Original Article

Effect of socioeconomic status on normative and perceived orthodontic treatment need

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ABSTRACT

Objective: To determine the influence of socioeconomic status (SES) on normative and perceived orthodontic treatment need, satisfaction with dental appearance, and regularity of dental attendance.

Materials and Methods: The sample consisted of 550 adolescents (232 boys, 318 girls) aged 13 to 17 years who were categorized according to SES into three groups: low, middle, and high SES. Normative treatment need was assessed by using the Index of Orthodontic Treatment Need. Data were collected by clinical examination and face-to-face interview. The χ^2 test and logistic regression analysis were used for statistical analyses.

Results: Approximately 34.0% of the untreated subjects had a definite dental need for treatment and 24.5% had a moderate need; among those, 53.5% were of low SES ($P = .017$). One-third of the sample had a moderate to definite esthetic need, most of whom had a low SES ($P = .009$). Of the subjects who were dissatisfied with their dental appearance and reported a self-perceived need for treatment, around one-third had a low SES. Most subjects with low SES were irregular dental attenders ($P < .001$). Subjects of low SES, those who had a self-perceived need for treatment, and those who were dissatisfied with their dental appearance were more likely to have a definite normative esthetic need.

Conclusions: Subjects of low SES exhibited greater normative and perceived treatment needs than subjects of higher SES. They were less satisfied with their dental appearance and visited a dentist less frequently. (*Angle Orthod.* 2014;84:588–593.)

KEY WORDS: Socioeconomic status; Normative treatment need; Satisfaction; Self-perceived need; Social class

INTRODUCTION

Reports in some populations indicate that socioeconomically deprived persons have unmet oral health needs and lack access to oral health services.[1,2] Furthermore, orthodontic treatment is not always covered by dental insurance plans, rendering socioeconomically deprived persons unable to receive it. In a recent survey,[3] the uptake of orthodontic treatment was reported to be significantly less in subjects from low socioeconomic backgrounds. However, whether this is because of their lower perceived or normative needs, higher satisfaction with appearance, or irregularity of dental attendance is not yet clear.

To date, the evidence regarding the effect of socioeconomic status (SES) on normative and perceived treatment need is not consistent. Some studies have found a positive association between them[4,5] whereas others have not.[6,7]

People seek orthodontic treatment mainly to improve dental appearance.[8] Self-perception of dental esthetics has been found to vary between subjects from rural and urban areas; those from rural areas, for instance, are more tolerant to the presence of a malocclusion.[9] Although a correlation between subjective and objective

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assessment of esthetics has been reported, laypeople tend to underestimate their own esthetic needs.[6,10]

It is not clear whether dissatisfaction with dental appearance is influenced by SES. Kerosuo and colleagues[11] reported that about two-thirds of subjects were satisfied with their dental esthetics and that satisfaction did not differ among the SES groups. In contrast, Devi and colleagues[12] found that subjects of low SES were less satisfied with their dental esthetics than those of high SES.

Tickle and colleagues[13] reported that children from deprived backgrounds were less likely to visit a dentist regularly, while Arora and colleagues[14] found no correlation between SES and frequency of dental visits. Children who visited the dentist regularly and whose mother attended regularly were more likely to have better dental health and be referred for orthodontic treatment.[15] Children from rural areas were less likely to receive treatment.[9,16]

However, most of these studies were conducted on children. Moreover, despite the finding that subjects from low SES were less likely to receive orthodontic treatment, the relationship between SES and the factors that may play a role in treatment demand and uptake has not been explored. Such information is needed for better planning of orthodontic services and to ensure that health care is provided equally among all social classes, especially in publicly funded clinics.

The aim of this study was to determine the influence of SES on normative and perceived orthodontic treatment need, satisfaction with dental appearance, and regularity of dental attendance.

MATERIALS AND METHODS

This cross-sectional study was part of an investigation of factors influencing treatment need and uptake.[3] Sample size calculation revealed that for a 95% power and 5% precision ($\alpha = 0.05$), the study should include at least 400 subjects.[17]

The sample comprised 550 Jordanian adolescents (232 boys, 318 girls) aged 13–17 years (mean age = 14.9 ± 0.8 years) who were randomly chosen from public and private schools located in four demographic areas of the capital city Amman, where approximately 265,000 students were registered in the eighth and ninth grades in public and private schools. A list of schools (public and private) in the Amman municipality was obtained from the Ministry of Education. Every fourth school was chosen from each list.

Ethical approval was obtained from the University of Jordan. Furthermore, each head of school was contacted to obtain approval and an appointment to examine the students. Written consent was obtained from the parents. All Jordanian students in the eighth and ninth grades who consented to participate in the study were clinically examined on the school premises by the first author. Alginate impressions were taken for those subjects who did not receive orthodontic treatment. A questionnaire was used to collect demographic data about each subject, including age, area of living, parents' education and job, and whether they had orthodontic treatment.

Socioeconomic Status

To establish a broad range of SES, both public and private schools were included in the sampling procedure. Public schools are usually frequented by subjects with a low SES because they provide free tuition, whereas private schools that require high tuition fees are frequented by subjects with higher SES.

After categorizing subjects according to the type of school they attended, SES was calculated using an index of socioeconomic classification developed specifically for the Jordanian population.[18] This was mainly based on the father's and mother's jobs, the parents' educational background, and the area of residence. Each variable was given a weight, the total of which established the socioeconomic weight. Cutoff points divided SES into three groups; low, middle, and high.

Normative Treatment Need

Normative treatment need was assessed from the study models using the Index of Orthodontic Treatment Need (IOTN).[19] Both the Dental Health Component (DHC) and the Aesthetic Component (AC) of the IOTN were recorded by the first author, who had previously been calibrated in the use of the IOTN.

Perceived Need for Treatment and Satisfaction with Appearance

For subjects who did not receive orthodontic treatment, perceived need for orthodontic treatment and satisfaction with dental appearance were recorded on a four-point Likert scale. The perceived need for treatment was determined by asking each subject whether she or he thought treatment was needed (1 = not at all; 4 = definitely). Satisfaction with dental appearance was assessed by asking the subjects if they were satisfied with how their teeth looked (1 = not at all; 4 = very satisfied).

Dental Attendance

Subjects who visited a dentist for a checkup at least once a year were considered regular dental attenders.

Table 1. Distribution of Subjects According to Socioeconomic Status

Socioeconomic Status	Girls (No.)	Boys (No.)	Total (%)
Low	95	78	173 (32.4)
Middle	125	73	198 (37.1)
High	87	76	163 (30.5)
Total	307	227	534 (100.0)

Statistical Analysis

The statistical analyses were performed using the Statistical Package of the Social Sciences 17.0 (SPSS Inc, Chicago, Ill). The χ^2 test was used to analyze differences between SES groups regarding normative and self-perceived treatment need, satisfaction with dental appearance, and pattern of dental attendance. Logistic regression analysis was used to study the predictive effects of SES, self-perceived need, satisfaction with dental appearance, gender, and pattern of dental attendance on normative esthetic treatment need.

The intraexaminer reproducibility of the DHC and the AC of the IOTN was assessed using weighted kappa. After 1 month of initial assessment, 25 study models were randomly selected and the DHC and AC were recorded. Intraexaminer kappa values for the DHC and the AC were 0.98 and 0.90, respectively, indicating good agreement.

RESULTS

Of the 550 subjects, 16 were excluded due to incomplete data. In total, 195 subjects had a present or past history of orthodontic treatment, and 339 subjects did not receive any form of orthodontic treatment. The distribution of SES within the sample is shown in Table 1.

Orthodontic Treatment Need and SES

The distribution of normative orthodontic treatment need according to SES is shown in Table 2. Normative treatment need as measured by DHC and AC was greatest among persons with low SES ($P = .017$ and $P = .009$, respectively).

A total of 198 (58.4%) of the untreated subjects were in moderate or definite need for treatment as assessed by the DHC of the IOTN. Of those, 106 subjects (53.5%) were from the low SES group. Of the 111 (32.8%) subjects who had a moderate to definite need of treatment as assessed by the AC of the IOTN, 69 (62.2%) were from the low SES group.

Satisfaction with Dental Appearance and Self-Perceived Need for Treatment

The results showed that the number of subjects who were satisfied with their dental appearance was greater than those who were dissatisfied (Table 3). Subjects of low SES were significantly more dissatisfied with their dental appearance than those of middle or high SES ($P < .001$). Of the subjects who reported being dissatisfied with their dental appearance, 67.0% were from the low SES group, 19.1% were from the middle SES group, and 13.9% from the high SES groups.

There was a significant difference in the perceived need for orthodontic treatment between the low and higher SES groups ($P = .011$). Of the total untreated subjects, 87 (25.6%) reported a self-perceived need for treatment (Table 3). Among those, 53 subjects (60.9%) came from the low SES group and 17 subjects (19.5%) each came from the middle and high SES groups.

Socioeconomic Status and Dental Attendance

There was a significant difference in the dental attendance pattern between the three SES groups (P

Table 2. Distribution of Subjects' Normative Treatment Need According to the Dental Health and Aesthetic Components of the Index of Orthodontic Treatment Need in the Three Socioeconomic Status Groups for Untreated Subjects (n = 339)

	Socioeconomic Status			
Index of Orthodontic Treatment Need	Low No. (%)	Middle No. (%)	High No. (%)	Total No. (%)
Dental Health Component grade*				
No need (grades 1 and 2)	58 (17.1)	55 (16.2)	28 (8.3)	141 (41.6)
Borderline need (grade 3)	37 (10.9)	25 (7.4)	21 (6.2)	83 (24.5)
Definite need (grades 4 and 5)	69 (20.3)	26 (7.7)	20 (5.9)	115 (33.9)
Aesthetic Component grade**				
No need (grades 1–4)	95 (28.1)	80 (23.6)	53 (15.6)	228 (67.3)
Borderline need (grades 5–7)	51 (15.0)	20 (5.9)	10 (3.0)	81 (23.9)
Definite need (grades 8–10)	18 (5.3)	6 (1.8)	6 (1.8)	30 (8.9)

* $\chi^2 = 11.992$; $P = .017$.
** $\chi^2 = 13.415$; $P = .009$.

Table 3. Satisfaction with Dental Appearance and Self-Perceived Need for Orthodontic Treatment for Each Socioeconomic Group for Untreated Subjects

	Satisfaction with Dental Appearance*		Perceived Need for Treatment**	
Socioeconomic Status	Satisfied No. (%)	Dissatisfied No. (%)	Yes No. (%)	No No. (%)
Low	87 (25.7)	77 (22.7)	53 (15.6)	111 (32.7)
Middle	84 (24.8)	22 (6.5)	17 (5.0)	89 (26.3)
High	53 (15.6)	16 (4.7)	17 (5.0)	52 (15.3)
Subtotal	224 (66.1)	115 (33.9)	87 (25.6)	252 (74.3)
Total	339 (100.0)		339 (100.0)	

* $\chi^2 = 72.532$; $P < .001$.
** $\chi^{22} = 8.992$; $P = .011$.

$< .001$). Most of the subjects with a low SES (82.7%) were irregular attenders (Table 4). Of the 261 subjects who visited a dentist at least once annually, only 30 (11.5%) were from the low SES group compared with 126 (48.3%) and 105 (40.2%) subjects from the middle and high SES groups, respectively.

Variables Affecting Normative Esthetic Need

Logistic regression analysis performed using the AC of IOTN as the dependent variable revealed that SES had a predictive independent effect on normative esthetic need; the low SES group was approximately three times more likely to have a definite normative esthetic need (Table 5). Subjects who reported a self-perceived need for treatment were four times more likely to have a definite esthetic need, and the odds increased twofold for those who were dissatisfied with their dental appearance (Table 5).

DISCUSSION

Reform of health care systems to provide government-subsidized treatment is a challenge in some countries mainly for financial reasons. To ensure equity in provision of health care among different socioeconomic strata of a society, it is important to recognize those subjects who have a great normative need for treatment.

More than one-third of the adolescents in this study had a definite need for treatment at an age when most orthodontic treatment would have been sought or completed,[20] and most of them were from a low socioeconomic background. A greater normative need for subjects of a low SES was also reported in other studies.[4,5] One possible explanation for the higher normative need in the socioeconomically deprived subjects is that their uptake of treatment is lower.[3]

Although treatment uptake was greater for persons with higher SES, it was not possible to know whether those subjects who received orthodontic treatment actually had a great normative need for it as assessed professionally, particularly given that approximately one in five subjects from each of the middle and high SES groups still had a definite dental need for treatment. It could be speculated that some of those subjects who sought treatment were not in great need of it. This explanation is supported by the findings of Kenealy and colleagues,[21] who reported that uptake of orthodontic treatment was greater in middle-class children with a low normative need than in lower-class children. However, with high normative need, they found no difference in treatment uptake between the different social classes.

When the level of satisfaction with dental appearance was investigated, the results revealed that subjects from a low socioeconomic background were significantly more dissatisfied with their dental appearance than those from middle or high socioeconomic backgrounds. Moreover, a quarter of the subjects reported a need for orthodontic treatment; among those, approximately two-thirds came from the low SES group. The higher frequency for self-perceived need reported by the low SES group and the lower satisfaction with their dental appearance are likely the result of lower uptake of treatment by this group. The lower uptake of orthodontic treatment by subjects of low SES could be attributed to financial barriers. Birkeland and colleagues[22] reported that more than three-quarters of parents who were interviewed before and after their children started treatment had the opinion that orthodontic treatment was so expensive that many could not afford it. Other authors have reported that cost was a barrier for the uptake of orthodontic treatment by subjects of low SES.[23,24] In

Table 4. Distribution of Subjects According to Dental Attendance Pattern Within the Three Socioeconomic Groups for the Total sample (n = 534)

Socioeconomic Status	Dental Attendance Pattern	
	Regular No. (%)	Irregular No. (%)
Low	30 (17.3)	143 (82.7)
Middle	126 (63.6)	72 (36.4)
High	105 (64.4)	58 (35.6)
Total	261 (48.9)	273 (51.5)

Table 5. Logistic Regression Analysis of the Effect of Independent Variables on the Aesthetic Component of the Index of Orthodontic Treatment Need

Independent Variables	B	Significance	Odds Ratio	95% Confidence Interval for Odds Ratio	
				Lower	Upper
Socioeconomic status	1.053	.013	2.865	1.244	6.599
Perceived need	1.430	.000	4.180	2.132	8.198
Dissatisfaction with dental appearance	0.756	.021	2.129	1.122	4.039
Dental Health Component of the Index of Orthodontic Treatment Need	2.369	.000	10.683	5.007	22.796
Female gender	−0.456	.126	0.634	0.354	1.137
Dental attendance	0.584	.088	1.794	0.917	3.511

contrast, the higher frequency of treatment in the middle and high SES groups was likely related to the financial ability of these subjects to undergo treatment in private clinics.[3] It could also be the result of the higher social status of parents and greater aspiration to provide orthodontic treatment for their children[23] or merely due to peer group influences,[20] as more subjects demand treatment on a social status basis regardless of their treatment need.

The increased prevalence of regular dental attendance by the higher SES groups in our study supports the findings of other studies.[15,25] The irregular dental attendance pattern in the low SES group could have lead them to miss the opportunity for adequate and timely referral to a specialist, thus reducing their chances for treatment uptake. It may have also contributed to their malocclusion as they could not have benefited from early intervention to prevent decay and early loss of teeth.[4] This in turn could have resulted in drifting of teeth and loss of space, which contributed to their greater normative need.

When normative need was assessed on esthetic grounds, however, few subjects exhibited a great need for treatment in all socioeconomic groups. Still, the normative esthetic need was greatest in the lower SES group. A limitation of this study is its cross-sectional design. It was not possible to know the percentage of affluent subjects with a definite need for treatment who had already received treatment. A longitudinal study would provide a better analysis of the effect of SES on normative and perceived treatment needs.

Nonetheless, these results confirm that socioeconomically deprived subjects have unmet self-perceived and normatively assessed needs, which is likely caused by the interaction of all of the aforementioned factors. The findings in this study reveal the disparities in orthodontic care provision for those who are socioeconomically deprived. Increasing oral health awareness through integration of oral health education programs in schools can benefit underprivileged children. Encouraging children to visit a dentist regularly may reduce the possibility that they will develop severe malocclusions by implementing preventive measures to minimize early decay and loss of teeth. It is also important to train general dentists in using indexes for orthodontic treatment need in order to recognize children with definite need for treatment and provide adequate and timely referrals to specialists.

CONCLUSIONS

- Normative treatment need (DHC and AC of the IOTN) was greater in the low SES group.
- Subjects with a low SES were less satisfied with their dental esthetics and perceived a higher need for treatment than subjects with higher SES.
- Regular dental attendance was more prevalent among the higher SES groups.
- Self-perceived need, SES, and dissatisfaction with dental appearance had a predictive effect on normative esthetic need whereas dental attendance pattern and gender did not.

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