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Self-perception of orofacial appearance: Brazil–Finland cross-national study

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ABSTRACT

Objective: (i) To study the measurement invariance of Orofacial Esthetic Scale (OES) and Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ), (ii) to compare the perception of orofacial appearance (OA) and (iii) to study the frequency of individuals who have sought or received aesthetic dental treatment between Brazil and Finland.

Methods: This was a cross-sectional observational study with snowball non-probability sample selection. Students and staff from universities in Finland and Brazil were invited to participate. Data were collected online using a demographic questionnaire, OES and PIDAQ. The samples consisted of 3636 Finns (75.0% female; age: 32.0 years) and 1468 Brazilians (72.6% female; age: 33.2 years). The frequency of receiving aesthetic dental treatment was estimated. If configurational invariance was observed, cross-national measurement invariance was verified by multigroup analysis. When measurement invariance was attested, factor scores were compared using Welch's t-test.

Results: OES showed configurational and measurement invariance and no significant difference between the countries. Despite similarity in satisfaction with OA, 71.9% of Brazilians had received aesthetic dental treatment, while 59.4% of Finns had never sought such treatments. PIDAQ did not present configurational invariance between the countries.

Conclusion: Although there is no difference in satisfaction with OA, seeking and receiving aesthetic dental treatment is significantly greater for Brazilians. Psychosocial impact of OA is perceived differently in the studied countries.

Introduction

Appearance and function of the orofacial components have a great influence on an individual's life. Facial expressions enable one to communicate even/also non-verbally and express feelings [1,2]. Personal assessment and social contexts support the construction of the concept of orofacial appearance (OA) by the individual. OA is important not only for individuals to construct their identity but also for their social interaction and insertion [3–6], which has led to an increase in concern related to OA. This is reflected in the increase in demand for aesthetic treatments in recent years [7], which occurs both in the desire to improve a physical aspect and also in relation to expectations involving emotional and psychosocial aspects [1,7,8]. Thus, if the health professional performing an aesthetic treatment wishes to develop a proper patient-centred treatment plan, it is important to understand and evaluate more broadly a patient's perception and expectations of OA and what leads them to seek this treatment.

Understanding the perception of OA is complex, since individual idiosyncratic behaviours, constructed from individual experiences and life in a specific culture, contribute to the formation of this perception [9]. Despite variability in perception of OA explained by idiosyncratic differences, some characteristics seem to be shared [9]. These can be individual or cultural characteristics [7,10–12]. Regarding individual characteristics, Campos et al. [10] observed that dental patients who have received aesthetic dental treatment and therefore like their own smile, dental appearance seems to have a lower psychosocial impact on their lives. Regarding cultural factors, it is a common thought that physical aspects (body and orofacial appearance) are perceived differently in

different cultures (culture-specific theory) [7], but some authors have observed agreement in the perception of traits (cross-cultural coherence theory) [11,12]. Therefore, studies that compare OA in countries with different cultures may be relevant for a better understanding of this perception.

Because perception of OA cannot be measured directly (latent variable), psychometric instruments are used. Two instruments for standardized measurement of OA are the Orofacial Esthetic Scale (OES) [13] (Supplemental File 1) that assesses satisfaction with OA and the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) [14] (Supplemental File 1) that assesses psychosocial impact of the appearance of teeth on an individual's life. Although the OES and PIDAQ were developed for prosthodontic patients and young orthodontic patients, respectively [13,14], previous studies have attested to adequate psychometric properties of these instruments when applied to different sample settings, including the general population [10,15–24]. In addition, a previous study [16] and a previous analysis (Supplemental File 2) found strong correlation between OES factor and PIDAQ factors. Thus, since the constructs evaluated in OES and PIDAQ are distinct and present high correlation, it becomes interesting the simultaneous application of OES and PIDAQ to explore the perception of OA more deeply.

When using the instruments for cross-national comparisons, the validity and reliability of the data should be firstly analysed [25]. Then, a study should be done to determine whether the used instruments operate similarly between countries (measurement invariance) [25]. It should be mentioned that this analysis is mandatory to ensure that scores obtained in different populations using psychometric instruments can be interpreted in the same way and therefore direct comparisons are allowed [26]. If the measurement invariance is not performed or the non-invariance between different populations is observed, the results of comparisons may lead to erroneous conclusions. This may occur because the latent phenomenon may differ between populations, making scores not comparable [26].

To the best of our knowledge, no previous studies compared the perception of OA using a standardized method and preserving the latent nature of this variable between countries with different cultures. Thus, the present study was conducted to build evidence about the influence of culture on the perception of OA. Information related to receiving aesthetic dental treatment in different countries was also collected. It is noteworthy that this type of treatment involves, in addition to improving the physical aspect, social and behavioural aspects [27]. To study receiving aesthetic dental treatment together with the perception of OA can produce knowledge about the real demands and expectations of individuals from different cultures who seek aesthetic dental treatment.

The aims of this study were (i) to study the measurement invariance of the OES and the PIDAQ, (ii) to compare the satisfaction with OA and the psychosocial impact of dental aesthetics and (iii) to study the frequency of individuals who have sought or received any aesthetic dental treatment between Brazil and Finland. It was hypothesized that comparison between Brazil and Finland, countries with geographical differences and cultural discrepancies, would result in a difference in perception of OA as suggested in culture-specific theory [7].

Methods

Study design and sampling

This is a cross-sectional study with non-probability snowball sample selection. Initially, students over the age of 18 years and staff from two universities in Finland (Tampere University and University of Oulu) and from five public universities in the São Paulo State, Brazil (UNESP, USP, UNICAMP, UNIFESP and UFSCAR) were invited by email to participate in the study. Then, a snowball strategy sampling was used to expand the samples. For this purpose, participants were asked to forward the survey link to their personal contacts. The researchers provided guidance for distributing the link *via* email or social media. The convenience and snowball sampling strategies were chosen since data collection took place during the Covid-19 pandemic, which would not make another sampling strategy feasible that would meet the aims of the present study.

The minimum sample size was calculated following the proposal of Hair et al. [28], who recommend a minimum of 10 participants per parameter of a factorial model to be tested. The largest factorial model to be tested is the first-order factorial model of PIDAQ, which has 54 parameters (24 items + 24 errors + 6 correlations). Therefore, the minimum sample size required for each country is 540 individuals. A higher number of participants was recruited to increase the variability and the representativeness of the data for the study populations.

Information on sex, age, monthly income, whether the individual is currently a dental patient, likes their own smile, anything bothers them about her/his smile and whether the individual has sought or received any aesthetic dental treatment was collected. The frequencies were estimated with a 95% confidence interval and comparisons between countries were performed using the z test ($\alpha = 5\%$). The satisfaction with orofacial appearance and the psychosocial impact of dental aesthetics were studied by the OES [13,15,16] and the PIDAQ [14,16,29], respectively.

Procedures and ethical aspects

Data collection was carried out online between 16 June and 30 July 2020. The invitation email contained information regarding the aims of the study and a link to the online questionnaire, which was created with the LimeSurvey software (LimeSurvey GmbH, Hamburg, Germany; URL http://www.limesurvey.org) on the server of Tampere University, Finland. To start the questionnaire, the participant gave informed consent. The demographic questions, including dental information, were initially presented followed by OES and PIDAQ in random order. Responses to OES and PIDAQ items was mandatory.

In Finland, approval for data collection was obtained from the Data Protection Officer of Tampere University, in accordance with the European Union's General Data Protection Regulation. The approval was included in the invitation message. In Brazil, the study was approved by the Research Ethics Committee of São Paulo State University (Unesp), School of Dentistry, Araraquara (CAAE: 88600318.3.0000.5416).

Measurement instruments

The OES is a one-factor scale containing seven items rated in a 11-point numeric scale (from 0: very dissatisfied to 10: very satisfied) [13]. An eighth item, which is not considered in the factorial model, is also present on the scale and evaluates the satisfaction with the overall orofacial appearance (Supplemental File 1). The Finnish (OES-Fi) and Portuguese (OES-Pt) versions of the OES were used [15,16].

The PIDAQ was originally developed with 23 items distributed into four factors (dental self-confidence, social impact, psychological impact, aesthetic concern) [14]. Responses were given in a five-point Likert-type scale (0: I do not agree, 1: I agree a little, 2: I somewhat agree, 3: I strongly agree and 4: I agree very strongly). The Finnish (PIDAQ-Fi) and Portuguese (PIDAQ-Pt) versions were used [16,29]. In both versions, the 24th item, which considers the colour of the teeth, was included in the dental self-confidence factor (Supplemental File 1) [10,16].

Data validity and reliability

To certify that the data obtained at present study is valid and reliable, a previous study [16] verified the fit of the factorial models of OES-Fi and PIDAQ-Fi for the data of the Finnish sample using Confirmatory Factor Analysis. Although previous studies have attested the psychometrics properties of the Portuguese versions of OES [15] and PIDAQ [10], the present study used a different sample setting and method of administering the instruments (paper-pencil vs. digital online). This may affect the way that the participants answer the items and how the instruments capture the proposed concept [30]. Therefore, the fit of the factorial models for the Brazilian sample was verified. The results are shown in Supplemental File 2.

Cross-national measurement invariance and comparison of factor scores

The configurational, metric and scalar invariances were evaluated to verify if the performance of the measuring instruments is the same between the Brazilian and Finnish samples. When configurational invariance of the factor model was observed between countries, cross-national measurement invariance was verified by multigroup analysis using the CFI difference for factor loadings (ΔCFI_λ), intercept (ΔCFI_i) and residuals (ΔCFI_{res}) [31]. Values of $|\Delta CFI|$ lower than 0.01 were indicative of measurement invariance. It is worth clarifying that cross-national invariance is necessary to compare the mean scores between countries. Thus, if configurational or measurement invariance was not observed, direct comparisons between the countries is limited. The analyses were performed using the 'lavaan' [32] and 'semTools' [33] packages of the R program (R Core Team, 2016).

When configurational and measurement invariance of the instruments were observed between countries, the factor scores were calculated for each country from the mean of the responses to the items. Homoscedasticity of the factor scores in different countries was evaluated by the Levene's test. If homoscedasticity was observed, the factor scores were compared using t-test with equal variances. Otherwise, the comparison was performed using Welch's t-test. The significance level adopted was 5%. The analyses were performed using IBM SPSS Statistics 22 (IBM Corp., Armonk, NY, USA).

Responses to OES and PIDAQ items

The mean scores to the items were calculated for the subgroups obtained from the crossing of the following variables: country (1 = Finland, 2 = Brazil), whether the individual has received any aesthetic dental treatment (0 = no, 1 = yes), whether the individuals like their own smile (0 = no, 1 = yes) and whether something bothers the individuals about their smile (0 = no, 1 = yes). The interaction of these variables was evaluated using a hierarchical log-linear analysis with backward elimination and Poisson's probability model [34]. The significance of the log-linear models was assessed using G^2 and χ^2_p statistics adopting a significance level of 5%. The mean responses to the OES and PIDAQ items according to the subgroups were plotted on a radar chart. The analyses were performed using IBM SPSS Statistics 22 (IBM Corp., Armonk, NY, USA), Microsoft® Excel for Mac (v.16).

Results

A total of 5104 individuals participated in the study. The mean age in the Finnish sample ($n = 3636$) was 32.0 (95%CI: 31.6–32.3) years and in the Brazilian sample ($n = 1468$) 33.2 (95%CI: 32.5–33.9) years. The characteristics of the participants according to the country is shown in Table 1. In both samples, the majority of the participants were female, reported not being currently under any dental care, liked their own smile and reported that some specific aspect of their smile bothers them. Regarding aesthetic dental treatment, the difference between the countries was observed, with the majority of the Brazilian participants reporting having received this treatment, while the majority of Finns reported never having sought or received such a treatment.

Cross-national measurement invariance and comparison of factor scores

The OES showed configurational and measurement invariance between the countries ($\Delta CFI_\lambda = -0.002$, $\Delta CFI_i = -0.004$, $\Delta CFI_{res} = -0.013$). For the Finnish sample, the OES

Table 1. Participants' characteristics (% (95% confidence interval = 95%CI)).

	Sample (% (95%CI))		z test[a]
Characteristic	Finnish (n = 3636)	Brazilian (n = 1468)	p value
Sex			
Female	75.0 (73.6–76.4)	72.6 (70.3–74.9)	.128
Male	23.4 (22.0–24.8)	27.1 (24.8–29.4)	.157
Other/no response	1.6 (1.2–2.0)	0.3 (0.0–0.6)	.837
Marital status			
Single	66.5 (65.0–68.0)	62.3 (59.8–64.8)	.023
Married/common law stable relationship	28.8 (27.3–30.3)	32.9 (30.5–35.3)	.104
Divorced	4.5 (3.8–5.2)	4.0 (3.0–5.0)	.872
Widower	0.2 (0.1–0.3)	0.8 (0.3–1.3)	.860
Are you undergoing dental treatment?			
No	83.6 (82.4–84.8)	77.5 (75.4–79.6)	<.001
Yes	16.4 (15.2–17.6)	22.5 (20.4–24.6)	.022
Have you sought or received any aesthetic dental treatment?			
I have never sought aesthetic dental treatment	59.4 (57.8–61.0)	18.1 (16.1–20.1)	<.001
I have sought aesthetic dental treatment, but have not received it	2.2 (1.7–2.7)	10.0 (8.5-11.5)	.033
I have received or I am currently receiving aesthetic dental treatment	38.4 (36.8–40.0)	71.9 (69.6–74.2)	<.001
Do you like your smile?			
No	26.2 (24.8–27.6)	22.5 (20.4–24.6)	.182
Yes	73.8 (72.4–75.2)	77.5 (75.4–79.6)	.016
Does anything bother you about your smile?			
No	37.7 (36.1–39.3)	29.0 (26.7–31.3)	.001
Yes	62.3 (60.7–63.9)	71.0 (68.7–73.3)	<.001

[a]z test: to compare prevalence between Finnish and Brazilian samples.

Table 2. Distribution of the participants according to country, if individual has received aesthetic dental treatment, if the individual likes their smile and whether something bothers the individual about her/his smile.

		Finland		Brazil		
		Aesthetic dental treatment		Aesthetic dental treatment		
Liking own smile	Something bothers about smile	No	Yes	No	Yes	Total
No	No	48	21	2	1	72
	Yes	528	350	106	221	1205
Yes	No	819	470	126	296	1711
	Yes	826	546	176	535	2083
	Total	2221	1387	410	1053	5071

mean score was 7.01 (standard deviation = 1.58) and for Brazil was 7.05 (standard deviation = 1.69), which points to positive valence of satisfaction with OA in both countries. The data for each country presented non-severe violation of normal distribution ($|sk| < 0.81$ and $|ku| < 0.57$) and heteroscedasticity between the countries was observed (Levene's test: $F = 7.60$, $p = .006$). No statistically significant difference was observed between countries (Welch's t-test: $t = -0.85$, $p = .40$). Despite this result, it is worth noting the significant difference observed in the frequency of seeking and receiving aesthetic dental treatment between countries.

The PIDAQ factorial model did not present configurational invariance between Finnish and Brazilian samples (PIDAQ-Fi: exclusion of items 9, 13, 14 and 15; PIDAQ-Pt: exclusion of item 6). Therefore, cross-national measurement invariance and comparisons of factor scores have not been performed for this instrument.

Responses to OES and PIDAQ items

Table 2 presents the distribution of the participants according to country, whether the individual has received any aesthetic dental treatment, like their own smile and anything bothers the individuals about their smile. According to the hierarchical log-linear modelling, a statistically significant

association was observed between the variables ($G^2(3) = 2.42$, $p = .490$; $\chi^2 p(6) = 2.46$, $p = .484$). The most parsimonious model to describe the distribution of the observed data presents the following interactions: aesthetic dental treatment and something bothers the individual about their smile; country, aesthetic dental treatment and liking own smile and country, liking own smile and something bothers the individual about their smile. The parameter estimates of the final log-linear model are shown in Table 3. Therefore, the interaction between these variables was considered for subsequent analyses.

The frequency of individuals in the four groups that simultaneously reported not liking their own smile and that nothing bothers them about their smile (Table 2, first line) is extremely lower than the other groups. For this reason, their mean responses were not considered in the following plot. Figure 1 shows the radar plot for mean scores to OES and PIDAQ items according to the groups established by the variables presented in Table 3. Three clusters can be noticed, which clusters are not related to different countries. In addition, whether the individuals have received any aesthetic dental treatment was also not related to the clusters. Whether the individuals like their own smile and whether they are bothered by something about their own smile were the variables for clustering. Individuals who like their own

Table 3. Estimates of the parameters of the final log-linear model considering the interactions between country, if individual has received aesthetic dental treatment, if the individual likes their smile and whether something bothers the individual about her/his smile.

Parameter[a]	Estimate	Standard error	95% CI	z	p
Constant	6.28	0.04	6.19–6.36	150.50	<.001
[Country = 1]	0.04	0.06	−0.07–0.15	0.73	.465
[Treatment = 0]	−1.08	0.07	−1.23–−0.94	−15.03	<.001
[Like smile = 0]	−0.88	0.08	−1.04–−0.73	−11.14	<.001
[Something bothers in smile = 0]	−0.573	0.06	−0.70–−0.45	−8.93	<.001
[Treatment = 0]*[Something bothers about smile = 0]	0.19	0.07	0.06–0.32	2.85	.004
[Country = 1]*[Treatment = 0]*[Like smile = 0]	1.92	0.13	1.68–2.18	15.08	<.001
[Country = 1]*[Treatment = 0]*[Like smile = 1]	1.48	0.08	1.32–1.63	18.82	<.001
Country = 1]*[Treatment = 1]*[Like smile = 0]	0.41	0.10	0.21–0.613	4.06	<.001
[Country = 2]*[Treatment = 0]*[Like smile = 0]	0.36	0.14	0.09–0.63	2.64	.008
[Country = 1]*[Like smile = 0]* [Something bothers about smile = 0]	−2.09	0.14	−2.37–−1.81	−14.76	<.001
Country = 1]*[Like smile = 1]* [Something bothers about smile = 0]	0.39	0.08	0.24–0.54	5.15	<.001
Country = 2]*[Like smile = 0]* [Something bothers about smile = 0]	−4.18	0.58	−5.33–−3.04	−7.17	<.001

[a]Parameters with redundant estimates (sum of parameters is null) have been eliminated to simplify the presentation. Reference values: country: 1 = Finland, 2 = Brazil; treatment (whether individual has received any aesthetic dental treatment): 0 = no, 1 = yes; like smile (whether the individuals like their own smile): 0 = no, 1 = yes; and something bothers about smile (whether something bothers the individuals in their smile): 0 = no, 1 = yes.

smile and who reported that nothing bothers them about their smile (continuous lines) presented numerical values of the means related to a lower psychosocial impact of dental aesthetics and a greater satisfaction with their facial appearance. The opposite was observed for individuals who do not like their own smile and who reported that something bothers them about their smile (dotted lines). The third cluster, composed of individuals who like their smile but something bothers them about their smile (dashed lines), presented intermediate values in relation to the other two clusters.

In Figure 1, patterns of responses to the items in each factor can be observed. For OES, the cluster with individuals who do not like their own smile and who reported that something bothers them in their smile (dotted line) showed a higher mean value in item 7 ('gum's appearance') in relation to the other items. For the other two clusters, the mean response to items forms a figure that resembles an octagon, with no apparent discrepancy between them.

For PIDAQ factors, all clusters showed lower mean values in items 17 ('My teeth are attractive to others') and 24 ('I find my teeth colour to be very nice') in the dental self-confidence factor and higher value in items 3 ('I envy the nice teeth of other people') and 20 ('I wish my teeth looked better') in the Psychological Impact factor. The cluster with individuals who do not like their own smile and who reported that something bothers them about their smile (dotted line) presented lower mean values in items 13, 14 and 15 ('Sometimes I think people are staring at my teeth', 'I am somewhat inhibited in social contacts because of my teeth' and 'I sometimes catch myself holding my hand in front of my mouth to hide my teeth') from the social impact factor and in item 6 ('I am somewhat distressed when I see other people's teeth') from the psychological impact factor.

In general, there was a low psychosocial impact related to dental aesthetics in the lives of individuals (mean (standard deviation)) of PIDAQ factor scores: Brazil – dental self-confidence = 1.93 (1.04), social impact = 0.56 (0.78), psychological impact = 1.06 (0.99) and aesthetic concern = 0.82 (0.99); Finland – dental self-confidence = 1.95 (1.02), social impact = 0.57 (0.81), psychological impact = 0.87 (0.85) and aesthetic concern = 0.69 (0.90)). However, as stated above, it is emphasized that the PIDAQ scores cannot be directly compared, since the operationalization of the concept is different between the countries.

Discussion

This cross-national study aimed to study the measurement invariance of the OES and PIDAQ factorial model. Furthermore, it aimed to compare the satisfaction with OA, the psychosocial impact of dental aesthetics and the frequency of individuals who have sought or received any aesthetic dental treatment between Brazilian and Finnish adults. This study emerged since OA has shown greater importance within dentistry, where the demand for treatments that improve OA has increased [7]. The identification of factors involved both in the perception of OA and in the demand for aesthetic dental treatment can assist the professional in the elaboration of a treatment that targets not only what the patients desire but also what they really need [6]. Thus, verifying the influence of culture on these aspects, by comparing countries with different characteristics, becomes relevant.

The OES presented measurement invariance and no statistically significant difference in mean scores between the countries, rejecting the hypothesis that the satisfaction with OA is different between Finland and Brazil. So, while there may be different beauty standards related to physical traits, the results support the cross-cultural coherence theory [11,12], which maintains that there is an agreement on the perception of specific aesthetic trait between different countries and cultures. Despite this, Brazilians had a higher frequency of individuals who had received any aesthetic dental treatment compared to Finns. It can be suggested that a cultural identity may be related to the value attributed to aesthetic dental treatment. Therefore, even though an aesthetic treatment aims to improve a physical aspect, it can also involve commercial behaviours, resulting in consumption habits and social prestige [27]. In addition, the latter are evident in countries with high social discrepancy, such as Brazil, which may explain the difference between countries. The idea that aesthetic treatment has also a consumerism component is supported by the result that having an aesthetic dental treatment had no influence on responses to the items
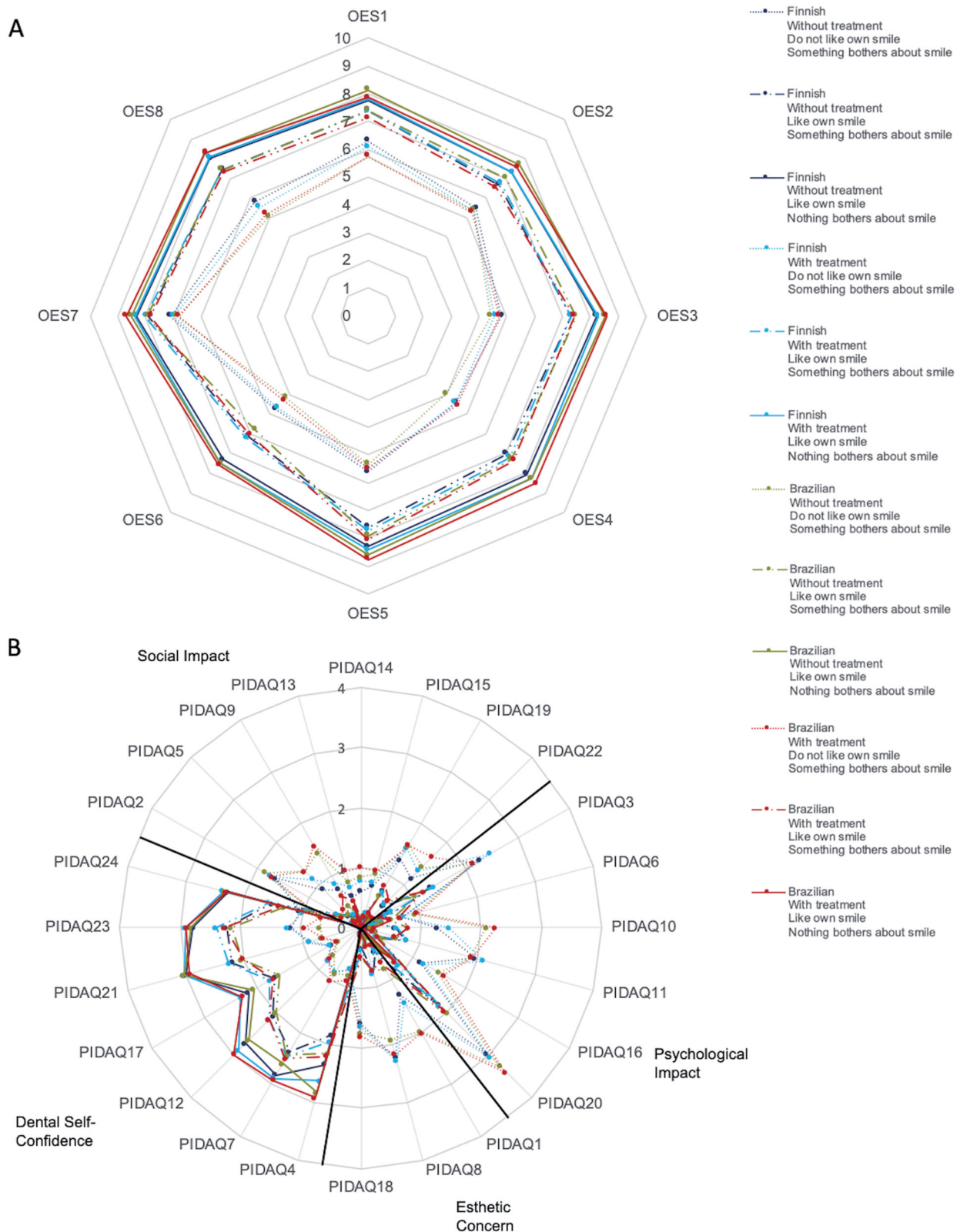
Figure 1. Mean scores given to the items of the Orofacial Aesthetic Questionnaire (OES) (A) and Psychosocial Impact of Dental Aesthetic Questionnaire (PIDAQ) (B) according to the interaction between the country, whether an individual has received any aesthetic dental treatment, whether the individuals like their own smile and whether something bothers the individuals about their smile.

of OES and PIDAQ. Thus, further investigations on the values of the aesthetic dental treatment in different social classes and cultures may be relevant.

Regarding the PIDAQ, configurational invariance was not observed. This finding shows that psychosocial impact of

dental aesthetics is assessed differently in Brazil and Finland and points to a difference in how individuals perceive this impact on their lives. This could be because of the different social and cultural context between Brazil and Finland, in which physical aspects, including orofacial components, can

have different meanings in social interactions and ways of expressing the body for society. Thus, unlike the concept of satisfaction with OA, the hypothesis of cultural differences (culture-specific theory) [7] can be accepted for the psychosocial impact of dental aesthetics.

Responses to the OES and PIDAQ items were found to be influenced whether the individual did not like his/her own smile and whether the individual was bothered by any specific physical aspect. Therefore, if the dentist aims to elaborate on a patient-centred treatment plan considering the concepts of the OES and PIDAQ, it is relevant to establish a dentist-patient relationship with good communication [35]. Thereby, the dentist will be able to identify the patient's concerns related to physical aspects of their smile and assess the risk-benefit of an aesthetic treatment. In addition, with the establishment of open dialogue, the dentist can instigate changes in the patient so that they can take pleasure in seeing their appearance. It is also noteworthy that some patients may present symptoms or disorders, such as body dysmorphic disorder or anxiety, and neither an aesthetic treatment nor a dentist-patient dialogue sufficiently satisfy the patient or reduce the psychosocial impact of OA in their life [36]. It is important for the dentist to be able to suspect or identify such cases and verify how many previous aesthetic procedures the patient has had and deciding to refer the patient to a professional (such as psychologist or psychiatrist) who can properly assess and treat their emotional and mental status [36].

Analysing the responses to the PIDAQ items, all clusters showed a lower mean for items 13, 14 and 15 than the other items of the same factor (social impact factor). These items have content related to characteristics of social interaction. The low means may be related to the period of data collection that was performed in both countries during the Sars-Cov-2 pandemic and period of social isolation to control the spread of the virus. The difference in the pattern of responses in item 17 ('My teeth are attractive to others') of the dental self-confidence factor should be investigated since it is the only item in this factor that corresponds to external judgement. Two aspects can be considered to justify this difference: the individuals did not consider external judgement important or, conversely, the individuals' answers were low values in this item because they may be more sensitive to the way others view their appearance. However, it is not possible to speculate about this since additional information would be needed. The same aspects can be considered to explain the difference in item 24 ('I find my teeth colour to be very nice') since the colour of teeth is the main component of the smile in external evaluation. The high responses in item 20 ('I wish my teeth looked better') deserves attention since the excess of desire to improve appearance may be related to some symptoms or disorders (as previously discussed) and signs of addiction to aesthetic treatment [36]. Health professionals are responsible for verifying how many previous aesthetic procedures the patient has had and deciding to refer the patient to a professional who can properly assess and treat their emotional and mental status [36].

The convenience sample design was a limitation of the study, which may affect the generalizability of the results for the whole population in the countries. However, it should be noted that the measurement invariance of the OES and PIDAQ was observed between independent samples from both countries [10,15,16], supporting the stability of validity of the results obtained by these instruments. In addition, we sought to obtain a large sample in both countries in an attempt to obtain the results more comprehensive and to approximate to population variability. Online data collection can also be considered a limitation, especially in Brazil, since generally people who have access to the internet have a higher level of education and are at a higher socioeconomic level. As noted by Alhajj et al. [37], individuals with these characteristics tend to be more concerned with oral health, have greater access to treatments and better hygiene conditions, which leads to greater satisfaction with OA. Thus, the online data collection can hinder the generalization of the results for the whole population. It is noteworthy that data collection occurred during the pandemic and social isolation; therefore, the online data collection was a feasible strategy for that. Furthermore, the impossibility of comparing the results of this study with those of previous studies that used OES and PIDAQ in different countries is highlighted. This is due to methodological differences applied in the studies (e.g. score calculation, response scale, number of items) and, mainly, due to the impossibility of evaluating the measurement invariance between populations. The measurement invariance is a way of attesting that the latent phenomenon assessed by the psychometric instrument is similar between different populations, and therefore, scores can be directly compared [25,26]. Thus, we recommend that researchers join efforts to conduct cross-national studies following the recommendations for appropriate measurement invariance procedures in order to unveil cultural factors involved in the perception of OA.

Despite its limitations, this cross-national study provides evidence on the perceptions of OA in countries with large cultural differences, paving the way for a discussion about the values of aesthetic treatments in different cultures. It is also expected to contribute with dentists in Finland and Brazil so that they can use the OES and PIDAQ in clinical practice. Based on the mean scores of the general population provided by the study, they will be able to identify information related to the importance that OA has in their patients' lives and then to develop a patient-centred treatment plan. In addition, the study provides subsidies for dentists who practice aesthetic treatment to reflect on their social role as health professionals. This reflection extends to dentists around the world, since body aesthetics, including OA, can be considered a form of capital (aesthetic capital) [38].

Conclusion

There was no difference in satisfaction with OA between Brazil and Finland. Despite this, seeking and receiving aesthetic dental treatment is significantly greater for Brazilians

than Finns. In addition, although participants from both countries responded similarly to OES and PIDAQ items, the psychosocial impact of OA is perceived differently between them. It points to a cultural influence on the perception of this impact.

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