

Association between Unmet Dental-Care Needs and the Intention to Use Mobile Healthcare Services among Soldiers

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Background: Although a direct association has been established between oral health management and maintaining military combat readiness and fulfilling defense duties, unmet dental-care needs have been consistently reported, and there has been little research on the role of mobile healthcare services in addressing this issue. This study explored the association between unmet dental-care needs and the intention to use mobile healthcare services among military personnel.

Methods: This study was conducted on military personnel who visited a military hospital in Gyeonggi-do, Korea, from August 19 to August 31, 2024. A total of 150 self-administered questionnaires were distributed and 135 valid responses were analyzed. The analysis included general characteristics, dental care utilization, and intention to use mobile healthcare services. Statistical analyses, such as t-tests, ANOVA, and multiple regression, were employed to determine the factors influencing the intention to use mobile healthcare services.

Results: This study found that military personnel with unmet dental-care needs had significantly higher intentions to use mobile healthcare services than those without such needs. The analysis revealed that the key factors influencing this intention were perceived health status and previous dental-care utilization. Specifically, participants who rated their overall health as better and those who had used dental care services in the past year showed a greater tendency to express interest in mobile healthcare services than those who did not. Furthermore, unmet dental-care needs were more prevalent among soldiers who reported limited access to dental facilities owing to time constraints or a lack of prioritization of oral health, which increased their inclination toward utilizing mobile healthcare solutions as an alternative.

Conclusion: Mobile healthcare solutions can offer personalized and timely care as viable alternatives for improving oral health management in the military. Moreover, integrating mobile healthcare services into military health systems could significantly reduce unmet dental-care needs and enhance overall combat readiness by promoting better health outcomes.

Key Words: Military personnel, Mobile health, Oral health

Introduction

1. Background

The management of oral health among soldiers directly affects their combat readiness and ability to fulfill national defense duties¹⁾. Owing to the controlled environment of the military, soldiers after enlistment consume more snacks and practice poorer oral hygiene than they did pre-enlistment²⁾. This inadequate oral healthcare practices can lead to the need for extensive dental treatments, resulting

in personnel shortages and loss of combat effectiveness³⁾. Thus, oral health management in the military is crucial to ensure the overall efficiency and safety of forces. unmet dental-care needs refer to situations where appropriate dental services are either not provided or are inaccessible⁴⁾, occurring because of economic constraints, time limitations, or lack of accessibility⁵⁾. Previous studies indicate that between 14.1% to 24.1% of military personnel have unmet medical needs, with reasons for unmet dental-care needs including ‘no time to visit,’ ‘low trust in military hospitals,’ ‘difficult

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appointments or prolonged waiting duration,' and 'the military hospital being too far away.'^{6,7)} Therefore, a system that improves accessibility to dental care services is necessary to address these unmet needs. Due to the controlled military environment and operational duties in remote areas^{8,9)}, it is challenging for soldiers to receive regular dental checkups, thus leading to a higher incidence of oral diseases. This issue has raised concerns about unmet dental-care needs^{6,7)}, and strategies have been proposed to provide appropriate and timely medical care to soldiers exposed to injuries and illnesses during their service¹⁰⁾. Mobile health services, which leverage mobile devices and applications to enhance personal management skills and offer cost-effective solutions, can serve as alternatives in these circumstances¹¹⁾.

Mobile health services enable users to access health-related information, such as disease prevention, diagnosis, and treatment, through various mobile devices and applications¹²⁾. These services offer the advantage of allowing users to monitor and manage their health status anytime and anywhere without being restricted by time or location¹³⁾. Thus, the establishment of mobile health services for dental care can play a significant role in resolving soldiers' unmet dental-care needs and effectively manage their oral health.

Various factors influence the intention to use mobile health services. For financial insurance consumers, factors such as health concerns, perceived health benefits, health self-efficacy, and personal innovativeness, as well as system quality factors such as ease of use, information quality, and service quality, have been shown to affect continuous intention to use mobile health services¹⁴⁾. For sports center users who have experience using mobile health applications, perceived usefulness has been positively associated with intention to use, interpreted as being due to the utility and practical purposes of ongoing use encouraged by innovative technologies. Perceived usefulness has been positively associated with intention to use for sports center users with experience using mobile health applications, and innovative technologies encouraged the utility as well as practical purposes of ongoing use¹⁵⁾. Previous studies on mobile health services targeting the older and general consumers have consistently highlighted the positive influence of educational level and innovativeness on the intention of

older individuals to use digital health services. However, concerns about personal information leakage remain a significant barrier, and consumer health beliefs have been shown to positively affect the adoption of mobile health services. Additionally, it has been emphasized that service design should consider factors like control location and perceived utility, with information quality, design, innovativeness, and health concerns being critical determinants of digital health adoption among older adults¹⁶⁻¹⁸⁾. Despite these insights, the gap is noticeable in research focusing on the intention to use dental care services and mobile health services among soldiers.

2. Objectives

This study aimed to explore the association between unmet dental-care needs and the intention to use mobile healthcare services among military personnel. Service members often face challenges in receiving timely dental care because of the unique nature of military life, leading to unmet needs. This study sought to understand how unmet needs influence the intention to adopt mobile healthcare services. These findings are expected to provide insights to design more effective mobile healthcare solutions to improve dental care access for military personnel.

Materials and Methods

1. Participants

This study was conducted with soldiers who visited the Military Hospital located in Gyeonggi-do, Korea, between August 19 and August 31, 2024, for approximately two weeks. The sample size was calculated using the G*POWER software program (version 3.1.9.7; Franz Faul, University of Kiel, Kiel, Germany) based on independent sample t-tests. Applying a significance level of 0.05, power of 0.8, and medium effect size of 0.15, the minimum sample size was calculated to be 128; considering a dropout rate of 20%, self-administered questionnaires were distributed to 150 participants. The survey was conducted after explaining the study purpose and obtaining voluntary consent, and 135 questionnaires were finally analyzed after excluding 15 incomplete responses. This study was approved by the Institutional Review Board of Shinhan University.

2. Research tools

1) General characteristics

The demographic, occupational, and health status characteristics were based on the 2014 and 2015 Military Health Surveys¹⁹⁾, and the oral health status, dental service utilization, and unmet dental-care needs were derived from items in the 2022 National Health and Nutrition Examination Survey²⁰⁾, representative of the survey data. For demographic characteristics, sex (male and female) and educational level ('high school graduation or below' and 'attending college or higher') were categorized, with age as the continuous variable. Occupational characteristics such as assigned branches were classified as combat branch, technical branch, administrative branch, and special branch. The types of duty stations were major/medium city, rural area/town/village, and remote area (General Out Post [GOP]/Isolated Area/Island/Naval Ship). Working hours were classified based on a threshold of 60 hours as either '60 hours or less' or 'more than 60 hours.' Work hour stress was measured using a 5-point Likert scale ranging from '1=none' to '5=a lot,' and was reclassified into 'none, moderate, and high.'

Health status characteristics were re-categorized from a 5-point scale where '1=very unhealthy' to '5=very healthy' into 'unhealthy,' 'moderate,' and 'healthy.' The health status compared to one year ago was re-categorized using a 5-point scale ranging from '1=much worse' to '5=much better' into 'worsened,' 'moderate,' and 'improved.' The health status of soldiers compared to peers and subjective oral health status were reclassified from a scale of '1=very poor' to '5=very good' into 'poor,' 'moderate,' and 'good.' Previous day brushing was confirmed using a dichotomous variable of 'yes' or 'no,' and brushing times were categorized as before and after breakfast, lunch, and dinner as well as after snacks and before bed. The experience of using dental services in 2023 was categorized as either 'yes' or 'no,' and the number of dental visits was categorized from one time to five or more times. The categories of dental treatment were 'regular checkups,' 'preventive treatment,' 'restorative treatment,' 'periodontal treatment,' 'oral surgery,' 'prosthetic treatment,' 'implant,' 'orthodontic treatment,' and 'others' (e.g., whitening, temporomandi-

bular joint treatment). Unmet dental-care needs refer to situations where appropriate dental-care services are not provided or are inaccessible. The experience of unmet dental-care was first confirmed as 'yes' or 'no,' and the reasons for unmet dental-care needs were identified as 'economic,' 'inconvenient transportation,' 'difficult to visit due to mobility issues or health reasons,' 'fear of dental treatment,' 'oral health is less important than other issues,' 'lack of information about specialized hospitals,' 'no time to visit,' and 'unable to get an appointment promptly.'

2) Intention to use mobile healthcare services

Health concerns were measured using items from Dutta-Bergman²¹⁾, Innovativeness from Rogers et al.²²⁾, Pearson²³⁾, and Venkatraman and Price²⁴⁾, while facilitating conditions, social influence, effort expectancy, performance expectancy, and use intention were measured using items developed by Venkatesh et al.²⁵⁾ and Norman and Skinner²⁶⁾, and translated by Luo et al.¹⁴⁾. A total of 35 items were measured on a 7-point Likert scale, ranging from '1=strongly disagree' to '7=strongly agree,' with higher scores indicating a higher intention to use mobile healthcare services. In this study, the reliability of the scale was evaluated using Cronbach's alpha, which yielded a high value of 0.97, indicating excellent internal consistency among the items measured.

The operational definitions of the sub-factors of the intention to use mobile healthcare services are as follows: health concern refers to the degree to which an individual is concerned about their health information and management, and innovativeness refers to the degree to which an individual adopts new information technology more readily than others. Facilitating conditions refer to the belief that the organization and technical infrastructure are well prepared to support new information technology, whereas social influence refers to the degree to which the user and their social circle believe in using mobile healthcare. Effort expectancy refers to the belief in the ease and convenience of using mobile healthcare, which refers to the expectation and belief that mobile healthcare usage will help improve health. Intention to use refers to the likelihood of continuing to use mobile healthcare now or in the future, or recommending it to others.

3. Data analysis

Descriptive statistical analyses were conducted to identify the general characteristics of the study participants. Additionally, basic statistics such as mean, standard deviation, skewness, and kurtosis were calculated for soldiers' intentions to use mobile healthcare services to check the normal distribution of the data. Box plots were used to visually confirm the median values of the intention to use

mobile healthcare services according to unmet dental-care needs among soldiers. A t-test and ANOVA were performed to check the mean differences in the intention to use mobile healthcare services according to the general characteristics of soldiers and unmet dental-care needs. Scheffe's post-hoc analysis was used to confirm differences between groups when there were more than three groups. Multiple regression analysis was conducted to examine the association

Table 1. General Characteristics of Soldiers (n=135)

		Category	n	%
Sociodemographic characteristics	Sex	Male	133	98.5
		Female	2	1.5
	Age (mean±SD)		21.03±1.84	
Professional characteristics	Educational level	High school graduate or lower	20	14.8
		Attending college or higher	115	85.2
	Assigned branch	Combat branch	66	48.9
		Technical branch	37	27.4
		Administrative branch	18	13.3
		Special branch	14	10.4
	Type of work location	Major city/small to medium city	45	33.3
		Rural area/town/village	82	60.7
		Remote area (GOP/Isolated Area/Island/Naval Ship)	8	5.9
	Average working hours per week	60 hours or less	105	77.8
More than 60 hours		30	22.2	
Work stress	None	21	15.6	
	Normal	75	55.6	
	Stressed	39	28.9	
Health and oral health	Subjective health status	Unhealthy	37	27.4
		Normal	54	40.0
		Healthy	44	32.6
	Health status compared to a year ago	Worse	49	36.3
		Normal	60	44.4
		Better	26	19.3
	Health status compared to peers	Bad	45	33.3
		Normal	56	41.5
		Good	34	25.2
	Subjective oral health status	Bad	36	26.7
		Normal	70	51.9
		Good	29	21.5
	Brushing teeth yesterday	Yes	133	98.5
		No	2	1.5
Toothbrushing time (n=133) (multiple responses)	Before breakfast	24	18.1	
	After breakfast	101	75.9	
	Before lunch	0	0	
	After lunch	82	61.7	
	Before dinner	4	3.0	
	After dinner	86	64.7	
	After snack	4	3.0	
	Just before going to bed	74	55.6	

Table 1. Continued

		Category	n	%
Characteristics of dental care use	Experience using dental care (last year)	Yes	83	61.5
		No	52	38.5
	Number of dental visits (last year) (n=83)	1	26	31.3
		2	27	32.5
		3	11	13.3
		4	8	9.6
		5 or more	11	13.3
	Treatment contents (n=83) (multiple responses)	Regular checkup	25	30.1
		Preventive treatment (fissure sealant, fluoride application, etc.)	3	3.6
		Conservative treatment (nerve treatment, caries treatment)	25	30.1
		Periodontal treatment (gum treatment, scaling, etc.)	33	39.8
		Oral surgery treatment (including tooth extraction)	23	27.7
		Prosthetic treatment (including denture treatment)	1	1.2
		Implant	0	0
		Orthodontic treatment	15	18.1
Others (whitening, temporomandibular joint treatment, etc.)		7	8.4	
Unmet dental-care	Experience with unmet dental-care needs	Yes	24	17.8
		No	111	82.2
	Reasons	Economic reasons (because the treatment is too expensive)	4	16.7
		The dental clinic is too far away (inconvenient transportation)	0	0
		Health reasons	0	0
		Because I am too afraid of dental treatment	3	12.5
		Because oral problems are less important than other problems	7	29.2
		Because I don't know where to go (lack of information about specialized hospitals, etc.)	0	0
		Because I don't have time to visit (because I can't leave work)	8	33.3
		Because I can't make an appointment in a short period of time	2	8.3

SD: standard deviation, GOP: General Out Post.

between unmet dental-care needs and the intention to use mobile healthcare services among soldiers. Model 1 included demographic and occupational characteristics, while Model 2 added health status variables to Model 1 to determine their influence on the intention to use mobile healthcare services. Statistical analyses were performed using R software (version 4.3.2; R Foundation for Stati-

stical Computing, Vienna, Austria), and the statistical significance level was set at 0.05.

Results

1. General characteristics of soldiers

Table 1 shows the general characteristics of the soldiers.

Of the respondents, 133 (98.5%) were male with an average age of approximately 21 years. Regarding their educational level, 115 soldiers (85.2%) were currently attending or had completed college. Regarding occupational characteristics, 66 soldiers (48.9%) belonged to combat branches and 82 soldiers (60.7%) were stationed in rural areas, towns, or villages. Regarding health status, 54 soldiers (40.0%) rated their subjective health status as ‘moderate,’ while 60 soldiers (44.4%) assessed their health compared to one year ago as ‘moderate,’ and 56 soldiers (41.5%) compared their health to their peers as ‘moderate.’ The subjective oral health status was rated as ‘moderate’ by 70 soldiers (51.9%). In 2023, 83 soldiers (61.5%) reported using dental services. The most common type of dental treatment was periodontal treatment (33 soldiers, 39.8%), followed by regular check-ups and restorative treatment (25 soldiers, 30.1%). Regarding unmet dental-care, 17.8% experienced it, citing ‘no time to visit’ (33.3%) and ‘oral health being less important than other issues’ (29.1%) as the main reasons.

2. Intention to use mobile healthcare services among soldiers

The results of the analysis of the intention to use mobile healthcare services among soldiers using a 7-point Likert scale are shown in Table 2. The average score for “health concern” was the highest at 6.05, followed by “effort expectancy” at 5.59, and “performance expectancy” at 5.49. Conversely, when examining the sub-factors that influence soldiers’ intention to use mobile healthcare services, it was found that they had a high level of concern for their health information and health management and they tend

to believe that mobile healthcare services are easy and convenient to use and can help improve their health.

3. Median intention to use mobile healthcare services according to unmet dental-care needs among soldiers

The median intention to use mobile healthcare services according to the experience of unmet dental-care needs among soldiers was visually confirmed (Fig. 1). The median intention to use mobile healthcare services for soldiers without unmet dental-care needs was 5.171, whereas the median intention to use for those with unmet dental-care needs was 5.443, indicating that soldiers with unmet dental-care needs had a higher intention to use mobile healthcare services.

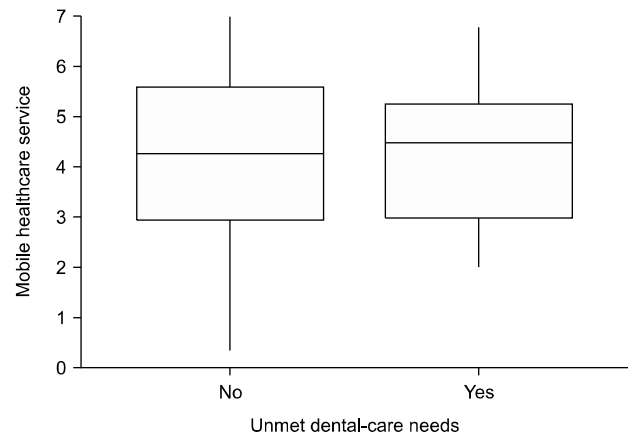


Fig. 1. Intention to use mobile healthcare services according to unmet dental-care needs among soldiers.

Table 2. Descriptive Statistics of Subfactors in Soldiers’ Intention to Use Mobile Healthcare Services

Category	M	SD	Skewness	Kurtosis
Health concern	6.05	0.97	-1.11	0.92
Innovativeness	5.06	1.51	-0.27	-0.89
Facilitating conditions	4.77	1.27	-0.22	0.74
Social influence	5.01	1.31	-0.14	-0.19
Effort expectancy	5.59	1.24	-0.66	-0.06
Performance expectancy	5.49	1.26	-0.35	-0.56
Intention to use	5.31	1.38	-0.33	-0.54

7-point Likert scale.
M: mean, SD: standard deviation.

4. Comparison of mean intention to use mobile healthcare services according to unmet dental-care needs and soldier characteristics

The results of the comparison of the mean intention to use mobile healthcare services according to unmet dental-

care needs and soldier characteristics are shown in Table 3. In the group with unmet dental-care needs, subjective health status, health status compared to a year ago, health status compared to peers, and dental-care experience over the previous year were found to influence the intention to

Table 3. Mean Difference in Intention to Use Mobile Healthcare Services by Unmet Dental-Care Needs

Category		Use intention for mobile healthcare services									
		Unmet dental-care needs (yes)					Unmet dental-care needs (no)				
		M	SD	F(t)	p	Scheffe	M	SD	F(t)	p	Scheffe
Educational level	High school graduate or below	4.58	0.51	2.318	0.142		5.51	1.24	0.560	0.456	
	Attending college or higher	5.36	0.86				5.31	1.00			
Assigned branch	Combat branch	5.11	0.79	0.634	0.540		5.23	1.06	2.120	0.102	
	Technical branch	5.55	1.02				5.40	1.14			
	Administrative branch	5.23	0.77				5.88	0.83			
	Special branch	-	-				5.03	0.85			
Type of work location	Major city/small to medium city	5.23	0.91	0.598	0.559		5.58	0.93	2.897	0.052	
	Rural area/town/village	5.35	0.86				5.16	1.08			
	Remote area (GOP/Isolated Area/Island/Naval Ship)	4.37	NA				5.82	0.79			
Average working hours per week	60 hours or less	5.29	0.93	0.039	0.845		5.31	1.03	0.323	0.571	
	More than 60 hours	5.20	0.61				5.44	1.08			
Work stress	None	5.45	0.79	0.498	0.615		5.34	1.31	0.811	0.447	
	Normal	5.12	0.98				5.24	0.93			
	Very stressed	5.51	0.53				5.52	1.08			
Subjective health status	Unhealthy	5.20 ^a	0.61	4.094	0.031	(b < c)	5.26	1.04	2.590	0.071	
	Normal	4.92 ^b	0.94				5.13	1.03			
	Healthy	6.22 ^c	0.69				5.62	1.00			
Health status compared to a year ago	Worse	5.28 ^a	0.70	4.196	0.029	(b < c)	5.24	0.98	0.625	0.537	
	Normal	5.04 ^b	0.83				5.33	1.11			
	Better	6.71 ^c	0.20				5.54	0.99			
Health status compared to peers	Bad	5.22 ^a	0.71	6.472	0.006	(a, b < c)	5.04	0.84	2.438	0.092	
	Normal	4.90 ^b	0.77				5.41	1.09			
	Good	6.39 ^c	0.41				5.58	1.12			
Subjective oral health status	Bad	4.96	0.72	1.272	0.301		5.16 ^a	1.03	3.084	0.049	(b < c)
	Normal	5.43	1.01				5.23 ^b	0.98			
	Good	5.70	0.47				5.77 ^c	1.09			
Experience of using dental care (last year)	Yes	4.64	0.84	5.059	0.034		5.29	0.98	0.531	0.468	
	No	5.48	0.62				5.45	1.18			
Number of dental visits (last year) (n=83)	1	4.27	0.29	3.010	0.192		5.22	0.91	1.099	0.364	
	2	5.28	0.69				5.29	1.07			
	3	-	-				5.38	0.85			
	4	-	-				4.83	0.51			
	5 or more	4.43	0.84				5.78	1.22			

7-point Likert scale.

M: mean, SD: standard deviation, NA: not available, GOP: General Out Post.

use mobile healthcare services. Scheffe's post hoc analysis showed that 'healthy' was significantly higher than 'normal' for subjective health status ($F=4.094$, $p=0.031$), health status compared to one year ago of 'better' was significantly higher than 'normal' ($F=4.196$, $p=0.029$), and health status compared to peers of 'good' was significantly higher than 'bad' or 'normal' in terms of the use intention of mobile healthcare services ($F=6.472$, $p=0.006$). health status compared to one year ago of 'improved' was significantly higher than 'normal' ($F=4.196$, $p=0.029$), and health status

compared to peers of 'good' was significantly higher than 'poor' or 'normal' in terms of the intention to use mobile healthcare services ($F=6.472$, $p=0.006$). Regarding dental service utilization over the past year, those without experience had a significantly higher intention to use mobile healthcare services than those with experience ($t=5.059$, $p=0.034$). In the group without unmet dental-care needs, subjective oral health status was identified as the only statistically significant influencing factor. Scheffe's post hoc analysis showed that subjective oral health status of

Table 4. Association between Unmet Dental-Care Needs and Soldiers' Use of Mobile Healthcare

Category	Model 1				Model 2			
	B	t	p	VIF	B	t	p	VIF
Unmet dental-care needs	0.056	0.234	0.815	1.070	-0.579	-1.222	0.227	1.187
Sex (ref. male)								
Female	-1.149	-1.377	0.171	1.174	-0.265	-0.209	0.835	1.340
Age	0.018	0.335	0.738	1.148	0.064	0.878	0.383	1.346
Educational level (ref. high school graduate below)								
Attending college or higher	-0.127	-0.490	0.625	1.075	-0.543	-1.415	0.163	1.259
Assigned branches (ref. combat branch)								
Technical branch	0.217	1.025	0.307	1.036	0.195	0.674	0.503	1.111
Administrative branch	0.525	1.912	0.050		0.661	1.989	0.049	
Special branch	-0.190	-0.608	0.544		-0.131	-0.353	0.726	
Types of duty stations (ref. major city/small to medium city)								
Rural area/town/village	-0.303	-1.520	0.131	1.059	-0.160	-0.586	0.560	1.200
Remote area (GOP/Isolated Area/Island/ Naval Ship)	0.179	0.451	0.653		0.151	0.262	0.794	
Average weekly working hours (ref. 60 hours or less)								
More than 60 hours	-0.091	-0.387	0.700	1.143	-0.148	-0.453	0.652	1.308
Work hour stress (ref. none)								
Normal	-0.091	-0.348	0.728	1.065	-0.106	-0.292	0.771	1.219
High	0.257	0.873	0.384		0.308	0.746	0.459	
Subjective health status (ref. unhealthy)								
Normal	-	-	-	-	-0.324	-0.929	0.357	1.543
Healthy	-	-	-	-	-0.377	-0.745	0.459	
Health status compared to a year ago (ref. getting worse)								
Normal	-	-	-	-	-0.189	-0.661	0.511	1.286
Getting better	-	-	-	-	0.009	0.023	0.982	
Health status compared to peers (ref. bad)								
Normal	-	-	-	-	0.734	1.907	0.050	1.661
Good	-	-	-	-	0.910	1.716	0.091	
Subjective oral health status (ref. bad)								
Normal	-	-	-	-	0.000	0.000	1.000	1.267
Good	-	-	-	-	0.421	1.126	0.265	
Number of dental visits (last year) (ref. 1)								
2	-	-	-	-	0.051	0.159	0.874	1.154
3	-	-	-	-	0.048	0.128	0.898	
4	-	-	-	-	-0.642	-1.462	0.149	
5 or more	-	-	-	-	0.384	0.971	0.335	
R-square		0.108				0.331		

Model 1 includes demographic and occupational characteristics, while Model 2 adds health characteristics to the same variables. VIF: variance inflation factor, GOP: General Out Post.

‘good’ was significantly higher than ‘normal’ in terms of the use intention of mobile healthcare services ($F=3.084$, $p=0.049$). Among health status variables, subjective oral health status was the only statistically significant influencing factor. Scheffe’s post hoc analysis confirmed that the subjective oral health status of ‘good’ was significantly higher than that of ‘normal’ in terms of the intention to use mobile healthcare services ($F=3.084$, $p=0.049$).

5. Effects of unmet dental-care needs on the use intention of mobile healthcare services among soldiers

The results of the analysis of the association between unmet dental-care needs and the intention to use mobile healthcare services among soldiers are shown in Table 4. The R-squared for Models 1 and 2 were 10.8% and 33.1%, respectively, and the variance inflation factor for all models were not greater than 10, indicating no multicollinearity issues. In Models 1 and 2, the administrative branch showed a higher intention to use mobile healthcare services than the combat branch (Model 1; $B=0.525$, $p<0.05$; Model 2: $B=0.661$, $p<0.05$). In Model 2, when comparing health status with peers, “Normal” was higher than “Bad” in terms of the use intention of mobile healthcare services ($B=0.734$, $p<0.05$). However, the hypothesis set in this study was that unmet dental-care needs would have a statistically significant association with the intention to use mobile healthcare services ($p>0.05$).

Discussion

1. Interpretation

This study examined the characteristics of soldiers, their overall health, oral health status, and intentions to use mobile healthcare services. Most soldiers, approximately 21 years old, practiced regular oral hygiene but had unmet dental-care needs due to time constraints and low prioritization of oral health. The intention to use mobile healthcare services was enhanced among those who perceived health better. However, unmet dental-care needs did not significantly influence this intention, indicating that other factors may be more influential in shaping healthcare preferences. In Models 1 and 2, the admini-

strative branch showed a higher intention to use mobile healthcare services than the combat branch. In Model 2, comparison of health status with peers showed that ‘normal’ was higher than ‘poor,’ and ‘good’ was higher than ‘poor’ in terms of the intention to use mobile healthcare services. However, the hypothesis set in this study that unmet dental-care needs would have a statistically significant association with the intention to use mobile healthcare services was unsupported ($p>0.05$).

2. Comparison to previous studies

This study aimed to explore whether unmet dental-care needs among military personnel are significantly associated with their intention to use mobile healthcare services. However, the results did not support this hypothesis, as unmet dental-care needs were not found to have a statistically significant effect on the intention to use mobile healthcare services ($p>0.05$). Contrarily, other factors such as health status, perceived health compared with peers, and previous dental service utilization played more significant roles in influencing soldiers’ intentions to adopt mobile healthcare services. In addition, the following are discussions in comparison with previous studies. First, most soldiers had utilized dental services for periodontal treatment and regular checkups in the past year, reflecting a preventive approach to manoral health. Since July 2013, the Ministry of Health and Welfare has implemented a policy that allows adults over the age of 20 years to receive scaling once a year under national health insurance coverage²⁷. A study conducted 26 months after the implementation of this policy found that 87.3% of respondents were aware of this benefit²⁸. Such dental insurance policies likely contributed to raising awareness of oral health management among young soldiers from a preventive standpoint. Second, the results showed that among the subfactors of soldiers’ intention to use mobile healthcare services, “health concern” scored the highest (6.05), followed by “effort expectancy” (5.59) and “performance expectancy” (5.49). These results are consistent with those of a study by Park and Woo²⁹, which suggested that providing telemedicine in remote areas where soldiers are stationed, ensuring privacy, could have a positive association with healthcare access and health management by adre-

ssing unmet medical needs. Third, soldiers with unmet dental-care needs showed a higher intention to use mobile healthcare services (5.443) than those without such needs (5.171). This reflects a greater interest in mobile healthcare services among soldiers who could not access dental care for reasons such as time constraints or keeping the notion of oral health as less important. Our findings indirectly support those of previous studies, such as those by Kim et al.⁶⁾, who noted that unmet medical needs are more likely to occur during military service, and Kim et al.⁷⁾, who argued that the probability of unmet medical needs increases with the experience of various illnesses, highlighting the need to improve access to and autonomy in military healthcare facilities. Given these findings, soldiers may face challenges in accessing dental services and a mobile healthcare service system could play a crucial role in addressing these challenges. Fourth, this study found that soldiers' intentions to use mobile healthcare services varied based on their unmet dental-care needs and health status. Soldiers with unmet dental-care needs rated their health positively and showed a strong desire to manage their health. While the problem of unmet dental-care typically worsens health because of the inability to receive the necessary services^{5,30)}, this study suggests that for young soldiers, these experiences may have heightened their awareness of health management and motivated them to improve their situation³¹⁾. In contrast, soldiers without unmet dental-care needs also showed a high intention to use mobile healthcare services, with 98.5% practicing regular oral hygiene and many utilizing dental services. This indicates a strong concern for health and high acceptance of mobile technology among soldiers³²⁻³⁴⁾. Fifth, this study showed that unmet dental-care needs among soldiers did not have a statistically significant association with the intention to use mobile healthcare services. This result contrasts with those of previous studies, such as Ahn et al.³⁵⁾, which reported that unmet medical needs among older individuals increased the necessity and desire for health management. Similarly, in the context of middle- men, Kim and Lee³⁶⁾ found that unmet dental-care needs increased the desire for oral health management. Contrary to previous studies suggesting that unmet dental-care leads to better oral health management, this study found no significant association between unmet

dental-care needs and soldiers' intention to use mobile healthcare services. The young age of the study group, with an average age of 21 years and high acceptance of technology, may explain the minimal association between unmet dental-care needs and the intention to use mobile healthcare services. These soldiers also underwent regular dental checkups, which might explain why the hypothesis was not supported. Further research is required to examine mobile healthcare use among young soldiers who are highly receptive to technology.

3. Suggestion

This study suggests that mobile healthcare services could serve as effective alternatives to maintain soldiers' oral health, particularly for those who evaluate their health status positively. For instance, soldiers could benefit from receiving oral health information through mobile apps, learning proper oral health management techniques³⁷⁾, and using telemedicine for consultations without the need to visit a clinic³⁸⁾. Establishing such systems within military units could play a crucial role in maintaining national safety and enhancing military combat readiness. It is crucial to provide customized mobile dental healthcare services to soldiers because of their unique circumstances. Soldiers often face restricted access to dental care because of their location, demanding schedules, and nature of their duties. These challenges can result in unmet dental-care needs, leading to long-term oral health issues if not addressed promptly. Tailored mobile dental health care services can bridge this gap by offering real-time access to dental consultations, preventive care guidance, and follow-up treatment reminders. One practical example is a mobile app designed specifically for military dental care that allows soldiers to consult dental professionals who understand military-specific oral health challenges. By addressing the specific dental health needs of soldiers, such services can help maintain their oral health and ensure that they are fit for duty.

4. Limitations

This study was conducted among military personnel visiting military hospitals in a specific geographic area, which may limit the generalizability of the findings because of sample size limitations. Future studies should

include a sample that reflects the entire military population to increase the applicability of these findings. In addition, since we identified unmet dental-care needs among relatively younger military personnel, the fact that the proportion of unmet dental-care needs was lower than that in previous studies suggests that there are not many barriers to access dental care for military personnel. Therefore, it is necessary to understand the specific methods of mobile healthcare services and the characteristics of military units, in addition to studies that can confirm the patterns of dental care utilization among military personnel. Further studies that develop and analyze mobile healthcare services and address the limitations of this study may provide new perspectives for improving the oral health of military personnel.

Notes

Conflict of interest

No potential conflict of interest relevant to this article was reported.

Ethical approval

The study was approved by the Institutional Review Board of Shinhan University (IRB No. SHIRB-202407-HR-232-02).

Author contributions

Conceptualization: Han-A Cho and Mi-Sook Yoon. Data acquisition: Han-A Cho and Mi-Sook Yoon. Formal analysis: Han-A Cho. Supervision: Han-A Cho and Mi-Sook Yoon. Writing-original draft: Han-A Cho and Mi-Sook Yoon. Writing-review & editing: Han-A Cho and Mi-Sook Yoon.

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Data availability

Authors may provide raw data upon request.

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