Main discomforts during orthodontic treatment

Principales molestias durante el tratamiento de ortodoncia

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ABSTRACT

Orthodontic treatment is associated with improvement of the quality of life, although to achieve it the patients must experience side effects; appliances cause physical and psychological discomfort, as well as functional limitations. **Objective:** To analyze which are the main discomforts associated with the use of orthodontic appliances, their determinant discomfort factors and the effect they have on the quality of life of adolescents and adults; with the use of the OIDP (Oral Impacts on Daily Performances) questionnaire in the form of an interview. **Material and methods:** 45 individuals aged 12 to 36 years, with at least 6 months of orthodontic treatment, participated in this study. Data were obtained by interview questionnaires; the intensity of both physical and psychological discomfort was assessed using the IOPD. **Results:** 100% of the participants experienced discomfort associated with the use of orthodontic appliances. Most patients had a very mild overall effect (77.8%); the most affected activities were: cleaning or brushing teeth (95.5%), eating and enjoying food (82.2%), sleeping and relaxing (42.2%), speaking and pronouncing correctly as well as maintaining a normal emotional state without anger (35.5%) respectively. **Conclusions:** The discomfort associated with the use of orthodontic appliances had a negative influence on the quality of life of adolescents and adults. The determining factors for discomfort were: the presence of orthodontic appliances (100%), grains or ulcers (46%) and sensitive teeth (36.7%).

RESUMEN

El tratamiento ortodóncico está asociado con la mejora de la calidad de vida, aunque, para lograrlo, los pacientes deben experimentar efectos secundarios; los aparatos utilizados causan malestar físico y psicológico, además de limitaciones funcionales. **Objetivo:** Analizar cuáles son las principales molestias por el uso de aparatología ortodóncica, sus factores determinantes de malestar y el efecto que tienen en la calidad de vida de adolescentes y adultos, con el uso del cuestionario OIDP (*Oral Impacts on Daily Performances*) en forma de entrevista. **Material y métodos:** 45 individuos entre 12 y 36 años de edad, con al menos seis meses de tratamiento ortodóncico, participaron en este estudio. Los datos se obtuvieron por medio de cuestionarios en forma de entrevista; la intensidad del malestar, tanto físico como psicológico, se evaluó utilizando el OIDP. **Resultados:** El 100% de los participantes experimentaron malestar asociado al uso de aparatología ortodóntica. La mayoría tuvo efecto global muy ligero (77.8%); las actividades más afectadas fueron: limpiarse o lavarse los dientes (95.5%), comer y disfrutar los alimentos (82.2%), dormir y relajarse (42.2%), tanto hablar y pronunciar correctamente como el mantener el estado emocional normal sin enojo (35.5%) respectivamente. **Conclusiones:** Las molestias asociadas al uso de aparatología ortodóncica ejercieron una influencia negativa en la calidad de vida de adolescentes y adultos. Los factores determinantes de malestar fueron: presencia de aparatos de ortodoncia (100%), grano o úlcera (46%) y diente sensible (36.7%).

Key words: Orthodontics, discomfort, quality of life.
Palabras clave: Ortodoncia, malestar, calidad de vida.

INTRODUCTION

Malocclusion affects the physical, social, and psychological functioning known as quality of life.[1] Orthodontic treatment is associated with improved quality of life, as it can provide physical, social, and psychological changes.[2] To achieve improvement, patients must experience some side effects related to treatment with orthodontic appliances.[3]

Orthodontic treatment can be an uncomfortable process, as the appliances used represent foreign objects inserted into a physically and psychologically sensitive area of the body, causing physical and

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psychological discomfort,[4] as well as functional limitations such as: difficulty eating, difficulty to perform oral hygiene, speech, presence of halitosis, dental mobility, impaired taste perception and gingival bleeding. These affect quality of life[5] and may decrease the desire to undergo or cooperate with treatment.[6] Costa AA et al (2015) found that teenagers with braces showed 4.88 times more chance of experiencing high negative impact on OHRQoL (oral health in relation to quality of life), than those who did not use braces.[7]

Therefore, investigating the functional and emotional limitations caused by the use of orthodontic appliances is important to better understand the consequences of therapy. This information will assist the orthodontist in developing appropriate strategies for conducting treatment.[7]

To assess quality of life, questionnaires known as sociodental indicators are administered, which seek to reveal the perceived impact of oral health problems on quality of life.[8] The OIDP (Oral Impact on Daily Performance) is one of the few instruments used to measure OHRQoL.[9] It measures the effect of oral health based on 8 dimensions, related to the subject's ability to perform his/her usual activities in the last 6 months.[10]

Marques LS et al (2014) carried out research using the OIDP in the form of an interview with adolescents, where they obtained that the prevalence of OIDP through the use of brackets was 15.9%; only 17.6% of those interviewed reported having no impact on their daily activities. According to the impact, 38% had low intensity, 20% moderate intensity and 13% severe intensity. The main discomforts were: difficulties in eating, brushing teeth, speaking, in addition to dental mobility, halitosis, gingival bleeding, and taste perception disorders. They concluded that discomfort from braces has a negative influence on quality of life.[5]

Bernabé E et al (2008) also conducted a study using the OIDP as an interview and found that the Specific Impact Condition (SIC) was higher in adolescents with brackets; there was lower SIC in subjects with removable appliances or with a combination of both types. The prevalence of SIC from orthodontic braces was 22.7%, of which 35.8% had severe or very severe SIC. In particular 44.8% presented difficulties when speaking and 35.3% while eating. They concluded that nearly 1/4 of the adolescents reported an impact on their daily lives, primarily while eating and talking.[11]

The purpose of this study was to analyze the main discomfort caused by the use of orthodontic appliances, their determinants of discomfort and the effect they have on the quality of life of adolescents and adults, using the OIDP questionnaire in the form of an interview.

MATERIAL AND METHODS

In the orthodontic clinic of the Cuauhtemoc University, Guadalajara campus from February to May 2016, a descriptive, prospective and transversal study was carried out with the objective of assessing the discomfort caused by the use of orthodontic appliances. The sample universe was conformed of 45 subjects (31 women and 14 men), with a probabilistic sample size and a 95% confidence level. It was determined that the sample should be 42 according to the inclusion criteria: patients from 12 to 36 years of age with at least 6 months of orthodontic treatment completed at the time of the interview. First, the part of the instrument corresponding to the specific condition of discomfort was translated and adapted into Mexican Spanish, as it had not yet been validated in Mexico *(Table II)*. This was done by a dentist who was fluent in English (researcher). This translation was then reverse-translated by a professional translator of British nationality, as it is the original language of the OIDP; by comparing the reverse translation with the original questionnaire, a committee of experts verified that no valuable information had been lost in the process. Finally, a pilot test was performed to obtain the approval of the committee and thus obtain the validity of the instrument.

The main researcher completed the questionnaires, by interview. The OIDP rates 8 dimensions which are: eating and enjoying food, speaking and pronouncing correctly, cleaning and brushing teeth correctly, sleeping and relaxing, smiling and showing teeth without pain, maintaining the emotional state without anger, doing all work and socializing normally, and enjoying contact with people. First we found out whether or not there was difficulty, the answers were: yes (0 points) and no (1 point). 6 answer options are used to evaluate the frequency and are:

Never affect (0 points), less than once a month (1 point), once or twice a month (2 points), once or twice a week (3 points), three to four times a week (4 points), almost every day (5 points).

Severity level is rated: None (0 points), Very low (1 point), Low (2 points), Moderate (3 points), Severe (4 points), Very severe (5 points).

The effect is obtained by multiplying the score obtained from the frequency by the score of gravity in each of the 8 dimensions. Each element is ranked according to the score obtained.

No effect (0 points), very light (1 to 5 points), light (6-10 points), moderate (11-15 points), severe (16-20 points), and very severe (21-25 points).

The overall effect of the OIDP is obtained through the summation of the percentage of the 8 dimensions. It ranks: no effect (0 points), very light (1-40 points), light (41-80 points), moderate (81-120 points), severe (121-160 points) and very severe (161-200 points).[10]

The OIDP determines the cause of the impact linked to the affected dimension by means of the specific condition of discomfort section. The participant selects the cause or causes of the specific difficulty.[12] Possible causes are:

Toothache (1), Sensitive tooth (2), Tooth decay (3), Fractured tooth (4), Missing tooth (5), Loose tooth (6), Tooth color (7), Tooth position (8), Tooth shape or size (9), Bleeding gums (10), Gum retraction (11), Tartar (12), Grain or ulcer (13), Bad breath (14), Deformity of the mouth or face (15), Clicking or noise in the

Table I. Oral Impacts on Daily Performances (OIDP).[10]

	Frecuency		Severity		
In the past 6 months, have you had problems with your mouth, teeth or dentures that cause problems in the following?		During the past 6 months, how often did you have difficulty with the following?		On a scale of 0 to 5, in which 0 indicates absence of a problem in your daily life («nothing») and 5 the presence of a problem in your life activities («very serious»), in what way did your daily life was affected by the following?	
1. Eating and enjoying food	Answer	1. Eating and enjoying food	Answer	1. Eating and enjoying food	Answer
2. Speaking and pronouncing correctly	Answer	2. Speaking and pronouncing correctly	Answer	2. Speaking and pronouncing correctly	Answer
3. Cleaning or brushing teeth	Answera	3. Cleaning or brushing teeth	Answer	3. Cleaning or brushing teeth	Answer
4. Sleeping and relaxing	Answer	4. Sleeping and relaxing	Answer	4. Sleeping and relaxing	Answer
5. Smile/laugh and show your teeth without embarrassment	Answer	5. Smile/laugh and show your teeth without embarrassment	Answer	5. Smile/laugh and show your teeth without embarrassment	Answer
6. Keep the emotional state normal without getting angry	Answer	6. Keep the emotional state normal without getting angry	Answer	6. Keep the emotional state normal without getting angry	Answer
7. Do all the work or socializing in a normal way	Answer	7. Do all the work or socializing in a normal way	Answer	7. Do all the work or socializing in a normal way	Answer
8. Enjoy contact with people	Answer	8. Enjoy contact with people	Answer	8. Enjoy contact with people	Answer
Answers: (0) yes, (1) no		Answers: (0) never affected in the last 6 months, (1) less than once per month or up to 5 days total, (2) one or 2 times per month or up to 15 days in total, (3) once or twice a week or up to 30 days in total, (4) three to four times a week or up to 3 months in total, (5) almost every day or more than 3 months		Answers: (0) nothing, (1) very little, (2) little, (3) moderate, (4) severe, (5) very severe	

Table II. Oral Impacts on Daily Performances (OIDP).[13]

Now I will now investigate the specific condition that causes this difficulty. Which of the following oral conditions causes this difficulty?(Activity/Behavior)

Tooth pain	1	Gum retraction	11
Sensitive tooth	2	Calculus	12
Dental caries (tooth cavities)	3	Oral ulcers	13
Fractured tooth	4	Bad breath	14
Extracted tooth	5	Deformity of the face or mouth (cleft lip, cleft palate)	15
Loose tooth	6	Clicking or mandibular noises	16
Tooth color	7	Inadequate fillings or crowns (fractured, color)	17
Tooth position (crooked, protruded or Gap)	8	Loose or ill-fitting denture	18
Teeth shape or size	9	Orthodontic appliance	19
Bleeding gums	10	Any other reason? Please specify	88

jaw (16), Inadequate fillings or crowns (17), Loose or poorly fitted teeth (18), Orthodontic appliance (19), Other reason (88).[13]

Once the questionnaires were obtained and qualified, the database was transferred to SPSS (Statistical Program for the Social Sciences) version 20.0, where the statistical analysis was performed. We calculated the total discomfort presented by the patients, the total cumulative score for the severity of the discomfort, the average score for the severity of the discomfort and the total number of causes of impact. Contingency tables were also made for all qualitative variables by sex and age group and the exact probability of Fisher was calculated to assess whether differences between sexes or age groups were statistically significant. For quantitative variables, central trend and dispersion measures were calculated, globally, by sex and age groups. Student's t-test, Mann-Whitney's U-test, and Kruskal-Wallis' test were applied to assess whether there were significant differences between sexes or age groups.

RESULTS

The study included 31 women (68.9%) and 14 men (31.1%). 100% of them experienced discomfort associated with the use of orthodontic appliances.

The most affected daily activities were: cleaning or brushing their teeth, mentioned by 43 individuals, which is equivalent to 95.5%; eating and enjoying food, 37 (87.2%); sleeping and relaxing, 19 (42.2%); speaking and pronouncing properly and maintaining a normal emotional state without anger, 16 patients corresponding to 35.5% respectively; and finally smiling, laughing and showing their teeth without pain, affected 11 subjects, equivalent to 24.4%. Only the «eat and enjoy food» activity showed significant differences between men and women (p = 0.003) when the exact Fisher test was applied *(Tables III and IV)*.

There was no statistically significant difference between genders *(Table V)*.

None of the causes of impact showed statistically significant differences between genders. The most frequently mentioned cause of impact was orthodontic braces, referred to by all 45 participants (31 women and 14 men), which equals 100%. The percentage that followed was in the cause of impact: ulcer with 26 women (83.9%) and 9 men (64.3%); followed by sensitive teeth with 19 women (61.3%) and 8 men (57.1%) *(Table VI)*.

As for the number of discomforts presented by the study subjects, women showed the highest number of discomforts when compared to men (p = 0.00027). The most frequent number of discomforts in women was 3 discomforts which is equivalent to 41.9%; followed by 2 and 4 discomforts with 19.4% respectively; 5 discomforts with 16.1%; and ending with 7 discomforts with 3.2%. In men, 1 discomfort was more frequent, with 42.9%; 2, 4 and 6 discomfort with 14.3% correspondingly; 3 and 5 discomfort equivalent to 7.1% respectively *(Table VII)*.

Total variables were assessed with Student's t-test for independent samples and there were no statistically significant differences; Mann-Whitney's U-test was also applied between genders without finding significant differences *(Table VIII)*.

DISCUSSION

The results of the present investigation showed that 100% of the participants experienced discomfort associated with the use of orthodontic appliances, which had a negative influence on their quality of life. This is consistent with other studies.[1,5,7,11,14] The majority of patients had «very little» effect (77.8%) and 20% had «little» effect, while Marques LS et al. found the highest percentage to have «little» impact (38%).[5] In this study no «severe» and «very severe» impacts were reported, contrary to what was obtained

in others.[5,11] In the study conducted by Marques LS et al. 13.6% of the subjects were categorized with «severe» and «very severe» impact,[5] while Barnabas E et al. obtained 35.8% participants with «severe» and «very severe» impact.[11]

There was no statistically significant difference between genders, according to other research.[1,7,11]

The most affected daily activities were: cleaning or brushing teeth, experienced by 43 of the patients (95.5%); eating and enjoying the food present in 37 participants (82.2%) and sleeping and relaxing in 19 subjects (42.2%). Both in speaking and pronouncing properly and in maintaining the normal emotional state without anger, there was a 35.5% (16 patients); for smiling, laughing and showing teeth without embarrassment 11 subjects (24.4%) were affected. There are coincidences with other studies in the activities of eating and enjoying food, as well as speaking and pronouncing properly.[5,11,14] Cleaning or brushing teeth is consistent with Marques LS et al.[5] This study agrees with what Chen et al. found, in the dimension of smiling, laughing and showing teeth without embarrassment, as they obtained that patients felt self-conscious when smiling, although they used OHIP.[14]

In the eating and enjoying food activity there were statistically significant differences between men and women, which differ from other studies, where there were no differences between genders.[1,7,11]

Sleeping and relaxing, as well as maintaining normal emotional state without anger, were not reported as affected in other studies.[1,5,7,11,14]

In terms of the number of daily activities affected, there are differences with what was found by Bernabé

Table III. Degree of impact on daily activities of patients with orthodontic treatment (part 1).
Statistical probability was obtained with Fisher's test for comparison of occurrence frequency
of the severity categories between female and male patients.

In which way does the following affect your daily activities?	Female (n = 31)		Male (n = 14)		Total (n = 45)		p
	No.	%	No.	%	No.	%	
Eating and enjoying food?							
Nothing	2	6.5	6	42.9	8	17.8	0.003*
Very little	19	61.3	2	14.3	21	46.7	
Little	7	22.6	5	35.7	12	26.7	
Moderately	1	3.2	1	7.1	2	4.4	
Severely	2	6.5	0	0.0	2	4.4	
Very severely	0	0.0	0	0.0	0	0.0	
Speaking and pronouncing properly?							
Nothing	21	67.7	8	57.1	29	64.4	0.517
Very little	3	9.7	1	7.1	4	8.9	
Little	1	3.2	3	21.4	4	8.9	
Moderately	4	12.9	2	14.3	6	13.3	
Severely	1	3.2	0	0.0	1	2.2	
Very severely	1	3.2	0	0.0	1	2.2	
Brushing or cleaning your teeth?							
Nothing	1	3.2	1	7.1	2	4.4	0.124
Very little	2	6.5	3	21.4	5	11.1	
Little	7	22.6	6	42.9	13	28.9	
Moderately	18	58.1	4	28.6	22	48.9	
Severely	3	9.7	0	0.0	3	6.7	
Very severely	0	0.0	0	0.0	0	0.0	
Sleep and relax?							
Nothing	16	51.6	10	71.4	26	57.8	0.722
Very little	5	16.1	1	7.1	6	13.3	
Little	9	29.0	3	21.4	12	26.7	
Moderately	1	3.2	0	0.0	1	2.2	
Severely	0	0.0	0	0.0	0	0.0	
Very severely	0	0.0	0	0.0	0	0.0	

*p < 0.01
Note: Only in «eating and enjoying food» statistically significant differences were found between men and women.

et al. in our study the most frequent number of discomforts was 3 (31.1%) and 2 and 4 discomforts (17.8%) respectively; women had 3 discomforts (41.9%) and men 1 (42.9%). While Barnabas et al. found that 90.1% had 1 affected activity and 9.9% had a condition in 2 activities.[11]

The most frequently reported causes of impact were: orthodontic appliances, 100%; ulcers, 46%; sensitive teeth, 36.7%; both loose teeth and bleeding gums, 15.5%; dental pain, 13.3%; and bad breath, 8.8%. This coincides in part with what Marques LS et al. found, where they also attributed the discomfort to the presence of dental mobility, halitosis and bleeding gums.[5]

It is important to inform patients about the possible discomforts they may experience during orthodontic treatment, as well as to clarify that most of the discomforts are temporary, or that they will adapt to them and no longer perceive them as a burden.[3,14] This is why more than 3/4 of the subjects in this study had an overall «very little» OIDP effect and 1/5 found it «little», since all of them had more than 6 months of treatment. This information may improve treatment compliance, as well as improve communication between the orthodontist and the patient, leading to successful treatment.[7]

CONCLUSIONS

1. The discomfort associated with the use of orthodontic appliances had a negative influence on the quality of life of adolescents and adults.

Table IV. Degree of impact on daily activities of patients with orthodontic treatment (part 2). Statistical probability was obtained with Fisher's test for comparison of occurrence frequency of the severity categories between female and male patients.

In which way does the following affect your daily activities?	Female (n = 31)		Male (n = 14)		Total (n = 45)		
	No.	%	No.	%	No.	%	p
Smile/show teeth without embarrassment?							
Nothing	23	74.2	11	78.6	34	75.6	0.388
Very little	0	0.0	1	7.1	1	2.2	
Little	4	12.9	1	7.1	5	11.1	
Moderately	0	0.0	1	7.1	1	2.2	
Severely	2	6.5	0	0.0	2	4.4	
Very severely	2	6.5	0	0.0	2	4.4	
Maintain normal emotional state without anger?							
Nothing	18	58.1	11	78.6	29	64.4	0.506
Very little	8	25.8	2	14.3	10	22.2	
Little	5	16.1	1	7.1	6	13.3	
Moderately	0	0.0	0	0.0	0	0.0	
Severely	0	0.0	0	0.0	0	0.0	
Very severely	0	0.0	0	0.0	0	0.0	
Do all the work or socialize in a normal way?							
Nothing	29	93.5	13	92.9	42	93.3	0.377
Very little	0	0.0	0	0.0	0	0.0	
Little	2	6.5	0	0.0	2	4.4	
Moderately	0	0.0	1	7.1	1	2.2	
Severely	0	0.0	0	0.0	0	0.0	
Very severely	0	0.0	0	0.0	0	0.0	
Enjoy contact with people?							
Nothing	31	100.0	14	100.0	45	100.0	1.000
Very little	0	0.0	0	0.0	0	0.0	
Little	0	0.0	0	0.0	0	0.0	
Moderately	0	0.0	0	0.0	0	0.0	
Severely	0	0.0	0	0.0	0	0.0	
Very severely	0	0.0	0	0.0	0	0.0	

Table V. Global OIDP effect in patients with orthodontic treatment.
Statistical probability was obtained with Fisher's test for comparison of occurrence frequency
of the severity categories between female and male patients.

Global OIDP effect	Female (n = 31)		Male (n = 14)		Total (n = 45)		p
	No.	%	No.	%	No.	%	
Nothing	0	0.0	0	0.0	0	0.0	1.000
Very little	24	77.4	11	78.6	35	77.8	
Little	6	19.4	3	21.4	9	20.0	
Moderate	1	3.2	0	0.0	1	2.2	
Severe	0	0.0	0	0.0	0	0.0	
Very severe	0	0.0	0	0.0	0	0.0	

Note: No statistically significant differences were found between men and women for the Global Effect of the OIDP (Oral Impact on Daily Performances) test.

Table VI. Number and percentage of cases per cause of impact (oral condition that causes the discomfort) in patients with orthodontic treatment by gender. Statistical probability (p) was obtained with Fisher's exact test for comparison of occurrence frequency of the severity categories between genders.

Oral condition (activity/behavior) that causes the discomfort:	Female (n = 31)		Male (n = 14)		p
	No.	%	No.	%	
Orthodontic appliance	31	100.0	14	100.0	1.000
Ulcer	26	83.9	9	64.3	0.244
Sensitive tooth	19	61.3	8	57.1	1.000
Loose tooth	3	9.7	4	28.6	0.180
Bleeding gums	5	16.1	2	14.3	1.000
Tooth pain	5	16.1	1	7.1	0.648
Bad breath	4	12.9	0	0.0	0.294
Other reason	0	0.0	1	7.1	0.311

Note: None of the impact causes referred by patients showed statistically significant differences between genders. No case was mentioned for the following causes: dental caries, fractured tooth, missing tooth, teeth color, teeth position, teeth shape or size, gum retraction, deformity of the mouth or face, clicking or mandibular noises, defective restorations or crowns, loose or ill-fitting denture.

Table VII. Number and percentage of cases per total number of reported discomforts with orthodontic treatment by gender and total. Statistical probability (p) was obtained with Fisher's exact test for comparison of occurrence frequency of number of discomforts between genders.

Total number of discomforts reported by patients	Female (n = 31)		Male (n = 14)		Total (n = 45)		p
	No.	%	No.	%	No.	%	
No discomfort	0	0.0	0	0.0	0	0.0	0.00027*
1 discomfort	0	0.0	6	42.9	6	13.3	
2 discomforts	6	19.4	2	14.3	8	17.8	
3 discomforts	13	41.9	1	7.1	14	31.1	
4 discomforts	6	19.4	2	14.3	8	17.8	
5 discomforts	5	16.1	1	7.1	6	13.3	
6 discomforts	0	0.0	2	14.3	2	4.4	
7 discomforts	1	3.2	0	0.0	1	2.2	

* p < 0.001

Table VIII. Mean ± deviation of quantitative variables of the OIDP test (Oral Impacts on Daily Performances). Probability (p) was obtained with Student's T test for independent samples that assess if the observed differences between men and women are significant.

Variables assessed for the OIDP test	Male	Female	Total	P
Total number of OIDP discomforts	2.71 ± 1.94	3.45 ± 1.18	3.22 ± 1.48	0.205
Total score of OIDP intensity	5.36 ± 4.48	7.29 ± 4.26	6.69 ± 4.37	0.173
Mean intensity of the OIDP discomforts	1.83 ± 0.58	2.03 ± 0.61	1.97 ± 0.60	0.301
Total number of OIDP impact causes	2.79 ± 1.53	3.00 ± 0.97	2.93 ± 1.16	0.635

Note: No statistically significant differences were observed between genders for any of the assessed variables, not with the Student's T test or with the Mann-Whitney U test.

2. The majority of patients (77.8%) had a very mild effect on OIDP and the activities most affected were: cleaning or brushing teeth, eating and enjoying food, and sleeping and relaxing.
3. The most common discomfort determinants mentioned by the participants were: the presence of orthodontic appliances (100%), ulcers (46%) and sensitive teeth (36.7%).

Acknowledgements

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