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Cross-cultural adaptation of PIDAQ questionnaire to evaluate the psychosocial impact of dental esthetics in Chilean adolescents with malocclusion

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Abstract

Background: The Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) is a useful index to assess aspects of malocclusion that impact individuals' oral health-related quality of life. This study aimed to perform cross-cultural adaptation of the PIDAQ questionnaire to the language of the Chilean adolescent population. **Methods:** We used the framework of the Guidelines for the Transcultural Adaptation Process of self-reports and the Manuals for a language inclusive for the transcultural adaptation of the PIDAQ. The instrument was tested with 34 Chilean adolescents with malocclusion between 11 and 17 years of age. We evaluated equivalence considering criterion, content, and construct validity according to COSMIN methodology and performed Cronbach's alpha statistical test. Twenty-three items in the questionnaire were tested according to how clear and understandable the questions were to the reader and according to a Likert scale graduated in: not at all clear, unclear, clear, or very clear. For temporal stability, we calculated intraclass correlation coefficients (ICC). **Results:** We obtained a more than acceptable reliability with a Cronbach's Alpha of 0.95 for the total questionnaire. The questions grouped according to the dimensions of dental self-confidence, social impact, psychological impact, and esthetic concern obtained a Cronbach's Alpha of 0.95, 0.95, 0.95 and 0.94, respectively. The questionnaire showed high temporal stability at the test-retest with a total Intraclass Correlation Coefficient of 0.91 (0.89-0.91). **Conclusion:** The cross-cultural adaptation of the PIDAQ questionnaire achieved equivalence with the original instrument and obtained reliability and content, and construct validity in Chilean adolescents.

Keywords

PIDAQ, malocclusion, adolescent, index, oral health quality of life, Chile

Introduction

Malocclusions, a condition characterized by the misalignment of teeth and improper bite, are highly prevalent worldwide. Ranked third in prevalence after dental caries and periodontal disease, they affect many of the population, including children and adolescents (De Ridder et al., 2022). In Chile, several studies support these global findings, with reported prevalence rates ranging from 38.3% to 96.2% among young people while the global prevalence is estimated to be around 56% (Lombardo et al., 2020). The impact of malocclusions is not only limited to oral health but extends to an individual's overall quality of life (QoL), particularly in children and adolescents who may be more vulnerable to psychosocial challenges.

Malocclusions negatively influence both the physical and psychosocial dimensions of an individual's well-being (Baskaradoss et al., 2022). Limitations include difficulties with chewing, speech impairments, and increased susceptibility to dental trauma. On the psychosocial level, malocclusions can lead to diminished self-esteem, social isolation, and a higher risk of bullying, as children and adolescents with noticeable dental irregularities may face negative social perceptions and stigma (Taibah and Al-Hummayani, 2017).

The link between malocclusions and oral health-related quality of life (OHRQoL) has been well established (Göranson et al., 2023). OHRQoL is a multidimensional construct that encompasses an individual's subjective perceptions of oral health, functional well-being, emotional states, and overall satisfaction with their appearance and self-acceptance (Marshman and Robinson, 2007). For

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children and adolescents, the impact of malocclusions extends beyond oral function, as it can affect their confidence, social interactions, and even academic performance. Individuals with severe malocclusions are more likely to experience embarrassment, anxiety, and a lower sense of social belonging, all of which are detrimental to their overall quality of life (Baskaradoss et al., 2022).

Given the influence of malocclusions on both physical health and psychosocial well-being, addressing this condition early, particularly in growing children and adolescents, can improve both their OHRQoL and overall quality of life (Tsichlaki et al., 2021).

Patients who choose to undergo orthodontic treatment are often more motivated by the anticipated improvements in appearance, self-image, and social acceptance than by the resolution of a physical ailment. Consequently, there is increasing recognition that the psychosocial benefits of orthodontic treatment are, in many cases, the outcomes most desired by patients (Ao et al., 2020). However, the assessment of needs and outcomes in orthodontic treatment continues to be conducted primarily using clinician-reported outcome measures (CROMs), which fail to capture the psychosocial dimensions of malocclusions (Borzabadi-Farahani, 2011).

There are various tools to measure patient-reported outcome measures (PROMs), thereby broadening the assessment to include aspects related to OHRQoL (Santiwong et al., 2022). The Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) is specifically designed to evaluate the psychosocial impact of malocclusions on OHRQoL (Klages et al., 2015).

In Chile, dental care services are delivered through a combination of public and private sectors. The National Health Fund (FONASA) covers approximately 75% of the population, primarily those from low- and middle-income groups. Dental services under FONASA are provided in primary care centers, focusing on preventive and interceptive care, including orthodontics. Patients with severe malocclusions are referred to secondary centers, which face high demand and long waiting lists. The remaining 25% of the population receives care through Private Health Institutions (ISAPRE), accessible to individuals with private health insurance. Given this structure, the demand for orthodontic treatment that remains unmet by the public sector has increased. In this context, prioritizing treatment is essential. Employing PROMs, such as the PIDAQ, would provide a valuable complement to normative clinical indices to assess the need and priority for treatment (Castillo-Laborde et al., 2017).

When employing a questionnaire developed in one language for use in a different linguistic and cultural context, it is necessary to translate and adapt it to preserve its psychometric properties while considering the social and cultural characteristics of the new setting (Wild et al., 2005). Although a Spanish version of the PIDAQ exists (Montiel-Company et al., 2013) it has not been adapted to the cultural and societal norms of Latin America. Considering the growing importance of such instruments, this study aims to perform a cross-cultural adaptation of the PIDAQ for Chilean adolescents, incorporating inclusive language and a gender-sensitive approach.

Methods

The PIDAQ is self-administered, with 23 negatively and positively worded items, each answered on a five-point Likert scale (0 = not at all; 1 = a little; 2 = somewhat; 3 = strongly; and 4 = very strongly). It has one positive and

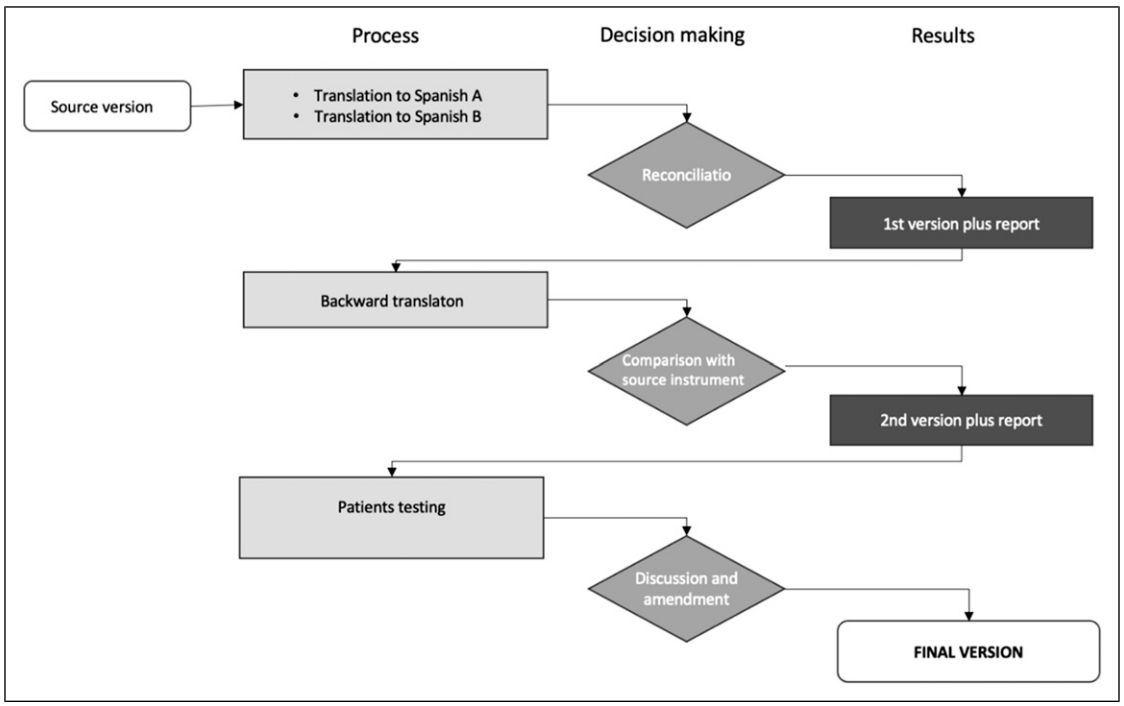

Figure 1. Cross-cultural adaptation process of a questionnaire (Beaton et al., 2000).

three negative domains, structurally composed of four subscales: aesthetic concern (AC; 3 items), psychological Impact (PI; 6 items), social impact (SI; 8 items), and dental self-confidence (DSC; 6 items). The original PIDAQ was written in English and has been adapted to different languages, settings, and population The cross-cultural adaptation was performed according to the guidelines for establishing cultural equivalence of instruments (Beaton et al., 2000) (Figure 1).

Cross-cultural adaptation began with a group of professionals with relevant expertise evaluating the pertinence of the domains of the original PIDAQ for the target population. The decision, reached by consensus, was that the items in the questionnaire could be used. Following this, direct translation was carried out independently by two native Chilean translators proficient in English. Subsequently, a backward translation into English was independently conducted by two native English-speaking translators fluent in Spanish and familiar with Chilean cultural nuances, both of whom were unaware of the study's objective.

A committee consisting of the research leader, an epidemiologist, a native English speaker, an orthodontist, and an adolescent reviewed the original, translated, and back-translated versions. After reaching consensus, the draft was revised according to the Manual for Non-Sexist Language. Semantic and idiomatic equivalence were achieved by ensuring that the translated items conveyed the same meaning as the original, and that colloquialisms communicated the intended message within the original domains. Experiential and conceptual equivalence were attained by ensuring that the items accurately captured participants' everyday experiences and reflected the same cultural and idiomatic concepts as the original.

The clarity of the translated items was assessed by 10 adolescents, who rated the understandability of each question using a 5-point Likert scale ranging from "not at all clear" (0) to "very clear" (5). Feedback from this pre-test, along with insights gathered from a focus group session led by the principal investigator, facilitated minor linguistic adjustments to enhance semantic and idiomatic equivalence. During the focus group, participants discussed the meaning and clarity of the questions to refine the wording. The final version was established after the expert panel, through consensus, confirmed that semantic, idiomatic, experiential, and conceptual equivalence had been achieved. The Scientific Ethical Committee of Health Sciences of the Catholic University of Chile approved this study (ID 211121001). The work was conducted according to the standards of the Helsinki Declaration and its later amendments.

The internal consistency and stability of the final version were tested with young people aged 11-17 years (mean 14.6 years) with different degrees of malocclusion commonly observed in typical orthodontic practice in Chile randomly selected from among 389 patients who requested orthodontic care at the Dental Clinic of the School of Dentistry of the Pontifical Catholic University. All belonged to the population of the Metropolitan Region of Chile and were from middle-income families. Parental consent was obtained from all participants. The inclusion criteria related to people of the relevant age attending a consultation about the need of orthodontic treatment. The exclusion criteria included intellectual or physical inability to answer the questionnaire; previous orthodontic treatment; the presence of caries, missing or chipped teeth, dark areas on the front teeth and depression or mental health symptoms (Navarro-Mateu et al., 2013). Sample size calculations were based Göranson and colleagues' (2021) data for PIDAQ scores for people needing and not needing orthodontic treatment, an alpha of 0.05 and a power of 95%. This a required a sample of 32 participants. Assuming a loss of 10%, the target was set at 40, a recommended value for temporal stability tests. The calculations were performed in the GPower® program (Faul et al., 2007).

PIDAQ was self-administered via a Google form while the patient was seated in the dental chair. An orthodontic trainee gave assistance but only intervened if the participant had any questions.

The internal consistency was tested with Cronbach's alpha and test-retest reproducibility with the intra-class correlation coefficient (ICC). For the test-retest reliability analysis, the same participants completed the questionnaire again, 30 days after the initial administration.

Alpha values above 0.7, with a maximum of 0.9 were considered acceptable for internal consistency. Similarly, ICC values exceeding 0.7 were regarded as adequate for evaluating temporal stability. We used Stata 17 [Stata Corp, College Station, TX, USA] for data analysis.

Results

Thirty-two participants completed the questionnaire initially and again within 30 days. The sample was normally distributed (Shapiro-Wilk test: 0.966, $p = 0.41$), consisting of 62.5% male and 37.5% female.

Content validity for all items was achieved when the committee agreed that the four equivalences were appropriately for the Chilean context. This was confirmed by good comprehension of the items by adolescents, as shown in Figure 2, suggesting that the questionnaire can be administered to this group in the same format as the original.

The reliability of the Chilean version of the PIDAQ ranged from acceptable to excellent, demonstrating robust internal consistency and temporal stability. Cronbach's alpha for the subscales ranged from 0.94 for AC to 0.96 for DSC, while the test-retest reliability showed an ICC of 0.91 (95% CI: 0.81–0.96) (Table 1).

Discussion

Malocclusions have psychosocial impacts (Ao et al., 2020; Iranzo-Cortés et al., 2020) and consequently, valid indicators of this dimension are needed. We selected PIDAQ as a multidimensional measure of orthodontic quality of life with good construct validity, both convergent and discriminant, as well as consistency in its scales. For this reason, we maintained the four-domain of the questionnaire without conducting exploratory factor analysis, as has been done in other translations (Santos et al., 2016). Therefore, the original adolescent version of the PIDAQ was translated

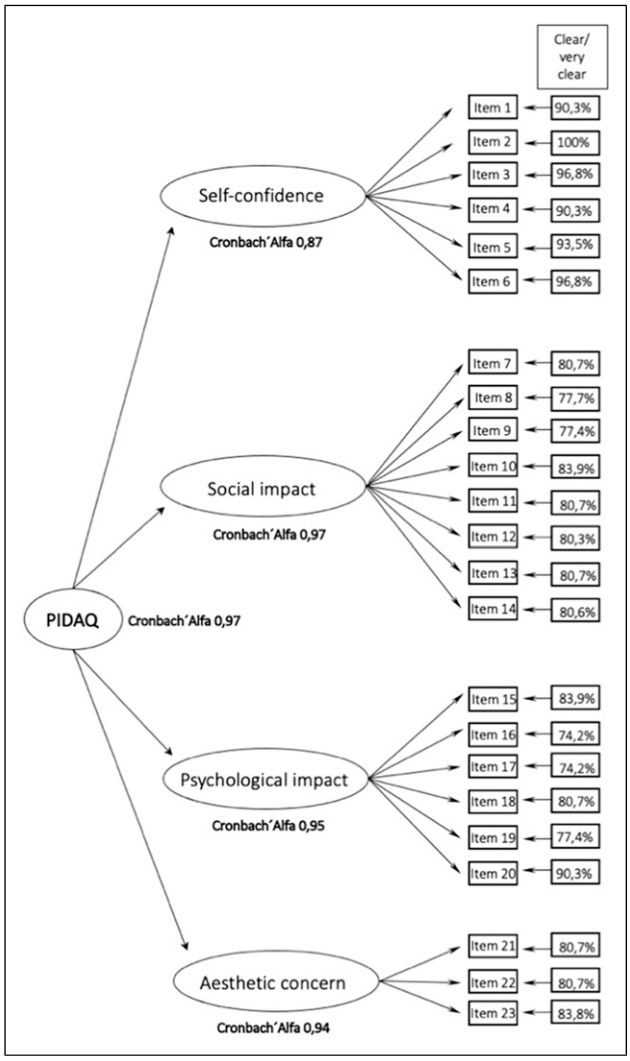

Figure 2. Assessment of adolescents' comprehension of the questionnaire items, confirming content validity and suitability of the four equivalences in the Chilean context.

(Klages et al., 2015), with only minor linguistic adjustments needed to ensure semantic and idiomatic equivalence. This was likely due to the meticulous cross-cultural adaptation during the translation.

The content validity of the adapted instrument proved capable of measuring the original PIDAQ constructs, adequately reflecting the contents of the four subscales (AC, PI, SI, DSC). The expert panel, eliminated irrelevant elements and modified those that required a higher linguistic approximation to obtain adequate semantic, idiomatic, experiential, and conceptual equivalence. Our version worded the items in the language of adolescents with a focus on gender identity and inclusive, non-discriminatory language, allowing the meanings of the questions to be brought closer to the semantics of adolescents, contributing to obtaining internal consistency.

Criterion validity was not reported in this study because there is no gold standard available for PROMs. However, we are currently conducting research to address this issue.

The reliability of the items in each subscale were stable and slightly higher than those of the original version, all covarying in the same direction and measuring the same phenomenon. This may be explained by the high interaction in social networks of young people, a culture of tribes that they consider more critical peer opinion than individual opinion (Steinsbekk et al., 2021). The ICC scores, which assess reproducibility, were generally suitable for all subscales. These scores were slightly closer to those in the original study (Klages et al., 2015).

Thus, the results obtained in this study for both reliability and stability were similar to versions in other languages (Campos et al., 2021).

The main limitation of this study is that the sample may not represent the population of Chilean adolescents. Nevertheless, the instrument has acceptable psychometric properties, making the Chilean PIDAQ suitable for future investigations.

Indices of OHRQoL can be considered for epidemiological studies. An increasing number of adolescents and young adults seek orthodontic care, primarily to resolve the psychological problems arising from malocclusion. PIDAQ can better assess the patient's needs than other instruments. Although the normative indices used in most epidemiological studies measure the severity of malocclusion by assessing anatomical mismatch, they ignore the perceptions and needs that individuals have about their malocclusions (Ao et al., 2020; Gherunpong et al., 2006). PIDAQ may identify individuals who would benefit the most from orthodontic treatment.

In conclusion, cross-cultural adaptation of the PIDAQ questionnaire achieved equivalence with the original instrument and obtained reliable content, and construct validity in Chilean adolescents.

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Ethical considerations

This study was approved by the Scientific Ethics Committee of the Faculty of Medicine of Pontificia Universidad Católica de Chile (CEC-MedUC, Project number 211121001).

Table 1. Total and domain specific values of Cronbach and ICC in the sample.

Domain	Numbers of items	Cronbach's alpha	ICC (95% CI)*
Dental self-confidence	6	0.955	0,913 (0.822 – 0.956)
Social impact	8	0.947	0,899 (0.794 – 0.885)
Psychological impact	6	0.946	0,897 (0.789 – 0.951)
Esthetic concern	3	0.939	0,885 (0.767 – 0.945)
Total	23	0.951	0,907 (0.808 - 0.956)

*Two-way random effects model: $p < .001$ for all values.

Consent for publication

All participants accepted to participate in this study.

Authors' contributions

HG designed the study. MT, YZ and MM collected the data. JV and DO were responsible for the statistical analysis. HG, MT, YZ and MM drafted the manuscript. JV and DO edited the manuscript. All authors read and approved the final manuscript.

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Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability Statement

The data are available upon request.

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