

Impact of the need for orthodontic treatment on academic performance, self-esteem and bullying in schoolchildren.

Impacto de la necesidad de tratamiento ortodóntico en el rendimiento académico, autoestima y bullying en escolares.

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Abstract: Objective: The aim of this study was to evaluate the impact of the need for orthodontic treatment on academic performance, self-esteem and bullying in schoolchildren. Material and methods: This cross-sectional study included a total of 147 school children between 12 and 18 years of age. Academic performance was measured taking into account the final average grades for all the courses; for self-esteem and bullying, scores obtained with validated questionnaires were used. The Dental Aesthetic Index was used to determine the need for orthodontic treatment. The Kruskal Wallis test was used for the comparisons between the scores for academic performance, self-esteem and bullying according to each category of need for orthodontic treatment; a level of significance of 5% was considered. Results: The results showed mean academic performance scores of 13.6, 12.5, 12.9, 13.2 for those who did not need orthodontic treatment, those with defined malocclusion, severe malocclusion and very severe malocclusion, respectively; for self-esteem the scores were 21.6, 20.9, 21.0 and 20.5; and for bullying, 14.2, 15.4, 14.5 and 13.0. No statistically significant differences were found between the scores in the different groups evaluated ($p>0.05$). Conclusion: The need for orthodontic treatment in schoolchildren showed no impact on academic performance, self-esteem and bullying. The need for orthodontic treatment, as measured by the Dental Aesthetic Index, did not prove to be a determining factor in the presence of such variables in schoolchildren.

Keywords: Academic performance; bullying; malocclusion; adolescent; self-concept.

Resumen: Objetivo: El presente estudio tuvo como objetivo evaluar el impacto de la necesidad de tratamiento ortodóntico en el rendimiento académico, autoestima y bullying en escolares. Material y métodos: El estudio transversal, incluyó un total de 147 escolares de 12 y 18 años de edad. El rendimiento académico fue medido mediante los promedios finales de todos los cursos de estudio, para la autoestima y el bullying se emplearon puntuaciones obtenidas con cuestionarios validados, y para determinar la necesidad de tratamiento ortodóntico se utilizó el Índice de Estética Dental. Las comparaciones entre las puntuaciones del rendimiento académico, autoestima y bullying según cada categoría de necesidad de tratamiento ortodóntico se empleó la prueba Kruskal Wallis, considerando un nivel de significancia del 5%. Resultados: Los resultados mostraron puntuaciones promedio de rendimiento académico de 13.6, 12.5, 12.9, 13.2 para quienes que no necesitaron de tratamiento ortodóntico, con maloclusión definida, maloclusión severa y maloclusión muy grave respectivamente; para la autoestima las puntuaciones fueron de 21.6, 20.9, 21.0 y 20.5; mientras que, para el bullying de 14.2, 15.4, 14.5 y 13.0. No se encontraron diferencias estadísticamente significativas entre las puntuaciones en los diversos grupos evaluados ($p>0.05$). Conclusión: La necesidad de tratamiento ortodóntico en escolares no evidenció impacto en el rendimiento académico, autoestima y bullying. La necesidad de tratamiento de ortodoncia, medida mediante el Índice de Estética Dental, no mostró ser un factor determinante de la presencia de dichas variables en escolares.

Palabras Clave: Rendimiento académico; autoimagen; acoso escolar; adolescentes; maloclusión.

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INTRODUCTION.

Schoolchildren with malocclusion suffer a greater negative impact on their quality of life, with emotional and social aspects being the most affected.¹ However, the exact impact of malocclusion on some aspects such as school performance,² self-esteem,³ and bullying^{4,5} is difficult to determine. Academic performance is the ability of an individual to respond to learning stimuli and to reach previously established educational goals. The presence of malocclusion can negatively affect school performance; 42.1% of students with dental malocclusion have below average academic performance.²

Self-esteem, understood as the ability to face the challenges of life by believing in oneself,⁶ can change after 10 years of age, since children at that age generally tend to have low self-esteem and are more pessimistic and self-critical.⁷ Self-esteem can vary according to the severity of malocclusion. Schoolchildren with Class II malocclusion (and more specifically, Class II, Division 2) have reported better self-esteem than those with Class I malocclusion, but no differences were found between other malocclusion groups.³ Bullying is defined as a form of aggressive behavior, in which dental characteristics can also play a role in nicknames, harassment and teasing among school children.⁸ The frequency of general bullying is around 30%, and bullying because of dental appearance is estimated to be around 19%.⁵

Malocclusion is a significant deviation from the ideal occlusion and can be considered aesthetically unsatisfactory, and involves a condition of imbalance in the position of the teeth, facial bones and soft tissues. Patients become more aware of their appearance when they reach maturity and associate it with a need for orthodontic treatment.⁹ According to the Angle classification, the most frequent malocclusion is Class I, followed by Classes II and III with similar incidence rates.³ Basha *et al.*,² reported that untreated malocclusion significantly affects the psychosocial well-being of school children, resulting in avoidance of social activities and lowering their school performance. Florián-Vargas *et al.*,³ found that self-esteem in schoolchildren can vary according to the severity of malocclusion, with self-esteem being better in those with Class I malocclusion. Bazán-Serrano *et al.*,⁵ reported that bullying was associated with the condition of teeth; however, Quito-Rabanal *et al.*,⁴ did not find differences in bullying between the different types of malocclusion, evaluated using the Angle classification.

The aim of this study was to evaluate the impact of the need for orthodontic treatment on academic performance, self-esteem and bullying in schoolchildren.

MATERIALS AND METHODS.

Ethical aspects and study protocol were approved by the Permanent Stomatology Research Committee of Universidad Privada Antenor Orrego, Trujillo-Peru (Code: 15702015FMEHUUPAO). Schoolchildren under the age of 18 gave their assent, and their parents signed an informed consent.

Study sample

The cross-sectional study was conducted in 147 high school students between 12 and 18 years of age (14.54+/-1.76) from an educational institution in the city of Trujillo-Peru. The following inclusion criteria were considered: schoolchildren with complete permanent dentition and tooth eruption up to the first molar. The exclusion criteria were: schoolchildren who did not agree to participate in the study, parent or guardian who did not authorize the participation of their child; schoolchildren undergoing orthodontic, orthopedic or orthognathic treatment, and schoolchildren using prosthetic accessories or who had undergone oral surgery. For the selection of the 147 participants, questionnaires were handed out to 380 schoolchildren, of whom 232 did provide sign authorization and 1 withdrew from school. No schoolchildren with orthodontic, orthopedic or orthognathic treatment were identified nor schoolchildren using prosthetic accessories or who had undergone oral surgery. The selected sample was grouped according to the need for orthodontic treatment, of which 18 did not present any anomaly or had normal occlusion (control), 63 with defined malocclusion, 42 with severe malocclusion, and 24 with very severe malocclusion.

Academic performance

In order to evaluate academic performance, the grades of participating students were used. Academic records were provided by the information management system of the educational institution. The final average grade of all the subjects was considered the an academic performance score.

Self-esteem

Self-esteem was evaluated using the Rosenberg test.¹⁰ Scores ranged from 0 to 3 for both affirmative and negative items, according to the scale of the questionnaire. The questionnaire was answered individually, and each student was isolated

from the rest of the class during this time.

Bullying

A validated questionnaire was applied to determine the presence of bullying.⁸ Scores were assigned according to the structure of the question, if the answer was "YES" the assigned value was 1, and if it was "NO", the value was 0.

For the affirmative responses that included subquestions, values from 0 and 1 for dichotomous responses were assigned, and from 1 onwards for ordinal responses.

Dental Aesthetic Index

To determine the need for orthodontic treatment, the Dental Aesthetic Index (DAI) was used.⁹ The DAI includes 10 occlusal-dental features identified through intraoral clinical examination:

- 1) absence of incisors, canines and premolars,
- 2) incisal segment crowding in both jaws,
- 3) spacing in the incisal segments,
- 4) central diastema measured in mm,
- 5) greater anterior jaw irregularity,
- 6) greater anterior mandibular irregularity,
- 7) anterior maxillary overjet,
- 8) mandibular anterior overjet,
- 9) vertical anterior open bite in mm, and

10) anteroposterior molar ratio.

Calculation of the total score was made by the formula: absence (x6) + crowding + spacing + diastema (x3) + superior irregularity + inferior irregularity + maxillary superposition (x2) + mandibular superposition (x4) + anterior open bite (x4) + anteroposterior molar ratio (x3) +13= DAI. The final DAI score represents the dentofacial anomaly according to the level of severity and the need for orthodontic treatment: a score less than or equal to 25 indicates no abnormality or normal; from 26 to 30, defined malocclusion; from 30 to 35, severe malocclusion; and 36 and above, very severe malocclusion.

Reliability of the method

For data collection, the researcher was calibrated in the determination of numerical assessments with respect to the need for orthodontic treatment through the evaluation of 10 schoolchildren. To determine the consistency of the intra- and inter-examiner measurements, the Intraclass Correlation Coefficient test was used, showing high reliability in the measurements, with values of 0.964 ($p<0.001$) and 0.920 ($p<0.001$), respectively. The self-esteem questionnaire presented a Cronbach's alpha coefficient of 0.70, and bullying presented a coefficient of 0.72, both regarding the total sample.

Table 1. Characteristics of the sample under study.

Variable	Category	n	Mean	Std. Deviation	Lowest	Highest	%
Age in years by sex (n=147)	Female	15	14.20	1.86	12	17	---
	Male	132	14.58	1.75	12	18	---
School grade and age in years	First	38	12.45	0.80	12	15	---
	Second	23	13.61	0.72	13	15	---
	Third	21	14.62	0.80	14	17	---
	Fourth	30	15.43	0.82	14	17	---
	Fifth	35	16.63	0.77	15	18	---
	Total		147	14.54	1.76	12	18
Academic performance (score)	---	147	12.85	2.01	4	25	---
Self-esteem (score)	---	147	20.93	3.51	12	30	---
Bullying (score)	---	147	14.59	5.04	1	32	---
DAI (score)	---	147	31.07	5.84	18	55	---
Need for orthodontic treatment (according to DAI scores)	No anomaly or normal	18	---	---	---	---	12.24
	Defined malocclusion	63	---	---	---	---	42.86
	Severe malocclusion	42	---	---	---	---	28.57
	Very severe malocclusion	24	---	---	---	---	6.33
	Total		147	---	---	---	---

Table 2. Comparison of bullying, self-esteem and academic performance scores in schoolchildren with different needs for orthodontic treatment.

Variable	Need for orthodontic treatment	Me	Mean	SD	Low	High	p-value*
Bullying (n=147)	No anomaly or normal	14.5	14.2	4.3	6.0	25.0	0.335
	Defined malocclusion	14.0	15.4	5.1	6.0	27.0	
	Severe malocclusion	15.0	14.5	4.9	4.0	32.0	
	Very severe malocclusion	14.0	13.0	5.6	1.0	28.0	
Self-esteem (n=147)	No anomaly or normal	21.0	21.6	2.8	16.0	27.0	0.339
	Defined malocclusion	21.0	20.9	3.9	12.0	30.0	
	Severe malocclusion	22.0	21.0	3.2	14.0	27.0	
	Very severe malocclusion	21.0	20.5	3.6	12.0	26.0	
Academic performance (n=147)	No anomaly or normal	13.0	13.6	3.3	9.2	16.3	0.343
	Defined malocclusion	12.6	12.5	1.9	4.4	17.9	
	Severe malocclusion	12.8	12.9	1.4	10.0	17.7	
	Very severe malocclusion	12.7	13.2	2.0	9.2	17.6	

*: Kruskal Wallis. Me: median. SD: standard deviation. Low: lowest value. High: highest value.

Statistic analysis

Data were processed in an automated way using the statistical package SPSS Statistics 22.0 (IBM, Armonk, NY, USA). Means, standard deviations, minimum and maximum values of the quantitative variables such as age and the scores of academic performance, self-esteem, and bullying, were calculated. The Kruskal Wallis test was used for the comparison of academic performance, self-esteem and bullying according to the need for orthodontic treatment. A level of significance of 5% was considered.

RESULTS.

Table 1 shows the descriptive characteristics of the studied sample. When comparing the scores of bullying, self-esteem and academic performance according to the need for orthodontic treatment, no statistically significant differences were found between them ($p > 0.05$), as it is shown in table 2.

DISCUSSION.

The results of the present study showed there were no differences between bullying, self-esteem and academic performance when comparing their scores with the various levels of the need for orthodontic treatment.

This would indicate that the need for treatment does not condition the presence of said variables. Contrary to what was

found, Basha *et al.*,² reported that malocclusion significantly affects psychosocial well-being in schoolchildren, as they avoid participating in social activities and have a lower performance in school. Likewise, Florián-Vargas *et al.*,³ reported that self-esteem may vary according to the severity of malocclusion in schoolchildren. In relation to bullying, Bazán-Serrano *et al.*,⁵ reported that this was associated with the aesthetics of teeth. However, these studies did not use the Dental Aesthetic Index to assess the need for orthodontic treatment.

The method used to evaluate malocclusion involves characteristics of both anterior and posterior teeth. Perhaps the inclusion of the characteristics of posterior teeth in the identification of the need for orthodontic treatment may have influenced the results, as these are not visible during social interactions, and would thus not affect the appearance of the person, consequently. As such they would have no impact on bullying or self-esteem and, in turn, on school performance. This reasoning can be reflected in the study conducted by Quito-Rabanal *et al.*,⁴ who found no differences in bullying between the different types of malocclusion, evaluated by means of a classification method that also considered posterior teeth in the identification of malocclusion. Another possible explanation for the absence of differences could be, in addition to the dental characteristics, the presence of non-oral factors, which can also come into play at the onset of psychosocial problems.^{6,7}

Bernabé *et al.*,⁹ identified some conditions related to dental appearance of the anterior region, which have a negative influence on the self-perceived dental appearance; and although these results confirmed that the occlusal characteristics in the anterior portion of the mouth play a role in dental aesthetics, their combined influence was minimal, which also suggests that other factors, such as extraoral characteristics, could explain remaining variability. In this sense, other studies would be necessary to assess these variables in more depth.

The evaluation of self-esteem and bullying from a general point of view becomes a limitation of the present study, because there are no instruments that refer exclusively to aspects related to teeth, specifically malocclusion. This is a factor that must be addressed in further studies.

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CONCLUSION.

The need for orthodontic treatment in schoolchildren did not show an impact on academic performance, self-esteem and bullying scores. The need for orthodontic treatment, as measured by the Dental Aesthetic Index, did not prove to be a determining factor in the presence of such variables in schoolchildren.

Conflict of interests: None.

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