): 0.34).

The study was approved by the Ethics Committee of the Faculty of Dentistry, Marmara University (Approval Number: 2023/142). Informed consent was obtained from all patients participating in the study. Inclusion criteria were being 18 years of age or older and providing written consent to participate in the study. Exclusion criteria were defined as having severe mental disorders and uncontrolled chronic diseases, pregnancy, psychiatric disorders, malignancies and untreated oral mucosal diseases.

Data were collected between June 2023 and March 2024 by a structured questionnaire administered during face-to-face interviews. The survey questionnaire consisted of questions on patients' sociodemographic characteristics and their experiences, behaviors and preferences regarding oral health and dental care. Data included patients' the frequency of tooth brushing, number of visits to the family medicine clinic, chronic disease status (comorbidity; presence vs. absence).

Patients were asked about the reason for last dental visit (check-up vs. treatment), most recent reason for dental treatment (such as dental pain, tooth decay, missing teeth(need for prosthesis), gingival bleeding, dissatisfaction with the appearance of teeth), approaches to oral health problems (visit a dentist, wait for a while, search social media, go to the emergency department, consult a pharmacist, consult a family physician, ask people around me) and searching information before visiting a physician. The questionnaire also assessed patients' opinions on the content and features they would like to see in an oral health mobile application.

Patients were asked to suggest potential content for a dental application by using a structured questionnaire. Multiple responses were allowed to receive detailed information about preferred content and videos (Kaczmarczyk et al., 2021; Sarı et al., 2023; Tiffany et al., 2018; Väyrynen et al., 2023). Potential content of a dental mobile application including information about oral health and treatments, educational videos on preventive oral care, appointment planning

tools was noted during face-to-face interviews. Moreover, the distributions of potential content in dental application were also shown according to approaches to oral health problems.

Since the structured questionnaire used in this study was adapted from our previous study performed with parents and pre-school teachers (Sarı et al., 2023), a validity and reliability analysis was not conducted. Trained interviewers (FBS) provided an overview of the study's objectives and assisted patients with literacy difficulties or visual impairments in completing the questionnaires.

1.2. Statistical Analysis

Data were analyzed using SPSS version 28 (IBM, Chicago, Illinois, USA) and presented as "means" and "standard deviations" for continuous data. The categorical data were presented as "n" and "%". Categorical variables including gender and preferences for dental application content were presented as numbers and percentages. Associations were analyzed using the Chi-square test. Since continuous variables, including age, education period, and frequency of tooth brushing per day, were not normally distributed, non-parametric analyses were performed for patients' approaches to oral health problems ("Visit a dentist", "Wait for a while", and "Search social media"). P-value < 0.05 was accepted as statistically significant.

2. ANALYSIS

The profile of the dental patients was presented in Table 1. The duration of formal education received was 12.14 ± 4.13 years. The frequency of visits to a family medicine clinic over the past year was 3.33 ± 3.66 times per year. The frequency of daily tooth brushing was 1.59 ± 0.71 in the whole group (Table 1).

Table 1. The Profile of the Study Group

		n	%
Gender	Female	237	83.5
	Male	47	16.5
	Total	284	100
Employment status	Employed	96	33.8
	Unemployed	188	66.2
	Total	284	100
Marital status	Married	135	47.9
	Single	147	52.1
	Total	282	100
Chronic Diseases (Comorbidities)*	Present	144	53.5
	Absent	125	46.5

	Total	269	100
	Mean	**SD**	
Age (years)	37.79	16.94	
Education years	12.14	4.13	
Number of visits in family medicine clinic/last year	3.33	3.66	
Frequency of tooth brushing/daily	1.59	0.71	

*Patients declared if they have chronic disease or not.

The primary reason for the last dental visit was noted as treatment (95.7%) in the whole group. The prominent symptoms were dental pain (31.7%, n=90), followed by tooth loss (25.4%, n=72), dissatisfaction with the appearance of their teeth (24.6%, n=70) and tooth decay (21.5%, n=61) during receiving dental care (Table 2).

In the presence of oral health problems, more than half of the patients (60.1%; n=167) indicated that they "consulted a dentist" when experiencing oral health problems. Following this, 20.9% (n=58) reported "searching social media" to solve their oral health problems on their own and 14.4% (n=40) preferred to "wait a while". Much lower rates (%3) were reported for going to the emergency room, consulting pharmacist and family medicine specialist and around people (Table 2).

Table 2. Recent Dental Visit and Self-Reported Oral Discomfort among Patients

	n	**%**
Reason for Last Dental Visit		
Check-up	12	4.3
Treatment	268	95.7
Total	280	100
Most Recent Reason for Dental Treatment*		
Tooth decay	61	21.5
Missing teeth (need for prosthesis)	72	25.4
Dental Pain	90	31.7
Dissatisfaction with the appearance of teeth	70	24.6
Approaches to Oral Health Problems		
Visit a dentist	167	60.1
Wait for a while	40	14.4
Search social media	58	20.9
Go to the emergency department	6	2.2
Consult a pharmacist	3	1.1
Consult a family physician	3	1.1
Ask people around me	1	0.4
Total	278	100

Searching Information Before Visiting a Health Professionals		
Yes	183	64.4
No	97	34.2
No Response	4	1.4
Total	284	100

*Multiple responses selected

In the study group, 76.8% (n=218) reported using at least one mobile health application and 64.4% (n=183) noted that they searched for information before visiting health professionals. Moreover, patients who searched social media to solve their oral health problem also preferred to search for information before consulting a dentist compared to others (75.9% vs 60.5%) (p=0.054).

No significant difference was observed in age, education period and frequency of tooth brushing according to approaches to oral health problems (p>0.05). Females were more likely to visit a dentist compared to males searching social media (p=0.023) (Table 3a).

Table 3a. Patient Characteristics and Preferences by Approaches to Oral Health Problems

		Approaches to Oral Health Problems* **						**p***
		Visit a dentist (n=167)		**Wait for a while (n=40)**		**Search social media (n=58)**		
		n	**%**	**n**	**%**	**n**	**%**	
Gender	Female	146	87.4	31	77.5	43	74.1	**0.041**
	Male	21	12.6	9	22.5	15	25.9	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**p****
Age		37.34	16.80	40.88	19.12	36.14	15.69	0.633
Education period (years)		12.52	4.20	11.26	4.42	12.37	3.69	0.252
Frequency of tooth brushing/a day		1.61	0.77	1.54	0.69	1.55	0.59	0.889

* Chi-square test was used for categorical variables.
** Kruskal-Wallis test was used for continuous variables (age, education years, daily tooth brushing frequency)
***Percentages were calculated within each approach group (Visit a dentist, Wait for a while, Search social media).

In the assessment of the possible content of a dental application, the most requested feature was found to be "Information about oral health and treatments" 56.3% (n=160). Then ''Educational videos on preventive oral care'' (55.3%; n=157) and "Appointment planning tools" (53.9%; n=153), were observed to be the other important items for patients (Table 3b).

Responses were categorized according to patients' approaches to oral health problems (Table 3b, Figure 1), allowing multiple selections to capture overall trends in preferences for dental application content. The three most frequently prioritized features (>50%) were consistently:

"Information about oral health and treatments (56.3%)", "Appointment planning tools (53.9%)" and "Educational videos on preventive oral care (55.3%)" (Table 3b).

Table 3b. Preferences for Dental Application Content in Patients with Different Perspectives to Oral Health Problems

	Approaches to Oral Health Problems***						P*
	Visit a dentist (n=167)		Wait for a while (n=40)		Search social media (n=58)		
	n	%	n	%	n	%	
Content**							
Information about oral health and treatments (n=160, 56.3%)	90	53.89	21	52.5	38	65.52	0.269
Appointment planning tools (reminders and alerts) (n=153, 53.9%)	91	54.49	20	50	32	55.17	0.858
Educational videos on preventive oral care (tooth brushing, flossing, fluoride application) (n=157, 55.3%)	100	59.88	16	40	33	56.90	0.074

*Chi-square test was used for the analysis. ** Multiple responses were recorded for application content.
***Percentages were calculated within each approach group (Visit a dentist, Wait for a while, Search social media).

Among patients "visiting a dentist" (n=167), the item "Educational videos on preventive oral care" was ranked as 59.88% (n=100), followed by "Appointment planning tools" (n=91, 54.5%) and "Information about oral health and treatments" (n=90, 53.9%) (Table 3b, Figure 1).

Patients who preferred to "wait for a while" (n=40) prioritised "Information about oral health and treatments" (n=21, 52.5%), followed by "Appointment planning tools" (n=20, 50.0%), then "Educational videos on preventive oral care" (n=16, 40.0%) (Table 3b, Figure 1).

Patients "searching social media" (n=58) also ranked "Information about oral health and treatments" highest (n=38, 65.5%), followed by "Educational videos on preventive oral care" (n=33, 56.9%) and "Appointment planning tools" (n=32, 55.2%) (Table 3b, Figure 1).

These results were important feedback for both developing patient's empowerment strategies and perspective of oral health policies.

Patients visit a dentist	Patients search social media	Patients wait for a while
1. Educational videos on preventive oral care 2. Appointment planning tools 3. Information about oral health and treatments	1. Information about oral health and treatments 2. Educational videos on preventive oral care 3. Appointment planning tools	1. Information about oral health and treatments 2. Appointment planning tools 3. Educational videos on preventive oral care

Figure 1. Prioritization of Dental Application Content among Patients with Diverse Perspectives on Oral Health Problems

3. DISCUSSION/CONCLUSIONS AND RECOMMENDATIONS

In the perspective of oral health policies, regular access to dental care, oral health literacy as well as preventive oral measures, are key domains for improving oral health and reducing treatment costs. The results of this study highlighted patients' attitudes toward oral health problems and the growing importance of mobile health technologies in dentistry. In the current study, dental patients were able to receive information by using an mHealth application with reliable content and suitable design in this digital age (Kim & Xie, 2017; Saini et al., 2025; Väyrynen et al., 2023; WHO, 2024). This approach may help to improve health literacy and patients' self-care behaviors because mobile platforms can shape health behaviors, provide easier access to information, and support timely decisions about care (Chatterjee et al., 2024; Glick et al., 2012; Hamberger et al., 2022; Kaczmarczyk et al., 2021; Khehra et al., 2021; Saini et al., 2025; Tiffany et al., 2018; Väyrynen et al., 2023; Weinert et al., 2022).

In the study group, dental pain, tooth decay, tooth loss and aesthetic problems were found to be main reasons for access to dental care. Similarly, dental pain, discomfort, functional limitations and psychosocial impacts are accepted as essential factors motivating dental visits from the patients' perspective (Kassebaum et al., 2017; Li et al., 2025; Peres et al., 2019; Zare et al., 2024).

When approaches to oral health problems were examined, most dental patients reported consulting “a dentist” (60.1%). They preferred to obtain information from dentist directly. However, “searching social media” (20.9%) or “preferring to wait a while” (14.4%) were found to be other common responses among dental patients. In addition, more than half of the patients (64.4%) reported that they searched for information before visiting a health professional, especially males. These results may illustrate reactive care-seeking patterns, indicating that dental care utilization is often triggered by acute painful symptoms rather than preventive motivations. In this context, patient empowerment strategies, are essential for shifting care-seeking behavior toward prevention by strengthening self-monitoring and encouraging proactive oral health practices, ultimately reducing reliance on reactive care and supporting broader public health goals (Fitzpatrick, 2023; Hamberger et al., 2022; Zolfaghari et al., 2021). Some patients reported searching social media for their oral health problems, especially males in the study. Delaying care or seeking information online were important results for the perspective of oral health policy and access to dental care (Chen et al., 2022; de Oliveira Júnior et al., 2025; Khehra et al., 2021; Kim & Xie, 2015; Li et al., 2025).

Nowadays, the digital world has become a primary source of oral health related information among dental patients. Social media and internet platforms are considered to be the primary and reliable easily accessible source of information for oral health because information asymmetry and the difficulty of selecting reliable online platforms are important challenges for dental patients. Furthermore, individuals' online health information-seeking behaviors significantly influence their healthcare decisions, including whether to seek medical consultation (Li et al., 2025). Moreover, in dentistry, such behaviors are thought to be shaped by levels of oral health literacy (de Oliveira Júnior et al., 2025). Patients may also use websites or social media accounts maintained by dentists or dental service providers to address similar concerns. Therefore, digital environmental tools are increasingly recognised as contributing to patient empowerment, education, self-assessment, and the promotion of a patient-centred approach to disease management for both patients and providers (Chen et al., 2022; Fernández-Luque & Bau, 2015; Fitzpatrick, 2023; Hamberger et al., 2022; Kim & Xie, 2017).

Almost three-fourths of dental patients (76.8%) had previously used at least one mobile health application (mHealth app). This approach aligns with global trends indicating increased utilization of health-related applications among adults seeking accessible, user-friendly solutions

for monitoring and managing health (Bhuyan et al., 2016; Fitzpatrick, 2023; Hamberger et al., 2022; Mahmood et al., 2019). From this perspective, our results are expected, as online resources are widely recognized as primary channels for acquiring health-related knowledge (de Oliveira Júnior et al., 2025; Fernández-Luque & Bau, 2015; Li et al., 2025; Ventola, 2014). Yet, the quality and reliability of content remain essential for improving oral health (Tiffany et al., 2018). These results may be interpreted within the multifactorial nature of access to dental care in oral health policies.

Dental applications should align with patient expectations and support proactive engagement with oral health. According to study results, "Information about their oral health and their treatments", "Educational videos on preventive oral health" and "Appointment planning tools" were the desired contents for a mobile dental application. Well-designed dental applications could play a critical role in guiding users toward timely clinical consultation, improving early diagnosis, and preventing progression of oral health problems (Stein et al., 2016; Tiffany et al., 2018; Väyrynen et al., 2023). Our results were in accordance with previous studies which indicated that applications must provide both educational information for improving oral health and practical tools supporting access to oral health services (Sarı et al., 2023; Stein et al., 2016; Tiffany et al., 2018; Väyrynen et al., 2023).

When evaluating the video content required in a dental application, "Educational videos on preventive care" was identified as the most frequently desired content among patients.

When faced with an oral health problem, the most desired features for a dental application were "Information about oral health and treatments" for patients searching social media and patients waiting for a while. Their ratios were over 50% in the study group whereas variation in percentages were also observed according to patients' approaches to oral health problems. On the other hand, "Educational videos on preventive oral care" was prominent item for "Patient visiting dentists". Moreover, "Appointment planning tools" was desired content for "Patients waiting for a while and Patients seeing a dentist". These features were important from a health policy perspective to improve oral health. This variation is also important for understanding patient perspectives and behaviour, and for guiding the development of patient-empowerment strategies.

These results may help the improvement of oral health literacy in developing patient empowerment strategies. Similar results are also observed in previous studies as visual and interactive materials for preventive care are widely recognized for enhancing user engagement and

improving information retention (Fitzpatrick, 2023; Ho, Chai, Huang, et al., 2025; Khehra et al., 2021; Le, 2022; Sarı et al., 2023; Scheerman et al., 2018; Scheerman et al., 2020; Stein et al., 2016; Tiffany et al., 2018; Väyrynen et al., 2023; Ventola, 2014).

This study is expected to be valuable for understanding patient behaviors, perceptions, and care-seeking processes, as the patient population presents with a diverse range of oral health issues, designing dental application as well as developing patient empowerment strategies.

This study had notable strengths. Firstly, it provided insights into the possible content of a dental application from the perspective of dental patients in a large study group. Marmara University Faculty of Dentistry serves as a public healthcare institution on the Anatolian side of Istanbul and has large patient population with diverse patient profiles. Secondly, sample size was calculated, and data were collected from this large patient population in accordance with the sample size calculation. By linking patients' behavioral approaches with their content preferences, this study gave clues for the development of patient-centred digital tools that support oral health literacy, patient empowerment, and preventive care. However, the main limitation of this study was that the data were collected from a single centre, and the questionnaire included items that had not been validated for this study.

Consequently, although dentists should be the primary source of information for patients, dental applications with user-centred design could be useful tools for accessing reliable information, education material, improving oral health and supporting the utilisation of dental care within the framework of patient empowerment strategies.

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