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Original Article

Cross-cultural adaptation, validation, and reliability assessment of the Persian version of the oral behaviour checklist for parafunctional habits in Persian-speaking populations

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Abstract

Background: Parafunctional oral habits, such as teeth grinding (bruxism) and clenching, significantly affect oral health and are frequently linked to psychological stress and anxiety. The Oral Behavior Checklist (OBC), a component of the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD), is an essential tool for evaluating these habits. However, a validated Persian translation of this checklist was previously unavailable. Consequently, this study aimed to translate the OBC into Persian and to assess its reliability and validity through an evaluation of dental students' parafunctional habits.

Methods: This cross-sectional study involved 270 dental students. The 21-item OBC underwent a rigorous translation and validation process, which included initial translation, expert review, back-translation, and achieving consensus. Its psychometric properties were evaluated using the content validity index (CVI), Cronbach's alpha, intraclass correlation coefficient (ICC), and exploratory factor analysis (EFA).

Results: The Persian version of the OBC revealed robust psychometric properties, exhibiting excellent validity (CVI = 0.95) and reliability (Cronbach's alpha = 0.67; ICC = 0.997). Furthermore, the analysis revealed a statistically significant correlation between participants' grade point average (GPA) and the occurrence of bruxism, with 45.18% of the subjects reporting teeth grinding or clenching on more than four nights per week.

Conclusion: The Persian version of the OBC is a valid and reliable tool for evaluating parafunctional habits among Persian-speaking individuals. Its utility lies in enhancing both clinical practice and educational strategies aimed at managing these behaviors.

Keywords: Validity, Reliability, Bruxism, Temporomandibular disorders, Habits

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Introduction

Oral parafunction describes atypical or excessive movements of oral structures, including the teeth, jaws, and tongue, that do not contribute to normal oral activities.[1,2] These parafunctional habits can stem from a range of etiologies, including stress, anxiety, malocclusion, sleep disturbances, pharmaceutical side effects, substance abuse, neurological conditions, and ingrained habits.[1,3] Tooth grinding and clenching are common oral parafunctions within the general population, with research indicating prevalence rates of up to 50% for grinding and 40% for clenching.[4-6] These habits can culminate in a range of adverse effects, such as tooth wear, muscle pain, temporomandibular disorders (TMD), gum recession, jaw pain, headaches, and an altered bite.[7-9]

Accurately identifying and effectively managing oral parafunctional habits is essential for preventing associated adverse effects and preserving optimal oral health.[10,11] Therapeutic approaches for these habits may encompass a range of interventions, including stress reduction techniques, the use of dental appliances, pharmacological management, and behavioral therapy.[12-14] The discomfort associated with TMD can substantially impair an individual's daily routines, compromise their psychosocial well-being, and diminish their overall quality of life.[15] Furthermore, parafunctional habits are recognized as a significant contributor to the development of masticatory system dysfunction, primarily through the repetitive

trauma they inflict, which is particularly crucial during the initial manifestation of TMD.[16] Furthermore, substantial psychosocial stress can precipitate TMD and may correlate with persistent TMD pain.[17] Consequently, prompt TMD diagnosis is crucial to avert subsequent complications.[18]

The assessment of these behaviors primarily relies on self-report questionnaires, such as the Oral Behavior Checklist (OBC). The Diagnostic Criteria for TMD (DC/TMD) guidelines specifically recommend the OBC for assessing parafunctional habits.[19] Previous research has effectively translated the OBC into several languages, such as Italian, Portuguese, and Turkish, confirming its reliability and validity within those populations.[20-22] However, the absence of a validated Persian version of the OBC currently restricts its use in Persian-speaking communities. This manuscript details the translation and psychometric evaluation of the Persian version of the OBC. The adaptation process adhered to recognized methodologies for cross-cultural tool development. Demonstrating the Persian version of the OBC's reliability and validity, this research provides a crucial instrument for assessing oral parafunctional habits within Persian-speaking communities. Ultimately, this contributes to enhanced diagnosis and treatment of TMDs, aligning with the DC/TMD guidelines.

It has been observed that dental students frequently experience significant stress throughout their academic careers. Furthermore, a relationship has been established between this stress and anxiety and the prevalence of oral parafunctional habits, such as teeth grinding and clenching.[23] Research consistently demonstrates considerable variability in TMD scores across different academic years of dental students. This observed fluctuation suggests a substantive correlation between TMD prevalence and oral parafunctional habits among this population.[23-25] Nour Eldin observed distinct differences in reported symptoms between fifth-year and first-year students: The former group experienced heightened tension and depressive symptoms, while the latter reported increased fear and respiratory issues.[26] Given the notable influence of oral parafunctions on an individual's overall well-being, it is imperative to address this concern, especially within populations susceptible to heightened stress and anxiety, such as dental students.

The present research aims to assess the prevalence of oral parafunctional habits among dental students in Kermanshah, Iran. It is crucial to acknowledge the importance of these habits in this demographic to facilitate the implementation of preventive strategies aimed at mitigating future adverse effects.

Methods

The current cross-sectional study was carried out in April 2022 at the Faculty of Dentistry, Kermanshah, Iran. The study population included all Persian-speaking dental students who had finished their foundational science coursework. A sample size comprising 270 students was established, guided by established recommendations for the development, translation, and validation of questionnaires in the fields of perioperative and pain medicine. This determination facilitated the achievement of adequate representation across various academic years through the implementation of stratified random sampling.[26,27] The sample size was determined by the structure of the OBC, containing 21 items. Following established statistical guidelines, particularly those for factor analysis, a minimum of 10 participants per item is generally recommended for the sample size calculation.[26,28] To ensure sufficient statistical power for the analysis, a minimum sample size of 210 participants was required, based on the questionnaire's 21 items. To further strengthen the study's reliability and accommodate for potential participant attrition or incomplete data, the sample size was increased to 270. This methodology guarantees statistically significant and reliable findings, thereby offering a thorough evaluation of the prevalence of parafunctional habits among dental students.

The OBC utilized in this study consisted of 21 questions, each offering five response options scored on a Likert scale from 0 ("never") to 4 ("all the time"). These questions were systematically categorized into two distinct groups: Sleep activities (2 items) and waking activities (19 items). For analytical purposes, both individual scores per question and a cumulative total score, ranging from 0 to 84, were computed.

The process of translating the questionnaire included multiple stages:

1. A bilingual expert initially translated the OBC from English to Persian.
2. A group of specialists in jaw and facial pain, oral medicine, and a Persian language editor reviewed and modified the translation.
3. A native speaker conducted a back-translation into English to verify accuracy and alignment with the original text.
4. The expert panel conducted a final review and reached a consensus to create the completed Persian version.

To establish construct validity, following the administration of the questionnaire to 270 dental students, Bartlett's test and the Kaiser-Meyer-Olkin (KMO) index were utilized. Test-retest reliability was evaluated by having a subgroup of 30 dental students complete the questionnaire on two separate occasions, with a two-week interval between administrations. The intraclass correlation coefficient (ICC) was subsequently computed to ascertain the consistency between the paired scores. Internal reliability was assessed via Cronbach's alpha coefficient, with a value of 0.7 or greater being

considered acceptable.

Results

The study involved 270 participants (134 (49.6%) men and 136 (50.4%) women). Table 1 details further socio-demographic characteristics, including age and marital status. The questionnaire yielded a mean total score of 26.32 ± 12.53.

The research initiated with the Persian translation of the OBC. Subsequently, a panel of six experts meticulously assessed each item to confirm its precision. This expert committee systematically evaluated all translated versions to establish semantic, idiomatic, experiential, and conceptual equivalence between the translated and original instruments. Discrepancies were meticulously addressed and reconciled, leading to a unanimous consensus on all items and the subsequent production of a pre-final version of the translated questionnaire.

The content validity of the questionnaire was assessed by analyzing the coefficients of individual items. With the exception of question 20, all items demonstrated favorable coefficients. Specifically, question 6 yielded a coefficient of 0.78, question 11 achieved 0.86, and questions 5, 7, 15, 17, and 21 all registered 0.93. The remaining questions obtained coefficients of 1. Despite the ongoing academic discourse regarding the classification of "yawning" as a parafunctional habit, question 20 was retained to preserve the fidelity of the translated instrument. The questionnaire's overall content validity was determined to be excellent, as evidenced by a content validity index (CVI) of 0.99.

To rigorously evaluate content validity, experts assessed each question on a scale from "completely agree" to "completely disagree." Their responses were used to compute the CVI and content validity ratio (CVR). All participating experts unanimously considered the questions to be essential. For the CVI, coefficients of at least 0.78 were predefined as acceptable, while for the CVR, scores of 0.99 or higher were considered acceptable. The initial validity analysis revealed that the majority of questions achieved acceptable CVIs, and every question successfully met the established CVR (Table 2).

The questionnaire's reliability was assessed using two distinct methods: Cronbach's alpha coefficient and the ICC, the latter being applied within a test-retest analysis. The reported Cronbach's alpha coefficient was 0.82, which suggests good reliability (Table 3). Furthermore, the ICC from the test-retest analysis yielded a coefficient of 0.99, signifying very good to excellent reliability. The ICC was also computed for each individual item on the questionnaire (Table 4).

Exploratory factor analysis (EFA) indicated that questions 1 and 2 lacked significant correlations with the remaining items and were therefore analyzed independently. Subsequent to their exclusion, the mean questionnaire score was determined to be 22.04 ± 12.42. All other questions exhibited appropriate correlations and meaningful interrelationships (Table 5).

The construct validity of the questionnaire was evaluated through the KMO measure and Bartlett's test of sphericity. The KMO measure, recorded at 0.898, indicated a high degree of sampling adequacy. Concurrently, Bartlett's test of sphericity yielded a statistically significant value of 2584.66 with a *P* value of less than 0.05, suggesting strong and acceptable levels of construct validity for the questionnaire. Factor analysis revealed that the

Table 1. Demographic characteristics of participants

Characteristic	Value	Count	Percent
Age	Mean: 25.48 (SD: 3.48)	-	-
GPA	Mean: 15.86 (SD: 1.08)	-	-
Gender			
Male	-	134	49.6%
Female	-	136	50.4%
Total gender	-	270	100.0%
Marital status			
Single	-	252	93.3%
Married	-	18	6.7%
Total marital status	-	270	100.0%

SD: Standard deviation; GPA: Grade point average

Table 2. Content validity index and content validity ratio for each question

Question	CVI	CVR
1	1.0	1.0
2	1.0	1.0
3	1.0	1.0
4	1.0	1.0
5	0.9	1.0
6	1.0	1.0
7	1.0	1.0
8	1.0	1.0
9	1.0	1.0
10	1.0	1.0
11	1.0	1.0
12	1.0	1.0
13	1.0	1.0
14	1.0	1.0
15	1.0	1.0
16	1.0	1.0
17	1.0	1.0
18	1.0	1.0
19	1.0	1.0
20	0.95	1.0
21	0.95	1.0
Total	0.99	1.0

CVI: Content validity index; CVR: Content validity ratio.

Table 3. Cronbach's alpha reliability coefficients for each question

Question	Cronbach's alpha
1	0.829527
2	0.845542
3	0.835331
4	0.838126
5	0.836590
6	0.831329
7	0.826613
8	0.820327
9	0.821654
10	0.813805
11	0.816473
12	0.813203
13	0.823748
14	0.820471
15	0.809977
16	0.820606
17	0.801822
18	0.816537
19	0.805854
20	0.805854
21	0.828979
Total	0.8295

Table 4. Intraclass correlation coefficients for questionnaire items

Question	ICC
1	1.0
2	1.0
3	1.0
4	1.0
5	1.0
6	0.98
7	1.0
8	1.0
9	1.0
10	1.0
11	1.0
12	0.99
13	0.99
14	1.0
15	0.97
16	1.0
17	1.0
18	1.0
19	1.0
20	0.97
21	0.95
Total	0.99

ICC: Intraclass correlation coefficient.

questionnaire primarily loaded onto a single factor, although four initial factors were identified. Factors 3 and 4 were subsequently excluded from the analysis due to an insufficient number of associated questions and a high degree of correlation with other existing factors (Table 6).

The questionnaire's validity and reliability were assessed by analyzing the impact of question 16. For the first factor, the Cronbach's alpha coefficient was 0.911 when question 16 was excluded, and 0.894 when it was included. This suggests that the removal of question 16 slightly improved the internal consistency for this factor. For the second factor, the coefficients were 0.785 when question 16 was excluded and 0.739 when it was included. The Cronbach's alpha coefficient for all questions, treated as a single factor, was 0.904. These results demonstrate that the Persian translation of the OBC exhibits strong validity and reliability for dental students at Kermanshah University.

Furthermore, we assessed the correlation between self-reported nocturnal bruxism (question 1) and demographic variables, such as gender, marital status, age, grade point average (GPA), and academic semester. In analyzing the correlation between gender and responses to question number 1, 20 individuals (consisting of 40% men and 60% women) indicated no incidence of bruxism. Conversely, 122 (45.18%) participants (consisting of 50.8% men and 49.2% women) reported experiencing teeth grinding or clenching more than four nights per week.

A study investigating the correlation between marital status and responses to question number 1 revealed that 122 single participants reported experiencing teeth grinding or clenching more than four nights per week, whereas only 10 married participants indicated the same frequency.

Discussion

According to a recent study, the Persian translation of the OBC is appropriate for clinical application within Iran, demonstrating robust psychometric properties. This instrument proves valuable for the effective evaluation of patients presenting with TMD and parafunctional oral habits. Furthermore, the study identified a statistically significant impact of GPA on the prevalence of parafunctional habits, suggesting a correlation between demographic variables and the manifestation of these habits.

The OBC is a widely utilized instrument for evaluating parafunctional habits that can culminate in oral health complications.[29] However, its initial development in English restricts its applicability to non-English-speaking populations. Consequently, this study aimed to translate the questionnaire into Persian for Persian speakers and

Table 5. Reliability of the Oral Behavior Checklist in dental students at the Faculty of Dentistry, Kermanshah, Based on the intraclass correlation coefficient

Measure	ICC	95% Confidence interval	F Test with True Value 0
		Lower bound	Upper bound
Single measures	0.993	0.985	
Average measures	0.997	0.993	

ICC: Intraclass correlation coefficient.

subsequently assess its validity and reliability within this linguistic context. The Persian version of the questionnaire demonstrates robust validity and reliability in assessing parafunctional habits among Persian speakers. These findings align with the results of a study conducted in Portugal by Barbosa et al,[22] where the OBC underwent a stringent process of translation and cultural adaptation into Portuguese, rigorously reviewed and approved by an expert panel. The field test results indicated strong item agreement between the English and Portuguese versions of the OBC, with a weighted Kappa statistic of at least 0.934. Furthermore, the test-retest reliability of the OBC SumScore was excellent, as evidenced by an ICC of 0.998 ($P<0.001$). Our findings indicate that the Portuguese version of the OBC demonstrates cross-cultural equivalence and possesses acceptable psychometric properties for use in Portugal. Furthermore, the observed ICC values in this study align with previous research, thereby confirming the instrument's reliability.

Building on Donnarumma and colleagues' research to evaluate the reliability of the Italian version of the OBC (OBC-It), the current study assessed the reliability of both the OBC-It and its six-item abbreviated form (OBC-It 6), specifically focusing on wake-time teeth clenching behaviors. The test-retest reliability of the OBC-It was assessed and found to be excellent, as evidenced by ICCs of 0.87 for Group A, 0.94 for Group B1, and 0.95 for Group B2. Similarly, the OBC-It 6 also exhibited strong reliability across all groups, with ICCs of 0.85 for Group A, 0.89 for Group B1, and 0.93 for Group B2. These results suggest that the OBC-It demonstrates strong reliability (ICC = 0.87), aligning with the findings from our research.[30]

Despite the overall robust validity of the study, a notable exception was observed for question 20, which pertained to yawning. This item demonstrated a low CVI (0.71), falling below the predetermined acceptable threshold of 0.79. All other questions in the study, however, surpassed this minimum CVI (CVI ≥ 0.79). Despite recommendations from experts to replace or remove a particular question, it was kept to uphold the questionnaire's credibility. This decision aligns with findings from other research indicating that yawning can lead to muscle pain and TMD, similar to other parafunctional habits.[28] Therefore, it is crucial to account for this factor when assessing parafunctional habits.

Table 6. Factor loading of the standard Oral Behavior Checklist in the students at the Faculty of Dentistry, Kermanshah

Questions	Before factor loading	After factor loading
q11	0.740	
q4	0.897	
q8	0.739	
q5	0.882	0.303
q9	0.716	
q3	0.802	
q7	0.702	
q6	0.697	
q12	0.692	
q14	0.688	
q10	0.648	
q19	0.577	0.357
q10	0.476	0.330
q13	0.418	0.386
q14	0.469	0.349
q17		0.774
q20		0.685
q18	0.370	0.637
q15	0.614	
q21	0.486	0.517

Further analysis from the study suggested that items 1 and 2 should be considered distinct from the remaining questions, implying they may assess a separate construct. Preliminary reliability analysis yielded a Cronbach's alpha coefficient of 0.67, which falls below the optimal threshold. Nevertheless, the internal consistency of the questionnaire was robust, evidenced by a Cronbach's alpha of ≥ 0.70 for individual factors and 0.90 for the overall instrument. While the removal of certain items could have yielded a higher Cronbach's alpha, such modifications were precluded by concerns regarding the questionnaire's established reliability.

The Persian version of the OBC demonstrates strong validity and reliability for assessing parafunctional habits in Persian-speaking populations, proving its utility for both epidemiological research and clinical assessments. This underscores the critical need for cross-cultural adaptation and translation of questionnaires to ensure their relevance and applicability across diverse linguistic groups. Future research should focus on further investigating the questionnaire's efficacy and suitability within a broader spectrum of cultural and linguistic environments.

This study successfully translated the OBC into Farsi for Persian speakers, concurrently establishing its validity and reliability. Consequently, this questionnaire is now a valuable tool for assessing parafunctional habits within the Persian-speaking population. Further investigation

is recommended to address the identified limitations of the questionnaire and to explore its suitability across diverse cultural and linguistic settings. The results of this research hold substantial implications for the evaluation of parafunctional habits within the Persian-speaking population. Furthermore, they underscore the critical need for the development and rigorous validation of comparable assessment instruments tailored to diverse linguistic and cultural groups.

Research findings from various regions diverge from those observed in Iran.[25,26] For example, Karaman and Sapan's study[24] reported a greater incidence of oral parafunctional habits among female students, whereas our study revealed no significant differences between male and female students. These results imply that the mental health landscape in Iran might diverge from that observed elsewhere. Consequently, more research is essential to comprehensively establish the link between mental health and oral parafunctional habits within the Iranian population. Such research will empower healthcare professionals to pinpoint causative elements and formulate efficacious therapeutic strategies, thereby improving oral and mental well-being within the Iranian population.

Due to the limitations imposed by the COVID-19 restrictions, we were unable to assess the correlation between the severity of oral parafunction and OBC, as well as intraoral findings. Subsequent research should prioritize investigating this relationship. Beyond this, investigating the relationship between parafunctional habits and other oral health indicators, including dental caries and periodontal health, would be advantageous. This study will enhance our comprehension of how parafunctional habits influence overall oral health. Future research would benefit significantly from evaluating oral parafunction across larger and more diverse sample sizes.

Given that anxiety and parafunctional habits may potentially be linked to sleep disorders, headaches, and psychological disorders, the study of parafunction is inherently connected with numerous academic disciplines and specialized research areas.

Conclusion

This study successfully translated and validated the OBC for Persian-speaking individuals, confirming its reliability and validity. Nevertheless, further investigation is required to assess its clinical applicability and to facilitate its cultural and linguistic adaptation for broader use. When developing and translating questionnaires, it is crucial to account for cultural and linguistic variations, as highlighted by the study's findings. The Persian version of the OBC is thus a valuable instrument for understanding parafunctional habits among Persian speakers and can be effectively utilized in both epidemiological research and clinical assessments. Furthermore, an assessment of oral parafunctional habits in dental students reveals a substantial correlation between GPA and the prevalence of both stress and oral parafunctional behaviors among this population.

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Authors' Contribution

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Competing Interests

None declared.

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