

## Factors Affecting College Students' Teeth Whitening Preference

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### [Abstract]

This study investigated tooth whitening preferences among college students, evaluating their knowledge, satisfaction, aesthetic criteria, and preferences, while identifying influencing factors. Using a 28-item questionnaire covering general, tooth whitening knowledge, satisfaction, aesthetic criteria, and preference questions, 175 participants surveyed from June 7th to 10th, 2022, underwent analysis. Descriptive statistics, t-tests, analysis of variance, and regression analysis were applied. Results showed tooth whitening knowledge scored 2.90 out of 5 points, satisfaction 2.97, aesthetic criteria 3.59, and preferences 3.28. Tooth whitening knowledge was higher among female and health-related major students, while satisfaction was greater among males, non-health-related majors, and those without cosmetic procedures. Aesthetic criteria were stronger in participants with higher allowances and cosmetic procedures experience. No significant tooth whitening preference differences were found based on general characteristics. Regression analysis revealed significant impact of aesthetic criteria on tooth whitening preferences ( $\beta=0.252$ ).

▶ **Key words:** Tooth whitening, College students, Aesthetic criteria, Preference, Satisfaction

### [요 약]

이 연구는 대학생들의 치아미백 선호도를 알아보려고 시행하였다. 대학생을 대상으로 치아미백에 대한 지식과 치아에 대한 만족도, 미의기준, 치아미백 선호도를 파악하고, 치아미백 선호도에 영향을 미치는 인자를 확인하였다. 일반적 질문, 치아미백 지식, 치아 만족도, 미의기준 및 치아미백 선호도 등, 총 28개 문항으로 이루어진 설문지를 이용하여, 2022년 6월 7일부터 10일까지 조사된 175부를 분석하였다. 분석을 위하여 기술통계, T검정, 분산분석, 회귀분석을 이용하였다. 연구 결과, 치아미백 지식은 5점 중 2.90점, 치아 만족도 2.97점, 미의기준 3.59점, 치아미백 선호도 3.28점이었다. 일반적 특성에 따른 치아미백 지식은 여성, 보건계열에서 높게 나타났고, 치아 만족도는 남성, 비보건계열, 성형시술을 받지 않은 군에서 높았다. 미의기준은 용돈이 많고, 성형시술 경험이 있는 군에서 높았다. 치아미백 선호도는 일반적 특성에 따른 차이가 없었다. 회귀분석 결과, 미의기준이 치아미백 선호도에 영향을 미치는 것( $\beta=0.252$ )으로 나타났다.

▶ **주제어:** 치아미백, 대학생, 미의기준, 선호도, 만족도

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## I. Introduction

With the advancement of modern society and economic growth, living standards have improved, leading to increased social activities. Consequently, people's values have changed, and there is a growing interest in pursuing an improved quality of life, particularly focusing on health and appearance [1]. Previous studies have shown that aesthetic values and social beauty consciousness are on the rise, especially among individuals in their 20s to 30s, leading to a heightened interest in appearance [2]. As a result, physical satisfaction plays a significant role as an external representation of oneself. For university students, enhancing body satisfaction is a common interest, driving them to engage in body management behaviors and appearance-related consumer activities [3].

When people first meet and interact linguistically, symbolic cues provided by appearances become the basis for judging the possibility of satisfactory interactions [4]. Teeth, being highly noticeable during conversations or smiles, greatly influence people's impressions and appearance. Tooth discoloration, in particular, can not only be a personal concern but can also impact an individual's social activities [5]. To meet consumer aesthetic desires, dental care offers various aesthetic treatments [6]. Among these, teeth whitening is widely performed due to its affordability and convenience, making it an essential procedure in adult aesthetic treatments [7].

Teeth whitening treatment involves restoring the color of discolored teeth caused by factors such as coffee, cola, black tea, smoking, or trauma, using teeth whitening agents in an oxidative-reductive reaction without removing the discolored or stained teeth [8]. Due to a growing desire for beautiful teeth and psychological distress caused by tooth discoloration [9], the interest in teeth whitening has increased. However, there is a concern that despite the high demand for teeth whitening, the occurrence of side effects related to the procedure might be

overlooked [10]. Moreover, the focus on body and beauty, body complexes, and body management behaviors can influence not only adults but also adolescents [11], and research on teeth whitening among this population is currently lacking.

Therefore, this study aimed to investigate the knowledge of teeth whitening among college students who have a strong interest in beauty, assess their satisfaction with their dental condition, and understand the criteria for beauty based on Korean standards. Additionally, the study aimed to identify the factors that have the greatest influence on teeth whitening preferences and provide fundamental data to enhance satisfaction with teeth whitening.

## II. Methods

### 1. Subjects

This study is a survey research aimed at identifying factors influencing teeth whitening among university students. The data collection period for this research was from Jun 7th to 10th, 2022. The study participants consisted of 200 students from D University in the Daejeon region. Before conducting the survey, the purpose and methods of the research, assurance of anonymity in participation, voluntary consent to participate, and the potential benefits and risks of participation were verbally and in writing explained to the respondents. The survey was administered through self-administered questionnaires only to those participants who agreed to participate. Convenience sampling method was used to select the sample, and after excluding 25 incomplete responses, a total of 175 questionnaires were included in the analysis.

### 2. Research tools

#### 2.1 General characteristics

This section included 6 questions on gender, grade level, major, average monthly allowance,

smoking status, and experience with cosmetic procedures. The questions were adapted and supplemented from the items developed by An [12].

### 2.2 Teeth whitening knowledge

This section included 10 questions related to knowledge about teeth whitening, focusing on three sub-factors: whitening principles, whitening methods, and factors causing discoloration. Higher scores indicated greater knowledge about teeth whitening. The questions were adapted from the items used by An [12], and the reliability analysis yielded a Cronbach's alpha value of 0.85.

### 2.3 Teeth status satisfaction

This section included 2 questions, modified and supplemented [13] from the items developed by Kang [14], to assess satisfaction with teeth condition and teeth color. Participants rated their satisfaction on a 5-point scale, with higher scores indicating greater satisfaction. The reliability analysis yielded a Cronbach's alpha value of 0.60.

### 2.4 Aesthetic criteria

This section used the "Broad Conceptualization of Beauty Scale" (BCBS) developed by Tylka and Iannantuono [15] and translated by An [13]. It consisted of 9 items assessing subjective beauty, physical beauty, and psychological beauty. Participants rated their standards of beauty on a 5-point scale, with higher scores indicating higher beauty standards. The reliability analysis yielded a Cronbach's alpha value of 0.87.

### 2.5 Teeth whitening preference

This section included 3 questions adapted and supplemented from the items developed by An [13] to assess participants' thoughts on experiencing teeth whitening, willingness to participate in teeth whitening, and expected effects of teeth whitening. Participants rated their preferences on a 5-point scale, with higher scores indicating stronger preferences for teeth whitening. The reliability analysis yielded a Cronbach's alpha value of 0.70.

## 3. Statistical analysis

The collected data were analyzed using the SPSS (Statistical Package for the Social Sciences for Windows) 25.0 program. Frequency and percentage were used for categorical variables related to the subjects' general characteristics, while mean and standard deviation were used for continuous variables. T-tests, ANOVA, and post-hoc analysis were conducted to test differences between variables based on general characteristics. Regression analysis was performed to identify variables that influence preference for teeth whitening.

## 4. Ethical Consideration

The researcher informed the subjects directly about the purpose and methodology of the study, the voluntary nature of participation, the option to withdraw at any time, and the assurance of information confidentiality. Informed consent was obtained from subjects who willingly agreed to take part in the study.

## III. Results

### 1. General characteristics

The subjects consisted of 88.0% female and 12.0% male participants. Among the participants, 54.9% belonged to health-related majors, while 45.1% were in non-health-related fields. Regarding the monthly allowance, 53.7% of college students had an allowance between 'over 300,000 won and less than 700,000 won,' 41.7% had an allowance 'less than 300,000 won,' and 4.6% had an allowance 'over 700,000 won.' When asked about their experience with cosmetic procedures, 74.3% answered 'No,' and 25.7% answered 'Yes.' Smoking was reported by 2.9% of the participants, and 97.1% answered 'No.' (Table 1).

Table 1. General characteristics (N=175)

Characteristics	Division	N(%)
Gender	Male	21(12.0)
	Female	154(88.0)
School Year	Freshmen	75(42.9)
	Sophomore	69(39.4)
	Junior	31(17.7)
Major	Health-Related	96(54.9)
	Non-Health-Related	79(45.1)
Monthly Allowance (won)	>300,000	73(41.7)
	≤300,000 ~ <700,000	94(53.7)
	≥700,000	8(4.6)
Smoking	Yes	5(2.9)
	No	170(97.1)
Experience with Cosmetic Procedures	Yes	45(25.7)
	No	130(74.3)

## 2. Knowledge, Satisfaction, Aesthetic Criteria, and Preference for Teeth Whitening

On average, the research subjects scored 2.90 out of 5 points for teeth whitening knowledge, 2.97 out of 5 points for satisfaction, 3.59 out of 5 points for aesthetic criteria, and 3.28 out of 5 points for preference (Table 2).

Table 2. Knowledge, Satisfaction, Aesthetic Criteria, and Preference for Teeth Whitening

Variables	Mean±SD
Knowledge	2.90±0.60
Satisfaction	2.97±0.79
Aesthetic Criteria	3.59±0.52
Preference	3.28±0.74

## 3. Teeth Whitening Knowledge, Satisfaction, Aesthetic Criteria, and Preference According to General Characteristics

Regarding teeth whitening knowledge according to general characteristics, statistical significance was found based on gender and major. Females had a higher knowledge score (3.09) compared to males (2.39) with statistical significance ( $p < 0.000$ ).

Health-related majors (3.03) had higher knowledge scores than non-health-related majors (2.62) with statistical significance ( $p = 0.01$ ). However, there were no significant differences in school-year, monthly allowance, smoking, and experience with cosmetic procedures.

Regarding teeth whitening satisfaction according to general characteristics, statistical significance was found based on gender, major, and experience of cosmetic procedures ( $p < 0.05$ ). The participants in male, non-health-related majors, and without cosmetic procedures experience showed higher satisfaction scores.

Regarding aesthetic criteria, statistical significance was found based on monthly allowance and cosmetic procedures experience. The students with a monthly allowance of  $\geq 700,000$  won and cosmetic procedures experience showed higher satisfaction scores ( $p < 0.05$ ).

Table 3. Teeth Whitening Knowledge, Tooth Status Satisfaction, Aesthetic Criteria, and Preference According to General Characteristics

Characteristics	Subcategories	Knowledge		Satisfaction		Aesthetic Criteria		Preference	
		M±SD	p	M±SD	p	M±SD	p	M±SD	p
Gender	Male	2.39±0.46	0.001**	3.23±0.67	0.038*	3.65±0.57	0.578	3.17±0.60	0.451
	Female	3.09±0.60		2.79±0.41		3.58±0.51		3.30±0.76	
School Year	Freshmen	2.88±0.50	0.124	2.96±0.82	0.473	3.61±0.43	0.550	3.41±0.73	0.440
	Sophomore	3.06±0.66		2.92±0.78		3.61±0.63		3.28±0.75	
	Junior	2.79±0.46		3.12±0.75		3.50±0.41		3.21±0.72	
Majors	Health-Related	3.03±0.51	0.013*	2.82±0.76	0.040*	3.59±0.48	0.905	3.35±0.71	0.182
	Non-Health-Related	2.62±0.61		3.21±0.53		3.59±0.56		3.20±0.77	
Monthly Allowance (won)	>300,000	2.97±0.60	0.828	2.88±0.90	0.642	3.43±0.54	0.044*	3.34±0.82	0.354
	≤300,000 ~ <700,000	2.93±0.60		3.04±0.72		3.56±0.50		3.22±0.70	
	≥700,000	3.04±0.80		3.00±0.46		3.88±0.41		3.54±0.53	
Smoking	Yes	2.89±0.36	0.515	2.97±0.68	0.808	3.59±0.36	0.799	3.28±0.89	0.971
	No	2.98±0.90		2.99±0.92		3.58±0.90		3.29±0.70	
Cosmetic Procedures	Yes	2.89±0.86	0.744	2.69±0.36	0.003**	3.89±0.36	0.049*	3.59±0.43	0.051
	No	2.91±0.95		3.28±0.60		3.57±0.59		3.28±0.81	

\*: $p < 0.05$ , \*\*: $p < 0.01$

Regarding teeth whitening preference, there were no significant differences in gender, school-year, major, monthly allowance, smoking, and experience of cosmetic procedures (Table 3).

#### 4. Factors Affecting Teeth Whitening Preference

A regression analysis was conducted to identify the factors that influence teeth whitening preference. The analysis indicated that beauty standards significantly affected teeth whitening preference ( $p = 0.001$ ), and the model's explanatory power was 15% (Table 4).

Table 4. Factors Affecting Teeth Whitening Preference

Characteristics	B	SE	$\beta$	$p$
constant	2.155	.481		.000
Knowledge	.007	.101	.005	.942
Satisfaction	-.061	.070	-.065	.383
Aesthetic Criteria	.362	.107	.252	.001
$R^2=.166$ Adj. $R^2=.150$ $p=.001$				

SE: standard error

## IV. Discussion

As life becomes more abundant, the demand for aesthetic treatments has increased, and various aesthetic therapies are gaining popularity [16]. Specifically, teeth play a significant role in a person's appearance, being one of the most noticeable features during conversations and smiles. Their shape and color can greatly influence the impression they make. Dental discoloration, among the esthetic aspects of teeth, is not only a personal concern but also impacts a person's social activities [17]. Recently, tooth whitening has garnered growing interest and demand among consumers as one of the popular aesthetic treatments offered in dentistry [18]. This study aims to explore the factors influencing the demand for tooth whitening among university students in their 20s, who show a high interest in tooth whitening.

Appearance plays a crucial role in shaping a person's image in interpersonal relationships and social life, making personal appearance manage-

ment essential for modern individuals [16]. A charming and beautiful appearance serves as a means of expressing one's individuality and plays a significant role in establishing social relationships, making it an important factor in social life [19]. The standards of beauty vary based on social and cultural contexts. Individuals internalize these standards, known as sociocultural attitudes towards appearance, and use them to evaluate their bodies [20]. As a result, there is a growing trend of people engaging in various appearance management behaviors to meet these socially and culturally demanded standards of beauty. In recent times, individuals actively invest time, effort, and resources in appearance management to achieve a healthy and attractive body image, which contributes to personal happiness and social success [21-22].

As the overall quality of life improves due to advancements in living standards, rapid developments in various media, and advances in medicine, the concept of beauty has become more diverse [23]. Previous studies on beauty-related factors have shown that as aesthetic values and social awareness of beauty increase, appearance recognition becomes more significant for individuals in their 20s and 30s [2]. Therefore, physical satisfaction becomes crucial as an external indicator of self-representation. College students engage in attractive and beautiful body management behaviors and actively participate in appearance-related consumer behavior to enhance their physical satisfaction [3].

Tooth whitening comes in three types: professional whitening, at-home whitening, and over-the-counter (OTC) whitening. Professional whitening, carried out by dentists in dental clinics, uses a high-concentration whitening agent with 25-35% hydrogen peroxide. At-home whitening involves using a whitening agent with 10-15% hydrogen peroxide for 4-6 weeks at home [24]. OTC whitening products have become more accessible to consumers through online shopping malls and

other outlets [25].

The study assessed the level of knowledge about tooth whitening using a 5-point scale and found statistically significant differences based on gender and major ( $p < 0.05$ ). Females showed higher knowledge levels than males, consistent with previous studies [26-27]. Students in health-related fields also exhibited a higher knowledge level, possibly due to perceiving tooth whitening as more aesthetic than related to oral health management.

Regarding tooth satisfaction, the study found statistically significant differences based on gender, major, and experience with cosmetic surgery ( $p < 0.05$ ). Males reported higher tooth satisfaction compared to females, which could be attributed to the strong aesthetic desires of female students leading to dissatisfaction. Non-health-related major students expressed higher satisfaction than health-related major students, possibly due to higher expectations for tooth condition among health-related majors who generally have better oral health management levels [18, 28-29]. Participants without cosmetic surgery experience also showed higher satisfaction. This aligns with previous findings that women with higher interest in appearance tend to be less satisfied with their own appearance and are more likely to engage in appearance management behaviors, which may include considering cosmetic surgery [30-34].

The study adapted and validated the Broad Conceptualization of Beauty Scale (BCBS) by Tylka and Iannantuono [15] to assess university students' internal beauty standards. Investigating the preference for tooth whitening based on general characteristics of the subjects, the study found statistically significant differences based on gender and cosmetic surgery experience. Females had a higher preference for tooth whitening, likely due to their lower satisfaction with tooth condition, leading them to seek satisfaction through aesthetic enhancements. Participants with cosmetic surgery experience also showed a higher preference for tooth whitening.

Analyzing the factors influencing the demand for tooth whitening, the study revealed that beauty standards significantly influenced the preference for tooth whitening. For each one-point increase in beauty standards, the preference for tooth whitening increased by 0.362 ( $p = 0.001$ ). Previous research on body image among college students supported the finding that beauty standards have a significant impact on appearance management behaviors, including tooth whitening [30-31, 33-35]. Therefore, with higher beauty standards among current college students, the preference for tooth whitening, as one aspect of appearance management behavior, is expected to increase. Thus, preparation for the potential growth in the tooth whitening market is essential.

According to one study [36], participants who underwent tooth whitening under professional supervision in a hospital setting expressed higher satisfaction. This suggests that professional whitening conducted by dentists in clinical settings, where they directly explain the procedure and precautions to patients, contributes to higher satisfaction rates. Therefore, efforts are needed to ensure the correct dissemination of knowledge about tooth whitening.

The study's limitation is its focus on students from a single university, which may limit the generalization of the findings to all college students. However, it still holds significance as it investigated the impact on the preference for tooth whitening. In future research, it would be beneficial to study individuals who have actually undergone tooth whitening, based on different whitening methods, to assess the effectiveness and satisfaction levels of tooth whitening.

## V. Conclusionson

This study revealed that aesthetic criteria significantly influenced the preference for teeth whitening. As aesthetic criteria increased among

current college students, the preference for teeth whitening increased. Thus, preparation for the potential growth in the teeth whitening market is essential.

## ACKNOWLEDGEMENT

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