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The factors effecting satisfaction of dental appearance and self-perceived need for orthodontic treatment in 10-11 and 14-15 year-old Lithuanian schoolchildren

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SUMMARY

Assessment of need for orthodontic treatment is complex and the opinion about it might differ between the orthodontist and children. Personal perception of the need for orthodontic treatment may be influenced by a variety of social, economical and cultural factors. The aim of this study was to investigate whether there is an association between normative and self-perceived orthodontic treatment need, and to evaluate the influence of age, gender and socioeconomic background on satisfaction of dental appearance and demand for orthodontic treatment. The study included 2024 schoolchildren: 1193 (657 girls and 536 boys) 10-11 year-old and 831 (450 girls, 381 boys) 14-15 year-old. The objective need for orthodontic treatment was found to be 42.6 percent while self-perceived need 35.3 percent among Lithuanian schoolchildren. Girls thought that they needed treatment more frequently than boys independent of age and living area.

Keywords: orthodontic treatment need, self-perceived need.

INTRODUCTION

Treatment of malocclusion places a considerable burden on health care resources, particularly when funded by public means. To define criteria assessing cut-of points for those needing and not needing orthodontic treatment is always problematic. Orthodontics is a specialty that relies heavily on patient cooperation for a successful end result [1]. It is important that treatment is delivered to meet patient's perceived needs and expectations, wherever possible. Therefore, presence of objective need for orthodontic treatment cannot be a single decisive factor providing orthodontic treatment. The effective management of the public health care system requires assessing not only a need, but also a demand in orthodontic treatment [2]. Children's feelings concerning their dental appearance or function should be central to assess a need of orthodontic treatment. Personal perception of the need for orthodontic treatment may be influenced by variety of social, economical and cultural factors [3]. However, traditional methods of estimating orthodontic treatment need are mainly based on normative need assessed by professionals using occlusal or cephalometric measurements. This shortcoming is serious because there are considerable differences between professional and patients' perceptions of dental appearance and need for treatment [4, 5]. It is evident that final assessment of orthodontic treatment need requires integration of a normative clinical measure with a patient-based indicator of the child's feelings and appearance, as well as with measures of the child's oral health-related behavior [6].

The aim of this study was to investigate whether there is an association between normative and self-perceived orthodontic treatment need, and to evaluate the influence of age, gender and socioeconomic background on satisfaction of dental appearance and demand for orthodontic treatment.

MATERIAL AND METHODS

The survey was carried out in 41 randomly selected schools in ten counties of Lithuania (Alytus, Kaunas, Klaipėda, Marijampolė, Panevėžys, Šiauliai, Tauragė, Telšiai, Utena and Vilnius). The cross-sectional study included twenty-three urban and eigh-

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teen rural schools according to the World Health Organization guide-lines for oral health surveys [7].

The 10-11 year-old and 14-15 year-old schoolchildren were invited to participate in the study. The group formation was based on the occlusal development stage (mixed or permanent dentition). Totally 4235 children were examined for objective orthodontic treatment need. Then all children were invited to complete a questionnaire about their dental appearance and perceived orthodontic treatment need (Appendix). The questionnaire was based on a Likert type scale using previously developed analogues and had four fixed answers [8].

The response rate was 47.8 percent. The 2024 completed questionnaires were collected. The number of 10-11 year-old respondents was 1193 (657 girls and 536 boys) and 14-15 year-old was 831 (450 girls, 381 boys). The mean age was 10.6 years in the younger children group and 14.4 years in the older children group. Schoolchildren undergoing orthodontic treatment at the moment of examination (7,7%) were included into study.

The answer to the question "Do you think you need an orthodontic treatment now?" was selected as representing self-perceived orthodontic treatment need. The characteristics of the group of subjects with a positive response to this question were compared with those with the negative response and tested in relation with the objective orthodontic treatment need, age, gender, living area and to the other items in questionnaire.

The normative orthodontic treatment need was assessed using the ICON [9]. The ICON consists of five components: the aesthetic component, upper and lower arch crowding/spacing assessment, presence of a crossbite, degree of incisor open bite/overbite and anterior-posterior fit of buccal segment (Table 1). ICON scoring protocol was following: first we measured all 5 traits, then obtained set of scores and multiplied the scores by their respective weights. The sum of the weighted scores is the ICON score for the case. The aesthetic assessment was made by selecting the picture, from the set of ten pictures of dental attractiveness (Figure 1) most similar to child's to be assessed occlusion. The need for orthodontic treatment was defined as having an ICON score of 43 or greater. This cut-off point is internationally recognized and recommended by the index authors [9]. All children were examined by the same orthodontist (DB-author of article) in a dental setting in the schools. The examiner had been previously trained and calibrated to use ICON index. The calibration of examiner was performed using 30 dental casts. The mean difference from gold standard was less than 5 ICON points and root mean square less than 9 ICON points.

Statistical analysis was performed using the SPSS package 15 for Windows and the SAS 9.1.3 system. All variables in our data set were ordinal, so we used gamma coefficient to assess correlation between variables and chi-square test to decide whether there exists some dependence between variables at all. Statistical significance was set at $P<0.05$

The study approval was obtained from Ministry of Education and Science of Lithuania, from National Bioethics committee and school headmasters. Parents consent was obtain before clinical examination of the children.

Appendix. The questionnaire about the children's dental appearance and perceived orthodontic treatment need

Age	**Gender M**	**F**	
1. Are you satisfied with your dental appearance now?			
very satisfied	satisfied	dissatisfied	very dissatisfied
1	2	3	4
2. Do you consider well aligned teeth important for overall facial appearance?			
very important	important	not important	not important at all
1	2	3	4
3. Do you think you need an orthodontic treatment now?			
Yes	No		
1	2		
If "yes", please give the main reason for your concern			
Appearance of teeth is unsatisfactory	Function of the dentition is unsatisfactory	Cleaning of teeth is difficult	My dentist said that I have malocclusion
1	2	3	4
4. Have you ever worn an orthodontic appliance?			
Yes	No		
1	2		

RESULTS

Using ICON index, objective need for orthodontic treatment among Lithuanian schoolchildren was found to be 42.6 percent. In the younger schoolchildren group need for treatment was 49.9 percent, while in the older schoolchildren group it was 33.9 percent.

The question *"Are you satisfied with your dental appearance now?"* was positively answered by more than a half of schoolchildren independent of age, gender and living area (Table 2). Almost on third of schoolchildren were dissatisfied and about 4% very dissatisfied with their dental appearance. Older children were more disappointed than younger ones. Girls, compared to boys, were less satisfied with their dental appearance, despite the surveyed age, but all these differences were not statistically significant. It is interesting, that 24.9% of younger and 26.8 of older schoolchildren who objectively did not needed orthodontic treatment, were more or less dissatisfied with their dental appearance.

The question *"Do you consider well aligned teeth important for overall facial appearance?"* was positively answered by overall majority of respondents (Table 3). The girls independent of age and younger schoolchildren from rural areas were liable to think that well aligned teeth are *very important* for facial appearance.

The question *"Do you think you need an orthodontic treatment now?"* was used to assess self-perceived orthodontic treatment need. More than 1/3 of all respondents in both age groups thought that they need orthodontic treatment (Table 4). Girls more often than boys and higher percentage of older schoolchildren from urban than from rural areas thought that they needed an orthodontic treatment ($p < 0.01$). Almost 1/3 of schoolchildren (27.1% in the 10-11 year-old and 27.6% in 14-15 year–old group), who did not needed orthodontic treatment, thought they did. The main reason for self-perceived orthodontic treatment need was unsatisfactory teeth appearance (60.5%). The other reasons: 32.4% of schoolchildren indicated that "my dentist said that I have a malocclusion", 4.2% of schoolchildren answered that the cleaning of teeth was difficult, and 2.9% of schoolchildren pointed out that function of their dentition was unsatisfactory.

Table 5 contains information about the mutual dependence of answers to questions 1, 2, 3 on the objective orthodontic treatment need. Because all variables were ordinal, gamma coefficient was used to estimate the correlation between them and provided together with its asymptotic standard error and chi square test to estimate the significance of dependence. The value of significance was set at $p<0.01$. As it was to be expected, the higher objective need for orthodontic treatment, the less schoolchildren are satisfied with their dental appearance and the more they are determined to perform such treatment ($p<0.01$). The same dependences were observed in all subpopulations: among girls and boys, among younger and older children, among those living in rural and in urban areas. On the other hand, importance of well-aligned teeth for overall facial appearance does not depend on the objective treatment need ($p< 0.12$).

The analysis of effects of age, gender, living area, attitudes towards dental esthetics and ICON index on self-perceived orthodontic treatment need shown in Table 6. The statistically significant factors affecting self-perceived orthodontic treatment need are objective orthodontic treatment need, gender and dissatisfaction with own dental appearance ($p <0.01$).

DISCUSSION

Assessment of an aesthetic need for orthodontic treatment is complex and opinion about it might differ between orthodontists and children [10, 11, 12].The

Table 1. Distribution of mandibular fractures by aetiology and gender

	SCORE						
COMPONENT	**0**	**1**	**2**	**3**	**4**	**5**	**Weight**
1. Aesthetic assesment	Score 1-10						7
2. Upper arch crowding	<2mm	2.1 to 5 mm	5.1 to 9 mm	9.1 to 13 mm	13.1 to 17 mm	>17mm	5
Upper arch spacing	<2mm	2.1 to 5 mm	5.1 to 9 mm	>9 mm		Impacted tooth	5
3. Crossbite	Not present	Present					5
4. Incisor open bite	Complete bite	<1mm	1.1 to 2 mm	2.1 to 4 mm			4
Incisor overbite	<1/3 lower incisor covered	1/3 to 2/3 covered	2/3 up to fully covered	Fully covered			4
5. Buccal segment antero-posterior	Cusp to embrasure only; Class I; II or III	Any cusp relation up to but not including cusp to cusp	Cusp to cusp				3

Table 2. Satisfaction with dental appearance according to age, gender, living area and objective treatment need

Satisfaction with dental appearance	10-11 years							14-15 years						
	Total	Gender		Living area		Treatment need		Total	Gender		Living area		Treatment need	
	n = 1193	Female n = 657	Male n = 536	Urban n = 831	Rural n = 362	ICON≤43 n = 598	ICON>43 n = 595	n = 831	Female n = 450	Male n = 381	Urban n = 522	Rural n = 309	ICON≤43 n = 536	ICON>43 n = 295
Very satisfied	13.7% (163)	13.4% (88)	14.0% (75)	13.8% (115)	13.3% (48)	16.2% (97)	11.1% (66)	14.6% (121)	12.7% (57)	16.8% (64)	17.2% (90)	10.0% (31)	17.3% (93)	9.5% (28)
Satisfied	56.3% (672)	53.6% (352)	59.7% (320)	58.0% (482)	52.3% (190)	58.9% (352)	53.8% (320)	52.6% (437)	51.3% (231)	54.1% (206)	52.1% (272)	53.4% (165)	55.8% (299)	46.8% (138)
Dissatisfied	26.1% (311)	28.2% (185)	23.5% (126)	24.3% (202)	30.1% (109)	21.9% (131)	30.2% (180)	28.2% (234)	30.0% (135)	26.0% (99)	26.4% (138)	31.1% (96)	24.4% (131)	34.9% (103)
Very dissatisfied	3.9% (47)	4.9% (32)	2.8% (15)	3.8% (32)	4.1% (15)	3.0% (18)	4.9% (29)	4.7% (39)	6.0% (27)	3.1% (12)	4.2% (22)	5.5% (17)	2.4% (13)	8.8% (26)

Table 3. Schoolchildren attitude towards importance of teeth aligned for overall facial appearance

Importance of teeth aligned for overall facial appearance	10-11 years							14-15 years						
	Total	Gender		Living area		Treatment need		Total	Gender		Living area		Treatment need	
	n = 1193	Female n = 657	Male n = 536	Urban n = 831	Rural n = 362	ICON≤43 n = 598	ICON>43 n = 595	n = 831	Female n = 450	Male n = 381	Urban n = 522	Rural n = 309	ICON≤43 n = 536	ICON>43 n = 295
Very important	49.0% (585)	52.0% (342)	45.3% (243)	46.0% (382)	56.1% (203)	48.0% (287)	50.1% (298)	48.0% (399)	51.8% (233)	43.6% (166)	48.8% (255)	46.6% (144)	46.6% (250)	50.5% (149)
Important	44.8% (534)	43.0% (283)	46.8% (251)	47.0% (391)	39.5% (143)	46.0% (276)	43.4% (258)	46.8% (389)	42.9% (193)	51.4% (196)	46.2% (241)	47.9% (148)	48.7% (261)	43.4% (128)
Not important	5.4% (64)	4.1% (27)	6.9% (37)	6.1% (51)	3.6% (13)	5.2% (31)	5.5% (33)	4.6% (38)	4.9% (22)	4.2% (16)	4.6% (24)	4.5% (14)	4.3% (23)	5.1% (15)
Not important at all	0.8% (10)	0.8% (5)	0.9% (5)	0.8% (7)	0.8% (3)	0.7% (4)	1.0% (6)	0.6% (5)	0.4% (2)	0.8% (3)	0.4% (2)	1.0% (3)	0.4% (2)	1.0% (3)

Table 4. Self-perceived orthodontic treatment need in relation to objective treatment need, age, gender and living area

Do you think that you need an orthodontic treatment now?	10-11 years							14-15 years						
	Total	Gender		Living area		Treatment need		Total	Gender		Living area		Treatment need	
	n = 1193	Female n = 657	Male n = 536	Urban n = 831	Rural n = 362	ICON≤43 n = 598	ICON>43 n = 595	n = 831	Female n = 450	Male n = 381	Urban n = 522	Rural n = 309	ICON≤43 n = 536	ICON>43 n = 295
Yes	35.6% (452)	40.2% (264)	30.0% (161)	35.7% (297)	35.4% (128)	27.1% (162)	44.2% (263)	34.8% (289)	41.1% (185)	27.3% (104)	38.3% (200)	28.8% (89)	27.6% (148)	47.8% (141)
No	64.4% (768)	59.8% (393)	70.0% (375)	64.3% (534)	64.6% (234)	72.9% (436)	55.8% (332)	65.2% (542)	58.9% (265)	72.7% (277)	61.7% (322)	71.2% (220)	72.4% (388)	52.2% (154)

Table 5. Dependences between answers to questions 1, 2, 3 and objective orthodontic treatment need

	1		2		3	
	γ±ASE	p	γ±ASE	p	γ±ASE	p
Treatment need	0.01±0.03	<0.01	0.05±0.03	0.12	-0.07±0.04	<0.01
1					-0.58±0.03	<0.01
2	-0.08±0.04	<0.01			0.13±0.04	0.02

ASE – asymptomic standard error.

Table 6. Odds ratio (OR) of age, gender and living area, ICON index when dependent variable was a positive response to the question "Do you think that you need an orthodontic treatment?" The basic alternative for each variable is shown in bold type.

Variable (n)	n	P	OR (95% CI)
Age **14-15 years** *versus* 10-11 years	2024	0.69	0.96 (0.80–1.16)
Gender **Male** *versus* female	2024	<0.01	0.60 (0.49–0.72)
Living area **Rural** *versus* urban	2024	0.05	0.82 (0.68–1.00)
ICON **> 43** *versus* ≤43	2024	<0.01	2.21 (1.84–2.66)
Are you satisfied with your dental appearance now? **Very satisfied + satisfied** *versus* Dissatisfied + very dissatisfied	2024	<0.01	0.20 (0.16–0.24)
Do you consider well aligned teeth important for overall facial appearance? **Very important + important** *versus* Not important + not important at all	2024	0.39	1.19 (0.80–1.78)

results show that 35.3% of schoolchildren in Lithuania thought that they were in a need of orthodontic treatment. These findings are similar to the outcome of surveys held in other countries. Research done in Turkey indicated that 37.8% of surveyed children thought they were in the need of treatment as well [13]. Several studies show that a demand for orthodontic treatment was higher in Latvia 49% and Poland 58.3%, while lower in Sweden 22% and Finland 25% [14,15,16] The contradicting results may appear from different selection of the study population, age and number of the subjects. However, the biggest discrepancy might appear due to different methods of the study.

In our study two age groups were compared. The results show that treatment need was higher in the younger children group than in older one. While treatment demand in both children groups was similar (respectively, 35.6% in the younger group and 34.8% in the older group).

Concerning the satisfaction of the dental appearance, more than a half of Lithuanian schoolchildren, who need orthodontic treatment, are satisfied with their dental appearance independent of age, gender and living area. The studies in the neighbour countries demonstrated similar results: in Poland – 61.9%, in Latvia – 63%, in Finland – 89% and in Norway – 70% [5, 14,17, 18]. Girls were more concerned about their own occlusions than boys. That finding is confirmed by other studies held in Norway, Sweden, Latvia, Brazilia, Finland and USA [19, 20, 21, 22, 23]. Our study shows that desire for treatment was more frequently reported than dissatisfaction with dental appearance (respectively, 35.6% and 26.1% in the younger children group; 34.8% and 28.2% in the older children group).

A few of the subjects had started orthodontic treatment prior to the study (7.7%). This could have some influence on their perception that their teeth looked better than the real normative need at the pretreatment stage. However, this was cross-sectional study and normative treatment need was assessed on the same day as self-perceived need. So, this could not have significant impact on final results.

This study confirms the effect of age and gender on the self-perception of dental appearance and orthodontic treatment need.

CONCLUSIONS

1. The prevalence of normative orthodontic treatment need among 10-15 year-old Lithuanian schoolchildren. is 49.6 percent
2. The self-perceived orthodontic treatment need among Lithuanian schoolchildren is 35.3 percent
3. Treatment need is higher than treatment demand among the 10-11 year old children with no difference in the 14-15 year old group.
4. Age and gender influence the self-perception of malocclusion. Girls and older children are more disappointed with their dental appearance
5. Rural children perceive their dentition similar to urban children.

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