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Understanding and Perception of Smiles in Relation to Esthetic Dentistry

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Abstract
Background: The smile is a vital aspect of human communication and has a significant impact on dental aesthetics and personal confidence. Esthetic dentistry, including smile design and analysis, plays a critical role in enhancing smile appearance. However, research on the perception of smiles, particularly among dental professionals, remains limited. This study aims to investigate the knowledge, attitudes, and self-perception of smiles among dental students, interns, general dentists, and specialists, while also exploring factors that influence smile evaluation.
Methods: A study was conducted with 275 participants, including dental students, interns, general dentists, and dental specialists, who were selected through random sampling at a dental clinic. Participants completed an electronic questionnaire designed to assess their demographic characteristics, knowledge of esthetic dentistry, attitudes toward smile perception, and experience with esthetic dental treatments. Statistical analysis was performed using IBM SPSS Statistics, and responses were categorized by demographic factors, academic year, and professional experience.
Results: The study revealed significant correlations between academic year and knowledge of esthetic dentistry topics, with more advanced students demonstrating greater knowledge. Gender and age influenced self-perception, with females and older participants rating their smiles more positively. Notable trends also emerged regarding factors influencing smile evaluation, including gender, age, and social status. Additionally, approximately half of the participants reported undergoing esthetic dental treatments, but no significant correlations were found between demographic variables and treatment history.
Conclusion: The study provides valuable insights into dental professionals' perceptions of esthetic dentistry and self-assessment of smile aesthetics. As students progress in their studies, their understanding of smile-related topics increases. Gender and age play critical roles in how individuals perceive their own smiles and evaluate others'. These findings highlight the importance of tailoring smile design and treatment approaches to the unique perspectives of patients. Further research with larger and more diverse samples is needed to generalize the findings.

Introduction

The smile, a universal symbol of warmth and connection, plays a crucial role in human communication. As a result, modern society increasingly emphasizes dental aesthetics, recognizing its contribution to enhancing facial beauty (1). The positive psychological impact associated with an appealing smile often drives individuals to pursue esthetic

dental treatments (2). This desire for cosmetic changes is typically self-perceived, influencing personal confidence and overall quality of life (3).

Beauty and attractiveness are inherently subjective, and one's perception of these qualities is shaped by various factors such as gender, age, ethnicity, socioeconomic background, marital status, educational level, profession, family influences, cultural exposure, and social media (4-6). In the realm of dentistry, a smile is a multifaceted expression influenced by dental structure, facial musculature, and emotions (7). The aesthetic appeal of a smile is determined by numerous elements that collectively influence how it is perceived, guiding dental interventions (8). Thus, dental students must develop a thorough understanding of smile aesthetics to become skilled practitioners capable of recognizing the different treatment options available and their appropriate uses (1). Additionally, it is essential for dental students to understand the differences in smile perception between dental professionals and the general public, enabling them to better assess patient needs and tailor treatments accordingly.

In esthetic dentistry, smile design and analysis have traditionally been based on rigid scientific principles with set measurements for aspects like shape, color, and position of smile components. However, smile perception is a dynamic concept, shaped by various influences over time. The rise of social media, for example, has significantly impacted the idealization of smiles, shaping how individuals perceive their own and others' smiles (9). While traditional smile analysis has focused on achieving an idealized, esthetically pleasing smile, it is important to recognize that beauty encompasses a spectrum of aesthetic values, with numerous factors influencing smile design. In this context, understanding the elements that affect how individuals perceive their own smiles, as well as how they evaluate the smiles of others, becomes crucial.

Limited research has been conducted on dental students' self-perception of their smiles (5,10-13). Moreover, no studies have compared smile self-perception between dental students and professionals.

Materials and Methods

This study was approved by the Research Ethics Committee at the Faculty of Dentistry.Participants were randomly selected from staff and students present at the dental clinic to ensure a diverse representation. Inclusion criteria included individuals enrolled as dental students, interns, or practicing dentists, either as general practitioners or specialists. There were no specific exclusion criteria for this study.

An electronic questionnaire was designed, consisting of four main sections.

Demographics

This section included questions regarding participants' gender, age range, social status, income, academic year, and specialty (if applicable).

Knowledge of Esthetic Dentistry

This section was completed by students and interns and was divided into two parts.

Part (a)

Part (a) contained three closed-ended questions with yes/no responses:

1. Questions related to topics covered in undergraduate education, such as anterior composite restorations, smile analysis, smile design, natural layering technique, direct and indirect veneers, teeth bleaching, and various enamel treatments.
2. Terms frequently used to describe a smile during undergraduate studies, including categories like normal/abnormal, pleasant/unpleasant, beautiful/ugly, ideal/imperfect, and others.
3. Esthetic dentistry terms covered during undergraduate education, such as golden proportion, midline shift, gingival display, smile arc, and incisal angulation.

Part (b)

Part (b) included eight questions addressing various factors in smile assessment, knowledge of smile analysis and design, gender influence on smile perception, and the relationship between beauty and naturalness in smile aesthetics. A five-point Likert scale was used for responses.

Attitude toward Smile Perception

This section was completed by all participants and consisted of two parts.

Part (a)

This part had two closed-ended questions answered with yes/no:

1. Factors influencing one's own smile rating, including personal opinions, family and peers' opinions, media (social, televised, printed), and the influence of celebrities.
2. Factors used in evaluating others' smiles, such as teeth color, shape, alignment, cleanliness, and gingival characteristics.

Part (b)

Part (b) comprised five statements on topics such as rating one's smile as natural or beautiful, interest in dental care, self-confidence related to teeth appearance, and the desire for a natural, beautiful smile. Responses were measured on a five-point Likert scale.

Two sets of data were used to quantify responses:

1. The first data set applied a scoring system for the closed-ended knowledge and attitude questions (part (a) for each question, Q1-5). The score for each participant was computed by summing the "yes" responses and dividing by the total number of answers for each question, resulting in a score between 0 and 1. A higher score indicated exposure to more topics, terms, or factors in smile rating.
2. The second data set included responses from the five-point Likert scale used in parts (b) of the knowledge and attitude sections, as well as the section on previous esthetic dental treatments and cost.

Participants were categorized into four groups: dental students, dental interns, general dentists, and dental specialists. The dental students were further divided into preclinical (3rd year) and clinical (4th, 5th, and 6th years) groups, with dental interns forming a separate subdivision. Statistical analyses involved descriptive statistics, presented as frequencies/percentages, and bivariate analysis (point-biserial correlation) to explore correlations between responses and potential paired analyses:

a) Responses from dental students to knowledge questions (using the first data set) correlated with gender, social status, and academic year.

b) Responses to attitude questions (using the first data set) correlated with gender, social status, age, income, and study group.

c) Interrelationships among the scores for students and interns

d) Interrelationships between attitude scores for all participants. The Chi-square test was applied to examine differences between study groups, income, and responses to previous esthetic dental treatments and cost (using the second data set).

Results

This study involved 275 participants, and the descriptive statistics are summarized in Table 1. In part (a) of the esthetic dentistry knowledge section, the majority of responses to Q1 showed a clear relationship with academic year ($p < 0.05$), indicating that students were exposed to a broader range of esthetic dentistry topics and smile-related terms as they progressed to higher academic levels. For Q2, a significant interaction was observed, with students in advanced years using terms like "beautiful" and "ugly" more frequently to describe smiles ($P < 0.05$). Regarding Q3, a negative correlation with social status was found ($p < 0.05$), with married students demonstrating a stronger association with terms such as "gummy smile", "buccal corridor", "smile line", "spacing", "teeth shade", and "teeth morphology" compared to single students. In part (b), notable direct correlations were found with academic year ($p < 0.05$).

All study participants completed the attitude section of the survey. For Q4, several significant interactions were observed with gender and age ($P < 0.05$), suggesting that females' self-perception of their smiles was influenced by more factors, and older participants tended to rate their own smiles more kindly. For Q5, the responses were primarily influenced by age ($P < 0.05$), showing that as participants aged, they considered more factors when rating others' smiles. Gender was also a significant factor in the Likert-scale responses, with correlations observed between gender, age, study group, and income ($P < 0.05$). A higher percentage of females and married participants agreed with the statement "I find my smile natural," while regarding the belief that their smile was beautiful, there were no significant gender differences. However, more females believed their smile affected their confidence, while more males felt embarrassed by their smiles.

Three scores were generated based on the main knowledge questions (Q1-3) and two scores based on the main attitude questions (Q4 & 5). Analysis of the relationships between these five scores revealed some significant patterns. There was a positive correlation between the first knowledge question (Q1) and the second and third knowledge questions, as well as the second attitude question (Q2, Q3, Q5) ($P < 0.01$). Additionally, both the third knowledge question and the first attitude question (Q3, Q4) showed positive correlations with the second knowledge question (Q2) and the second attitude question (Q5) ($p < 0.01$).

Concerning previous dental treatments, nearly half of the participants reported having undergone dental procedures. However, chi-square tests revealed no significant associations between the demographic variables and responses to questions in this section ($p > 0.05$).

Table 1. Descriptive statistics of the study participants.

Variable	Frequency (n)	Percent (%)
Gender		
Male	151	54.9
Female	124	45.1
Age (years)		
<24	120	43.6
25-39	105	38.2
>40	50	18.2
Social status		
Single	142	51.6
Married	122	44.4
Divorced/Widowed	11	4
Income (Saudi Riyals)		
No income	49	17.8
<5000	59	21.5
5000 – 10,999	59	21.5
11,000 – 29,999	50	18.2
>30,000	58	21.1
Study group		
Student	65	23.6
Intern	74	26.9
General Dentist	52	18.9
Specialist	84	30.5
Specialty (for specialists)		
Restorative Dentistry	13	4.7
Endodontics	11	4
Prosthodontics	10	3.6
Orthodontics	14	5.1
Periodontics	18	6.5
Oral maxillofacial MF Surgery	7	2.5
Pedodontics	5	1.8
Other specialty	6	2.2
Academic year (for students)		
Preclinical (3rd year)	12	4.4
Clinical (4th, 5th & 6th years)	53	19.3
Internship	74	26.9

Discussion

This study aimed to explore dental students' perceptions of smiles, including their own, as well as comparisons with dental interns, general practitioners, and specialists. The null hypothesis proposed that there would be no significant difference in smile perception between students and professionals. However, our findings led to the rejection of this hypothesis in several instances.

We examined three key knowledge questions (Q1-3), designed to assess dental students' understanding of various aspects of esthetic dentistry, including smile-related topics, descriptive terms, and esthetic concepts. The results revealed a clear trend: as students advanced through their academic years, they were increasingly exposed to smile-related topics and terminology. This outcome was expected, with higher-level students, such as interns, naturally having more exposure due to the progression of their educational curriculum. Notably, Q2 highlighted a significant interaction, showing that students in advanced years were more likely to use terms like "beautiful" and "ugly" when describing smiles. This finding warrants attention because it aligns with the correlation found in the Likert-scale questions, where higher-grade students seemed to adopt a more multifactorial view of smiles. Paradoxically, this contradicts the principle of a multifactorial approach, which should not rely on such polarized terms. This trend is

consistent with psychological studies that suggest a tendency to use generalized descriptors in evaluating esthetics [14,15]. Additionally, Q3 showed a stronger correlation with married students compared to their single counterparts. Terms like "gummy smiles," "buccal corridor," "smile line," "spacing," "teeth shading," and "teeth morphology" were more closely linked with married students, not because of their acceptance of these traits but because they were covered during their studies. This pattern may reflect personal experiences, such as how a married person perceives their partner's smile, potentially influencing their awareness of certain traits [16]. It is possible that married individuals were more aware of these features before encountering the specific terminology, which could lead to better retention. This is especially relevant given the frequency of these traits in clinical practice [17-19]. A key finding also revealed that more females associated smile evaluation with gender, while more males believed in an ideal smile. This could be attributed to the enhanced creativity and vivid imagery often associated with women, leading to a broader perception of what constitutes the "ideal" smile [20].

Regarding attitudes, we posed two main questions (Q4 and Q5) to understand the factors that influence self-rating and others' smile evaluations. In Q4, we found that older individuals were more lenient when rating their own smiles. However, in Q5, older individuals seemed to use more factors when evaluating others' smiles. This contrasts with previous studies, which suggested that older people are generally less critical, while other studies showed no significant age effect on smile evaluation [21-24]. The study population of dentists and dental students likely explains this difference, as they progress from students to practicing professionals over time. Regarding the Likert-scale questions about attitudes, the statement "I find my smile natural" was significantly associated with females and married individuals, as well as factors such as age, study group, and income. When asked if they believed their smile to be beautiful, there were no significant gender differences in the responses. However, more females believed their smile influenced their confidence, while more males reported feeling embarrassed by their smiles. This finding aligns with previous research, including meta-analyses, showing that females tend to smile more due to societal expectations for greater expressiveness [25,26].

Nearly half of the participants reported having received dental treatments. Despite income disparities in the broader population, our study did not find a significant correlation between income level and the extent of dental treatments or expenditure on dental care. This finding contradicts previous literature, which has linked lower income with poorer oral health and financial barriers to dental care [27-30]. The unique composition of our sample, consisting primarily of individuals with professional backgrounds in dentistry, likely contributed to an increased awareness of dental health and available treatments. Future research should explore the impact of income on a more diverse sample to further investigate this hypothesis.

Conclusions

This study, involving 275 participants, revealed key trends in dental students' perceptions of smiles and their attitudes toward esthetic dentistry. As students advanced academically, their exposure to smile-related topics increased. However, some paradoxical trends, such as the use of polarized terms, emerged. Gender and age differences in attitudes were observed, with older individuals being more lenient in self-rating and more critical in evaluating others' smiles. These insights improve our understanding of smile perception among dental professionals. However, the generalizability of the findings is limited due to the use of a convenience sample drawn from a single dental institution.

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