Self-perceived Orthodontic Treatment Needs and Self-perceptions on Dental Aesthetic in Early Adolescence

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Abstract

The aims of this study were to evaluate self-perceived orthodontic treatment needs on the aesthetics of tooth alignment, self-perceptions to the appearance of teeth, and the association of both. Five hundred eighty-eight schoolchildren aged 12 to 14 years were selected to answer the questionnaires, which consisted of forms relating to self-perceived orthodontic treatment need using the Aesthetic component of the Index of orthodontic treatment need (IOTN-AC), and perceptions on dental aesthetic using an Oral Aesthetic Subjective Impact Scale (OASIS). The final score of OASIS added IOTN-AC (OASIS_AC) was interpreted into self-perception. The mean IOTN-AC grade was 2.33 (SD = 1.28). Most participants (n = 564, 95.9 percent) had low IOTN-AC grade reflecting no or slight orthodontic treatment need. The mean OASIS score of all students was 12.67 (SD = 5.42). In three hundred thirty-eight of the students (57.5 percent) had high OASIS score reflecting moderate or high demand in orthodontic treatment. The correlation test between IOTN-AC and OASIS score was slightly (r = 0.344). The majority (n = 291, 49.5 percent) of participants had low OASIS_AC score reflecting positive self-perception towards the appearance of their teeth. Gender had influence (P<0.001) only in the IOTN-AC grade. In conclusion, dissatisfaction with dental appearance has found to be associated with the desire for orthodontic treatment, and participants with negative self-perceptions have found to be more likely to undergo orthodontic treatment. However, most participants still concerned about the appearance of their teeth (high OASIS score) even though they thought that no treatment was needed (low IOTN-AC grade), leading to unnecessary orthodontic treatment.

Keywords: Self-perceived Orthodontic Treatment Needs/ Self-perceptions/ Oral Aesthetic Subjective Impact Scale (OASIS)/ Index of Orthodontic Treatment Need (IOTN)/ Orthodontics

Introduction

The main goal of orthodontic treatment is to correct dental occlusion, which could improve the function, and an aesthetically pleasing dentition in harmony with the facial appearance.[1] Furthermore, dental attitudes of patients have altered over time. Over the past few decades, the number of patients seeking orthodontic treatment has increased considerably together with socioeconomic status, and progressive changing opinions on facial appearance.[2,3] Therefore, traditional methods for evaluating orthodontic treatment need using only clinical measurements are inadequate and should be integrated with the psychosocial evaluation of patients' perceptions. Many studies have also reported that enhancing the facial appearance and psychosocial status of patients have led to their decision to

begin orthodontic therapy.[4-7] There are a few indices to evaluate the self-perception of individuals concerning their need for orthodontic treatment. These include the Index of Orthodontic Treatment Need (IOTN),[8] the Oral Aesthetic Subjective Impact Scale (OASIS),[6,9] the Dental Aesthetic Index (DAI),[9,10] the Occlusal Index (OI), and the Index of Complexity Outcome and Need (ICON).[11,12]

It appears that most of the teenagers seeking orthodontic treatment in Asia are not for aesthetic reasons but for fashion and peer pressure, even though it is unnecessary to receive the treatment.[13] There are few studies in Thailand, reporting orthodontic treatment need.[14-16] Therefore, the present study was intended to evaluate the self-perceived orthodontic treatment needs of a cohort of 588 teenagers. For

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this purpose, we used the Index of Orthodontic Treatment Need (IOTN) and the Oral Aesthetic Subjective Impact Scale (OASIS) questionnaire surveys.

The aims of this study, therefore, were to evaluate 1) self-perceived orthodontic treatment needs on the aesthetics of tooth alignment (IOTN), 2) self-perceptions of the appearance of teeth (OASIS), and 3) to analyze the correlation between self-perceived orthodontic treatment need and self-perceptions of the appearance of teeth.

Materials and methods

Subject recruitment This cross-sectional study was conducted in two government secondary schools from Khlong Luang District, Pathumthani, Thailand. The purposive sampling technique was used for the reason that these students have a similar socio-economic status and these schools have a similar level of educational standard. The sample size was calculated using an estimated single proportion formula. This study considered 46.7 percent prevalence of demand for orthodontic treatment from the previous study,[16] 95 percent confidence interval, and 5 percent precision error. The minimal sample size was 382 participants. To compensate for the possible loss of participants during the study, so that in this study used 588 students.

Five hundred eighty-eight schoolchildren (Two hundred forty-eight males and three hundred forty females; aged 12 to 14 years) were randomly recruited by a simple sampling technique. The inclusion criteria of this study were the schoolchildren who have the full eruption of all permanent teeth except the third molar, no missing teeth, and no history of extractions. Children who had previous orthodontic treatment were excluded. This study was approved by the Ethics Committee of Thammasat University. Assent forms and guardian consent forms were obtained from all subjects (No.952556).

The questionnaires were answered individually by children to assess demographic data, self-perceived orthodontic treatment need using the Aesthetic component of Index of orthodontic treatment need (IOTN-AC) and to assess perceptions on dental aesthetic using an Oral Aesthetic Subjective Impact Scale (OASIS).[17,18]

Self-perceived orthodontic treatment needs on the aesthetics of tooth alignment using IOTN-AC Self-perceived orthodontic treatment needs on the aesthetics of tooth alignment were evaluated from IOTN-AC comprising ten photographs (Figure 1) (Modified from the study of Brook PH and Shaw WC),[8] the first photograph (grade 1) is the most aesthetics, and the tenth photograph (grade 10) is the least aesthetic. The face to face interview was performed in the study. Students were asked to choose one from ten photographs which most matched the attractiveness of their dental appearance for IOTN-AC estimation. Grade 1 to 4, 5 to 7, and 8 to 10 indicate no/ slight need, moderate/ borderline need, and the definite need for orthodontic treatment respectively. The information on orthodontic treatment needs when considering the aesthetics of tooth alignment is really from students, not from the inspector's guidance.
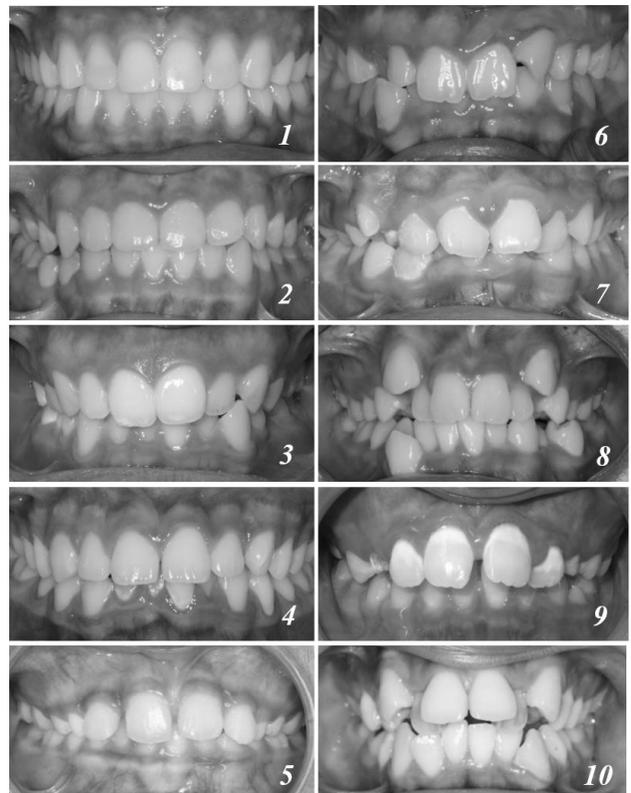

Figure 1   IOTN-AC distributed by level the Aesthetic Component (AC) of the IOTN (Modified from the study of Brook PH and Shaw WC)[8]

Self-perceptions to the appearance of teeth using OASIS With regard to the OASIS questionnaire, students were inquired to answer five questions on a 7-point Likert scale about their perception to their appearance of teeth or oral aesthetics. The score ranged from 5 to 35 (Figure 2) (modified from the study of Mandall N and co-workers), which score 5 to 10 and 11 to 35 indicate no/ low and moderate/ high demand respectively.[9,11,19]

The test-retest reliability coefficient of IOTN-AC and OASIS for thirty schoolchildren over a two-week interval were $r = 0.995$ and $r = 0.964$, respectively. The results showed excellent reliability.

Self-perception of dental aesthetics was estimated using the OASIS. The final OASIS score is acquired through the sum of the answers on the OASIS questionnaire, together with the value of the IOTN-AC score of selecting 1 from 10 color-photographs (grade 1 to 10) so as to achieve a single score which varied from score 6 to 45. The OASIS_AC score <14, =14, and >14 indicate positive, borderline, and negative self-perceptions, respectively.[2,20]

1. How do you feel about the appearance of your teeth?

Not concerned | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Very concerned

2. Have you found that other people have commented on the appearance of your teeth?

Not at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | All the time

3. Have you found that other people have teased you about the appearance of your teeth?

Not at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | All the time

4. Do you try to avoid smiling because of the appearance of your teeth?

Not at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | All the time

5. Do you ever cover your mouth because of the appearance of your teeth?

Not at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | All the time

Figure 2 OASIS distributed by level (Modified from the study of Mandall N and co-workers)[9]

Statistical analysis The data were evaluated using the Statistical Package for Social Science version 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA). The Kolmogorov-Smirnov test was used to define the distribution of data. The differences in IOTN-AC and OASIS scores between males and females were determined by the Mann-Whitney U-test with statistically significant at $P<0.05$. Spearman correlation coefficient was used to analyze the association between IOTN-AC and OASIS scores with statistically significant at $P<0.01$. Chi-square statistic was used to analyze the differentiation of perception between males and females with statistically significant at $P<0.05$.

Results

Self-perceived orthodontic treatment needs on the aesthetics of tooth alignment (evaluated by IOTN-AC) The Kolmogorov-Smirnov test demonstrated that the sample distribution wasn't normal for any scale. Therefore non-parametric statistical tests were used.

Five hundred sixty-four schoolchildren (95.9 percent) perceived their anterior tooth alignment to be satisfactory that show no or slight orthodontic treatment need (IOTN-AC score 1 to 4). Some of those (n = 15, 2.6 percent) had moderate or borderline orthodontic treatment needs and the group of the definite need for orthodontic treatment was only 1.5 percent (n = 9). Table 1 showed the distribution of IOTN-AC scores according to gender. The mean IOTN-AC score of all students was 2.33 (SD = 1.28) (2.11 ± 1.17 in males and 2.49 ± 1.33 in females). There was a statistically significant difference in IOTN-AC score between males and females and between groups of no/ slight need, moderate/ borderline need, and the definite need ($P< 0.001$).

Table 1 Self-perceived orthodontic treatment need according to gender measured using the Aesthetic component of the Index of orthodontic treatment need (IOTN-AC)

IOTN-AC	Sex		Total
	Male, n (%)	Female, n (%)	
No / Slight need (Grade 1-4)	241 (97.2%)	323 (95.0%)	564 (95.9%)
Moderate/ Borderline need (Grade 5-7)	3 (1.2%)	12 (3.5%)	15 (2.6%)
Definite need (Grade 8-10)	4 (1.6%)	5 (1.5%)	9 (1.5%)
Total	248 (100%)	340 (100%)	588 (100%)

Self-perception score to the appearance of teeth (evaluated by OASIS) In three hundred thirty-eight (57.5 percent) of participants had moderate or high demand and two hundred fifty (42.5 percent) of students had no or low demand for orthodontic treatment. Table 2 showed the distribution of OASIS scores according to gender. The mean OASIS score of all students was 12.67 (SD = 5.42) (12.37 ± 5.21 in males and 12.89 ± 5.56 in females). There was a statistically significant difference in the OASIS score between groups of no/ low and moderate/ high demand (P<0.001). However, there was no statistically significant difference in the OASIS score between males and females (P = 0.349).

Table 2 Self-perception of the dental aesthetic score to the appearance of teeth according to gender measured using the Oral Aesthetic Subjective Impact Scale (OASIS)

OASIS	Sex		Total
	Male, n (%)	Female, n(%)	
No/ Low demand (Score 5-10)	108 (43.5%)	142 (42.0%)	250 (42.5%)
Moderate/ High demand (Score 11-35)	140 (56.5%)	198 (58.0%)	338 (57.5%)
Total	248 (100%)	340 (100%)	588 (100%)

Association between self-perceived orthodontic treatment need and self-perceptions to the appearance of teeth There was a significant correlation between IOTN-AC and OASIS scores (r = 0.344, P<0.001). Three hundred sixteen students (53.7 percent) have no or slight need for orthodontic treatment (IOTN-AC score 1 to 4) but they were in the group of moderate or high demand (OASIS score 11 to 35), as shown in Figure 3.
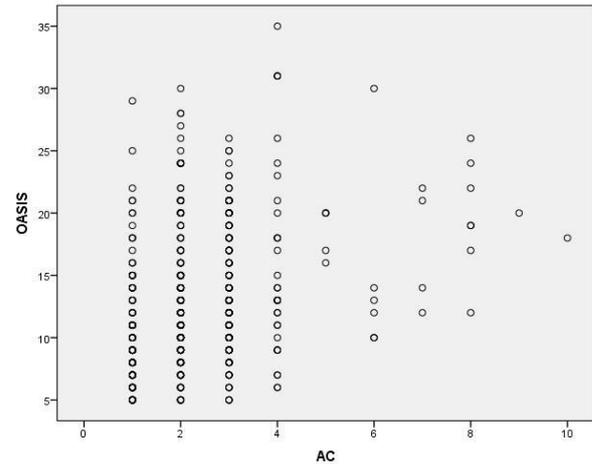

Figure 3 Correlation between OASIS and IOTN-AC

Regarding OASIS_AC scores, most students (n = 291, 49.5 percent) had positive self-perception towards the appearance of their teeth; followed by negative (n = 267, 45.4 percent) and borderline (n = 30, 5.1 percent) self-perception, respectively. Table 3 detailed the distribution of self-perception as perceived by students according to gender. There was a statistically significant difference in OASIS_AC scores between groups of positive, borderline, and negative self-perceptions (P< 0.001), but no significant difference was found according to gender (P = 0.533).

Table 3 Self-perception on dental aesthetic according to gender measured using OASIS_AC

OASIS_AC	Sex		Total
	Male, n (%)	Female, n(%)	
Positive (Score < 14)	127 (51.2%)	164 (48.2%)	291 (49.5%)
Borderline (Score = 14)	10 (4.0%)	20 (5.9%)	30 (5.1%)
Negative (Score > 14)	111 (44.8%)	156 (45.9%)	267 (45.4%)
Total	248 (100%)	340 (100%)	588 (100%)

Discussion

The important reason that influences patients to seek orthodontic treatment is psychological, which is to improve dental appearance and to achieve improved aesthetics.[6] The demand for orthodontic treatment in Thailand has increased[13] but not all patients have the true need for orthodontic treatment.[15] The orthodontic indices are mostly considered from the clinician's perspective. Orthodontic treatment need was not only influenced by objective occlusal characteristics, but also by the subjective perception of their aesthetics. So, the present study was designed to evaluate self-perceived orthodontic treatment need and self-perception on dental aesthetic.

The reason for selecting 12- to 14-year-old children was two issues. First, this span of age represents early adolescence, consequently that malocclusion in permanent teeth could be evaluated, but most children have not yet begun the orthodontic treatment. Second, the responders have appropriately mature to be able to define their own attitude and opinion.[17,18]

Orthodontic treatment need can be considered by treatment need indices such as AC and DHC of IOTN, OI, DAI, and ICON. The previous studies reported the validity of using the AC component of the IOTN in expressing dental attractiveness,[21,22] Therefore, IOTN-AC was used to evaluate self–perceived orthodontic treatment need in this study. However, IOTN-AC has some disadvantages because it is a relatively high subjective tool and does not reflect the true tooth conditions in the respondents. So that, it can create bias during the questionnaire.

Previous studies reported an association between IOTN-AC and OASIS scores which means increasing of IOTN-AC scores with higher OASIS scores. The children with fewer perceptual awareness inclined to be unsatisfied with their dental appearance and perceived greater orthodontic treatment need.[2,9,23] Interestingly, this study found that most children (n = 338, 57.5 percent) were dissatisfied by their dental appearance (high OASIS score), even though they had no problems with dental aesthetic (low IOTN-AC score).

Thus, IOTN-AC and OASIS scores were correlated slightly (r = 0.344). This finding has shown that some occlusal conditions related to aesthetic impairment such as crowding, missing, and malalignment of anterior teeth, were not associated with the perception of dental aesthetics. Therefore, the perceived oral aesthetic impact of malocclusion is not associated with a schoolchildren's perceived orthodontic treatment need. This point illustrates the numerous complexities in facial aesthetics perception and the perceptions in smile esthetics of layperson and dentists are different.[24,25] Thus, the patients should consult orthodontists for specified the true need for orthodontic treatment. The previous study indicated that the aesthetic factors had a strong relationship with the demand for orthodontic treatment.[15] The high OASIS score reflects great orthodontic treatment demand, so oral aesthetic impact seems important in motivating children to want orthodontic appliances. Moreover, schoolchildren probably greater exposure to people undergoing orthodontic treatment and wearing colorful braces, which lead to unnecessary orthodontic treatment.[13] The influence of high perceived aesthetic impact seems important to encourage people to meet orthodontists and get orthodontic treatment. This is principally important for the planning of dental health policies, especially knowledge in orthodontic treatment need.

These following factors may be involved in this research: The difficulty of selecting an appropriate picture from 10 colored photographs could be a factor of the IOTN-AC measuring problem. Some subjects attempted to seek the photographs most imitating their own teeth, rather than choosing the photograph that had a similar level of aesthetic appeal as their own teeth.[7] Moreover, some malocclusion such as anterior spacing, crossbite, and openbite, that could not be compared with any of the 10 photographs.

The previous studies indicated that the IOTN-AC index expresses only anterior teeth.[7,23] They concerned only the aesthetic consideration and did not compose the malposition of posterior teeth and occlusal abnormalities that

indicated the great need for orthodontic treatment. So that, the IOTN-AC index might not be valid in considering with IOTN-DHC index. The IOTN-AC grade is a precise assessment of the self-perceptions of the appearance of their anterior teeth, while the OASIS score enquires some questions about the perceptions of others and themselves, along with questions about their previous performance associated with the appearance of their teeth. Consequently, differences in the results may have occurred. Further study should be included in more areas in Thailand and considered both the subjective perception of aesthetics and the objective occlusal characteristics that lead to real treatment need. IOTN-DHC index should be used with IOTN-AC to evaluate normative orthodontic treatment need for the validity of data. However, self-perceived orthodontic treatment needs and self-perceptions on the dental aesthetic of the patients should also be taken before starting orthodontic treatment to increase satisfying results for both patients and orthodontists.

Conclusion

Most subjects were still concerned about the appearance of their teeth (high OASIS score) even though they thought that their dental appearance was good (low IOTN-AC grade). Subjects who have negative self-perception towards the appearance of their teeth are more likely to be dissatisfied with their dental appearance. Dissatisfaction with dental appearance is one of the important factors involved in the demand for orthodontic treatment.

In conclusion, dissatisfaction with dental appearance has found to be related to the desire for orthodontic treatment, and participants with negative self-perceptions have found to be more probable to undergo orthodontic treatment. However, most participants still concerned about the appearance of their teeth (high OASIS score) even though they thought that no treatment was needed (low IOTN-AC grade), leading to unnecessary orthodontic treatment.

Conflict of Interest All authors report no conflict of interest related to this study.

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บทคัดย่อ

วัตถุประสงค์ของการศึกษาเพื่อประเมินการตระหนักถึงความจำเป็นในการรักษาทางทันตกรรมจัดฟัน การตระหนักต่อลักษณะของฟันตนเอง และความสัมพันธ์ระหว่างปัจจัยทั้งสองโดยนักเรียนที่มีอายุ 12-14 ปี จำนวน 588 คน ถูกคัดเลือกให้ทำแบบสอบถามที่ประกอบด้วยการตระหนักถึงความจำเป็นในการรักษาทางทันตกรรมจัดฟันโดยใช้ดัชนีความจำเป็นในการรักษาทางทันตกรรมจัดฟันในส่วนเอสธีติกคอมโพเนนท์ (ไอโอทีเอ็น-เอซี) และการตระหนักถึงความสวยงามฟันโดยใช้ดัชนีโอเอสไอเอส ผลรวมของดัชนีโอเอสไอเอสและดัชนีไอโอทีเอ็น-เอซี (โอเอสไอเอส_เอซี) แสดงถึงทัศนคติต่อลักษณะฟันของตนเอง ผลการศึกษาพบว่าค่าเฉลี่ยของค่าดัชนีไอโอทีเอ็น-เอซีเท่ากับ 2.33 (ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 1.28) โดยนักเรียนส่วนใหญ่ (จำนวน 564 คน ร้อยละ 95.9) มีค่าดัชนีไอโอทีเอ็น-เอซีอยู่ในระดับต่ำซึ่งแสดงถึงการตระหนักถึงความจำเป็นในการรักษาทางทันตกรรมจัดฟันอยู่ในระดับไม่จำเป็นถึงจำเป็นเล็กน้อย ค่าเฉลี่ยของดัชนีโอเอสไอเอสของนักเรียนทั้งหมดมีค่าเท่ากับ 12.67 (ส่วนเบี่ยงเบนมาตรฐานเท่ากับ 5.42) นักเรียนจำนวน 338 คน (ร้อยละ 57.5) มีค่าดัชนีโอเอสไอเอสอยู่ในระดับสูง แสดงถึงว่ามีการตระหนักถึงความต้องการทางทันตกรรมจัดฟันอยู่ในระดับปานกลางถึงมาก ซึ่งดัชนีไอโอทีเอ็น-เอซีและดัชนีโอเอสไอเอสมีความสัมพันธ์กันอย่างมีนัยสำคัญทางสถิติ $(r = 0.344)$ นักเรียนส่วนใหญ่ (จำนวน 291 คน ร้อยละ 49.5) มีค่าดัชนีโอเอสไอเอส_เอซีอยู่ในระดับต่ำ แสดงถึงการมีทัศนคติในแง่บวกต่อลักษณะฟันของตนเอง ทั้งนี้ลักษณะทางเพศจะมีอิทธิพลเฉพาะค่าดัชนีไอโอทีเอ็น-เอซีเท่านั้น $(P<0.001)$ โดยสรุปพบว่า ความกังวลหรือไม่พอใจในลักษณะฟันของตนเองจะมีความสัมพันธ์กับความต้องการในการรักษาทางทันตกรรมจัดฟัน โดยนักเรียนที่มีทัศนคติในแง่ลบต่อลักษณะฟันของตนเองจะมีแนวโน้มที่มีความต้องการทางทันตกรรมจัดฟันที่มากขึ้น และถึงแม้นักเรียนจะคิดว่าฟันของตนเองมีลักษณะที่ดีอยู่แล้วและไม่มีความจำเป็นในการรักษา (ค่าดัชนีไอโอทีเอ็น-เอซีอยู่ในระดับต่ำ) แต่ก็ยังมีความกังวลต่อลักษณะฟันของตนเอง (ค่าดัชนีโอเอสไอเอสอยู่ในระดับสูง) ซึ่งนำไปสู่การรักษาทางทันตกรรมจัดฟันที่ไม่จำเป็น

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