

Preference for and Tolerance of the Intensity of Exercise questionnaire: Brazilian Portuguese version

Questionário de Preferência e Tolerância da Intensidade de Exercício: versão em português do Brasil

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Abstract – The aim of the present study was to adapt the Preference for and Tolerance of the Intensity of Exercise Questionnaire (PRETIE-Q) for the Brazilian population and to perform an initial psychometric evaluation. The study consisted of two phases: I) translation and back-translation and production of a Brazilian Portuguese version of the questionnaire; and II) psychometric evaluation and construct validation using cross-sectional correlations between Preference and Tolerance scores and physical activity variables. Ratings of semantic, idiomatic, cultural, and conceptual equivalence, as well as total content validity and degree of understanding were adequately high. Response rate was 100% and the average response time was less than 3:30 minutes (204 ± 62 s). Internal consistency coefficients were 0.91 and 0.82, while two-week test-retest reliability coefficients were 0.90 and 0.89 for Preference and Tolerance scales, respectively. Preference and Tolerance scales were significantly correlated with both self-reported intensity ($r = 0.48$ and $r = 0.57$, respectively) and frequency ($r = 0.40$ and $r = 0.51$, respectively) of habitual physical activity, as well as with the total Godin questionnaire score ($r = 0.20$ and $r = 0.40$, respectively) and frequency of strenuous exercise ($r = 0.29$ and $r = 0.49$, respectively). The Brazilian Portuguese version of PRETIE-Q retained the psychometric properties of the original, demonstrating adequate internal consistency, test-retest reliability, and cross-sectional correlations with physical activity variables among young adults.

Key words: Exercise prescription; Individual differences; Motor activity; Psychometrics; Translation.

Resumo – O objetivo do presente estudo foi adaptar o Questionário de Preferência e Tolerância da Intensidade de Exercício (PRETIE-Q) para a população brasileira e realizar uma avaliação psicométrica inicial. O estudo consistiu de duas fases: I) tradução, retrotradução e produção de uma versão em Português do Brasil; e II) avaliação psicométrica e validação de constructo através de correlações entre os escores de Preferência e Tolerância e variáveis de atividade física. Equivalências semântica, idiomática, cultural e conceitual, assim como validade de conteúdo total e grau de entendimento foram adequadamente altos. A taxa de resposta foi de 100% e o tempo médio para a resposta foi menor que 3:30 minutos (204 ± 62 s). Os coeficientes de consistência interna foram 0,91 e 0,82, enquanto os coeficientes de confiabilidade teste-reteste de duas semanas foram 0,90 e 0,89 para as escalas de Preferência e Tolerância, respectivamente. As escalas de Preferência e Tolerância foram significativamente correlacionadas com a intensidade autorreportada ($r = 0,48$ e $r = 0,57$, respectivamente) e frequência ($r = 0,40$ e $r = 0,51$, respectivamente) de atividade física habitual, assim como o escore total do questionário Godin ($r = 0,20$ e $r = 0,40$, respectivamente). A versão em Português do Brasil do PRETIE-Q (Apêndice) manteve as propriedades psicométricas do original, demonstrando adequada consistência interna, confiabilidade teste-reteste, e correlações transversais com variáveis de atividade física entre adultos jovens.

Palavras-chave: Atividade motora; Diferenças individuais; Prescrição de exercícios; Psicometria; Tradução.

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INTRODUCTION

Physical inactivity has been called “*the biggest public health problem of the 21st century*”¹. The Lancet Physical Activity Series Working Group² has stated that “... *the issue [of physical inactivity] should be appropriately described as pandemic...*” (cover page). This characterization is supported by population surveys showing that >30% of adults worldwide and >50% of Brazilians reported being less active than the minimum amount recommended for health promotion³. This level of inactivity is estimated to cause 6-10% of major non-communicable diseases and 5.3 million premature deaths annually around the globe⁴. A key factor contributing to such high rates of physical inactivity is the low adherence to exercise programs, with dropout rates averaging 50% in the first six months^{5,6}.

Traditionally, exercise guidelines have been based on a biomedical model. The recommended “dose” of exercise is decided on the basis of only two major considerations, namely (a) maximization of effectiveness (e.g., improvements in fitness and/or health) and (b) minimization of risks^{7,8}. However, it has become apparent that, even if a guideline is effective and safe, its individual and public health relevance will still be limited unless people are willing to adopt it. This has led to a proposal for a tripartite rationale for exercise intensity prescriptions, incorporating the additional component of affective responses to exercise, such as pleasure and displeasure⁷. This proposal is based on an empirically established positive relationship between affective responses and physical activity participation and adherence⁸⁻¹⁰. Moreover, studies have shown that there is large interindividual variability in affective responses during externally imposed exercise intensities, even when intensity is normalized for the fitness level of each individual⁷. These findings have led to calls for a paradigmatic shift from a prescription-based to a preference-based model of exercise promotion^{7,9,11}, and to a growing interest in the study of affective responses to exercise¹². The latest position stand of the American College of Sports Medicine (ACSM) has emphasized the importance of considering individual preferences and affective responses during exercise in increasing adherence¹³. Although still emergent, recent investigations have supported these recommendations, indicating a positive correlation between affective responses during exercise and (both current and future) physical activity participation^{9,10}, improved affective responses¹¹ and increased participation¹⁴ with self-selected intensity¹¹, and fitness gains following an exercise program at an intensity that “feels good”¹⁵.

In order to better understand the large interindividual variability in affective responses during exercise, the Preference for and Tolerance of the Intensity of Exercise Questionnaire (PRETIE-Q) was developed¹⁶. The PRETIE-Q consists of two 8-item scales, namely Preference and Tolerance, in which each item accompanied by a 5-point response scale. Both scales have demonstrated high internal consistency, from 0.80 to 0.89¹⁶⁻¹⁸, as well as good 3- and 4-month test-retest reliability, ranging from 0.67 to

0.85¹⁶. Additionally, construct validity tests have shown that the Preference scale correlates with self-reported exercise intensity¹⁶, affective responses to exercise¹⁶, self-selected exercise intensity¹⁹, and frequency of strenuous exercise¹⁷. On the other hand, the Tolerance scale has demonstrated correlations with affective responses during high-intensity exercise¹⁶ and the amount of time individuals persevered beyond the ventilatory threshold intensity during a graded exercise test²⁰. Furthermore, the Preference and Tolerances scales correlated with performance in a variety of physical fitness tests (e.g., sit-ups, 1.5 mile run) seem to reflect stable individual differences, as they remained unchanged despite changes in actual and perceived fitness due to training¹⁸.

The most recent edition of the *ACMS's Guidelines for Exercise Testing and Prescription*²¹ states that “Measures of individual exercise preference and tolerance could be useful for helping identifying what level of physical activity is appropriate to prescribe for different individuals” (p. 357). Therefore, using PRETIE-Q to help tailor exercise prescriptions may be a promising way to improve exercise adherence. Particularly in the past few years, Brazil has directed considerable scientific and governmental resources to the challenge of increasing physical activity in the population, especially by implementing physical activity opportunities in community settings²². For example, the “Academia da Saúde” (“Health Academy”) program, aims to offer supervised physical activity at no cost in 4,000 Brazilian cities²². However, millions of reais (R\$) may be wasted and the impact of these public policies on health could be jeopardized if exercise participation and adherence remain low. Thus, based on the aforementioned need to better understand interindividual differences in affective responses to exercise, further studies should be carried out involving the promising constructs of preference for and tolerance of exercise intensity. Additionally, the application of these constructs by professionals during supervised physical activity classes, such as “Academia da Saúde,” may help improve adherence to exercise programs. To date, however, there is no instrument available in Brazilian Portuguese to investigate these constructs. Hence, the aim of this study was to adapt the PRETIE-Q for the Brazilian population and to perform an initial psychometric evaluation.

METHODOLOGICAL PROCEDURES

The present study consisted of two phases. The first phase involved the translation and back translation of the PRETIE-Q with the purpose of producing a Brazilian Portuguese version of the instrument. The second phase consisted of a psychometric evaluation of this version, including construct validation in a Brazilian sample.

- **Phase 1. Translation, Back Translation and Production of the Brazilian Portuguese Version**

Cross-cultural translation and adaptation were conducted based on

the theoretical framework and stages recommended by Beaton et al.²³, as seen in Figure 1. These recommendations have been used worldwide and are currently part of the cross-cultural translation and adaptation process adopted by the International Quality of Life Assessment (IQOLA) and by the International Society for Quality of Life Assessment²⁴.

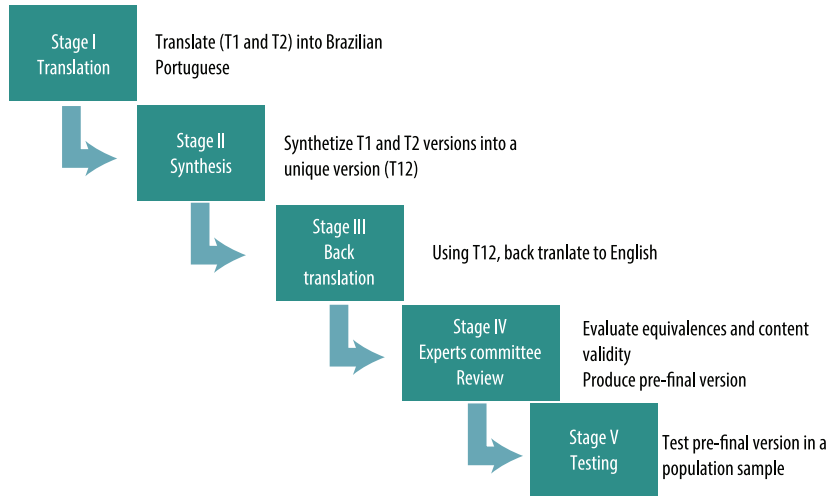


Figure 1. Stages involved in the cross-cultural translation and adaptation described in the present study. Adapted from Beaton et al.²³.

Firstly, the lead author of the original questionnaire allowed the cross-cultural translation and adaptation of the original PRETIE-Q to Brazilian Portuguese¹⁶. Then, two forward translations (T1 and T2) were performed from English (i.e., the original language) into Brazilian Portuguese (i.e., the target language). The translators, whose mother tongue was Brazilian Portuguese, produced T1 and T2 independently (*Stage I*). One translator had postdoctoral experience in Physical Education, having lived in an English-speaking country for more than one year and had English proficiency certificate. This translator was aware of the concepts being examined in the instrument. The other translator was an English teacher who had also lived in an English-speaking country, and was neither aware of the research purpose nor had a background in physical education, exercise science or related field. Both produced their forward translations in written form. Subsequently, a synthesis of these translations was performed by the authors of the present study by consensus, generating a unique common translation (T12) (*Stage II*). From this unique common translation, one back-translation was performed (*Stage III*) by a native English speaker who had lived in Brazil for several years, thus having mastered Brazilian Portuguese at an advanced level. This person was neither aware of the research purpose nor had a background in physical education, exercise science or related field. This back-translation was then sent to the lead author of the original questionnaire¹⁶, who provided feedback and additional semantic suggestions.

The semantic, idiomatic, cultural, and conceptual equivalence of items (*Stage IV*) was evaluated by two physical education specialists, one with

postdoctoral degree and the other with master's degree, as well as by the two forward translators. This equivalence was evaluated for title, instructions, and for each of the questionnaire items. Evaluators were provided with specific instructions regarding semantic, idiomatic, cultural, and conceptual equivalence based on recommendations of Beaton et al.²³. A 4-point response scale was used (1 = not equivalent, 2 = requires major alterations to be equivalent, 3 = requires minor alterations to be equivalent, 4 = equivalent). If any item received score 1 or 2, additional review of this item was performed.

The content validity was quantified by the content validity index (CVI)²⁵. Evaluation was performed by a panel of three physical education specialists (with master's degree or higher). They were instructed to refer to whether the items, and the instrument as a whole, measured the intended concepts and met the questionnaire objectives based on the definitions found in Polit and Beck²⁵. A 4-point response scale was used (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant but needs minor alteration, 4 = very relevant). Firstly, 17 partial CVIs were calculated (for each of the 16 items and for the questionnaire as a whole) by dividing the number of evaluators giving score 3 or 4 for each of the 17 ratings by the number of evaluators. Then, the mean value of these partial CVIs was calculated to obtain the total CVI.

With all the aforementioned documents completed, a final consolidation was conducted by a committee of experts, consisting of the study authors and the forward and back translators, producing the Brazilian Portuguese version of the questionnaire. The Brazilian Portuguese version was then tested in a sample of native Brazilian responders (*Stage V*). The PRETIE-Q consists of two 8-item scales, namely Preference and Tolerance, in which each item accompanied by a 5-point response scale. The Preference scale contains four items that measure preference for high-intensity (Items 6, 10, 14, 16) and four that measure preference for low-intensity exercise (Items 2, 4, 8, 12). Similarly, the Tolerance scale contains four items that measure high tolerance (Items 5, 7, 11, 15) and four that measure low tolerance of high exercise intensity (Items 1, 3, 9, 13). Items indicative of preference for low intensity (Items 2, 4, 8, 12) and items indicative of low tolerance (Items 1, 3, 9, 13) are reversed-scored. Thus, the possible score range for each scale is 8 - 40.

• Phase 2. Testing the Brazilian Portuguese Version

Subjects

The psychometric evaluation of the Brazilian Portuguese version of the questionnaire was conducted by applying it to a sample of 66 undergraduate students (2nd and 3rd years), comprising 41 men and 25 women. The construct validity tests^{17,19} were conducted with the original 66 respondents and an additional sample of 56 undergraduate students (a total of 122 individuals). Physical Education undergraduate students (n = 80) and other undergraduate courses (n = 42) were invited to participate through an

nouncements made at the beginning of a class period, with the consent of the respective instructors. After detailed explanation of procedures, participants immediately started responding the survey, which was administered in groups. All participants signed an informed consent form describing the study procedures, which had been approved by the local Ethics Committee (n. 430.908) according to the standards set by Resolution 466/12.

Procedures

The respondents rated their degree of understanding about the instructions and each item of the Brazilian Portuguese version of the questionnaire. Instructions and each item were accompanied by a 6-point Likert-like response scale (0 = I did not understand anything, 1 = I understood it a little, 2 = I understood it reasonably, 3 = I understood almost everything, but I had some doubts, 4 = I understood almost everything, 5 = I understood it perfectly and I have no doubts). Response rate was evaluated by the total number of refusals, both to answer the entire questionnaire and for each individual item. Response time was evaluated by administering the Brazilian Portuguese version of PRETIE-Q to 33 undergraduate students, who were completing the questionnaire for the first time. Response time was measured in minutes and seconds using a chronometer. The questionnaire was administered again after a 2-week interval.

The survey included basic demographic and anthropometric information such as age, weight, and height. The frequency and session duration of habitual physical activity, as well as the duration of lifetime involvement in physical activity, were also assessed. Frequency was assessed by the question “How many days (on average) do you exercise per week?” Session duration was assessed by the question “How long (on average) do you exercise per session?” (in minutes). Duration of lifetime involvement was assessed by the question “How long have you been exercising on a regular basis (at least 3 times per week)?” (in years and months, later converted into months)¹⁹.

Construct validity was evaluated by examining the cross-sectional relationship of the scores on the Preference and Tolerance scales with the self-reported intensity of habitual physical activity. Self-reported intensity of habitual physical activity was assessed by a modified form of the Borg’s Category Ratio 10 scale²⁶. The Godin Leisure-Time Exercise Questionnaire²⁷ was also used. It includes three questions inquiring about the number of times, during a typical 7-day period, the respondent performs strenuous, moderate, or mild exercise. Weekly frequencies are multiplied by 9, 5 and 3 for strenuous, moderate, and mild exercise, respectively, to calculate a composite “total leisure activity score”. The questionnaire also includes one item inquiring about the number of times, during a typical 7-day period, the respondent is engaged “in any regular activity long enough to work up a sweat (heart beats rapidly)”. For this study, the version of the Godin questionnaire recently adapted for the Brazilian population was used²⁸. The reliability and validity of studies on the Godin Leisure-Time Exercise Questionnaire are summarized elsewhere²⁷. Three groups were

formed based on whether respondents reported their highest frequency of participation in strenuous ($n = 24$), moderate ($n = 41$), or mild exercise ($n = 36$). Participants who reported an equal number of times per typical week for two or more intensity domains were excluded. Similarly, three groups were formed based on how often respondents are engaged in “any regular activity long enough to work up a sweat (heart beats rapidly)” during a typical 7-day period” (rarely/never, $n = 23$; sometimes, $n = 39$; often, $n = 60$).

Statistical Analysis

Descriptive statistics (means, standard deviations, frequencies, and ranges) was used to describe the participants’ characteristics. The sample size was calculated based on recommendations by Beaton et al.²³ for cross-cultural adaptations of psychometric instruments (i.e., at least 30 participants). Moreover, the sample size of 122 participants provides sufficient statistical power to detect a 6.25% variance overlap between two correlated variables ($r = 0.25$), assuming a two-tailed test of significance, alpha of 5%, and 1-beta of 80%. The internal consistency of the Preference and Tolerance scales was assessed by Cronbach’s alpha coefficient. Test-retest reliability (2-weeks) was examined using the intraclass correlation coefficient and associated 95% confidence intervals (CI) for the Preference and Tolerance scales, as well as for each individual item. The Pearson correlation coefficient was used to assess corrected item-total correlations, as well as associations of the Preference and Tolerance scores with habitual physical activity variables and the Godin questionnaire scores (leisure-time exercise habits). One-way analysis of variance (ANOVA) was conducted to compare the Preference and Tolerance scores between groups reporting higher prevalence of participation in strenuous, moderate, or mild exercise and groups reporting how often they perform “any regular activity long enough to work up a sweat (heart beats rapidly)” (from the Godin questionnaire). In case of significant omnibus test, Bonferroni-adjusted post hoc tests were performed for pairwise comparisons. Effect sizes are reported as partial eta squared (η^2), calculated as: sum of squares between groups / total sum of squares. Cases in which participants left a question unanswered are denoted with a different n value. Significance was set at $P < 0.05$ (two-tailed) for all analyses.

RESULTS

• Translation, Back Translation and Production of the Brazilian Portuguese Version

Minor disagreements between translators were resolved by consensus for the generation of the unique common forward translation. After back translation was completed, the lead author of the original questionnaire¹⁶, as well as the committee of experts, provided valuable suggestions. On item 3, the expression “breathing very hard” was back-translated as “difficulty breathing”. As this latter expression may be interpreted as a pathological symptom (e.g., asthma, COPD), item 3 was reviewed and modified from

“*respirando com dificuldade*” to “*respirando com muito esforço*”. Item 10 was back translated into “does not interest me”. As “interest” has a somewhat different meaning in Brazilian Portuguese, item 10 was reworded from “*não me interessa*” to “*não me agrada*”. Item 15 was back-translated as “force myself” and subsequently changed from “*me esforço*” to “*continuo*,” to better reflect the original meaning.

The evaluation of the semantic, idiomatic, cultural, and conceptual equivalence of title, instructions and each of the 16 items resulted in mean values ranging from 3.75 to 4.00 (on a scale from 1.00 to 4.00). All equivalences were scored by evaluators as 3 or 4 (none of them was scored 1 or 2). Content validity, assessed through the total CVI, was 0.90 out of 1.00, with the 17 ratings (16 items and the questionnaire as a whole) ranging from 0.66 to 1.00.

• Testing the Brazilian Portuguese Version

The Brazilian Portuguese version of the questionnaire was applied to 66 undergraduate students, 41 men (mean \pm SD, age 21 ± 3 yr, weight 75 ± 12 kg, height 175 ± 6 cm, BMI 25 ± 4 kg/m²) and 25 women (mean \pm SD, age 21 ± 1 yr, weight 60 ± 8 kg, height 166 ± 6 cm, BMI 22 ± 2 kg/m²) aged 18-27 years. Of them, 4.6% ($n = 3$) reported no regular physical activity (0 sessions per week), whereas the others reported an average of 4.4 ± 1.7 sessions per week ($n = 63$), lasting 74 ± 40 min performed at an intensity of 4.9 ± 2 ($n = 62$) out of 10.0 on the adapted version of the Borg’s Category Ratio 10 scale²⁶. On average, they had been physically active for almost 4 years (42.5 ± 49.9 months, $n = 58$).

The degree of understanding of the questionnaire instructions was rated 4.97 ($n = 36$) (on a scale from 0.00 to 5.00). The degree of understanding of the 16 items ranged from 4.24 to 4.97 ($n = 66$). There were no refusals (response rate of 100%). Average response time ($n = 33$) was less than 3:30 minutes (204 ± 62 s).

Cronbach’s alpha coefficient of internal consistency for the Preference and Tolerance scales was 0.91 and 0.82, respectively. The analysis of items revealed that, except for tolerance question number 7, no item had a negative contribution to internal consistency. Deleting question number 7 slightly increases Cronbach’s alpha coefficient from 0.82 to 0.85 for the Tolerance scale. All individual questions showed acceptably high correlations with the scores of their respective scales, except for question 7 from the Tolerance scale (Table 1). The test-retest reliability, which was examined after a 2-week interval, was 0.90 (95% CI = 0.84 - 0.93) for the Preference and 0.89 (95% CI = 0.82 - 0.93) for the Tolerance scale (Table 1). The 2-week test-retest reliability for each individual item is also presented in Table 1.

Self-reported intensity and frequency of habitual physical activity were significantly correlated with both Preference and Tolerance scales. Session duration and duration of lifetime involvement in habitual physical activity were significantly correlated only with the Tolerance scale. Regarding the Godin questionnaire scores, both Preference and Tolerance were signifi-

cantly correlated with the total Leisure Activity Score. The same occurred for the frequency of strenuous exercise. Conversely, the frequency of moderate and mild exercise was not correlated with either the Preference or the Tolerance scales. Correlations and associated P values are shown in Table 2.

Table 1. Corrected item-total correlations and 2-week test-retest reliability

Preference Items		Q2	Q4	Q6	Q8	Q10	Q12	Q14	Q16	Preference total score
Corrected Item-Total Correlation With Preference Score	r	0.76	0.66	0.65	0.80	0.75	0.68	0.69	0.68	---
Test-Retest Reliability		0.85	0.72	0.65	0.75	0.63	0.49	0.53	0.73	0.90
Tolerance Items		Q1	Q3	Q5	Q7	Q9	Q11	Q13	Q15	Tolerance total score
Corrected Item-Total Correlation With Tolerance Score	r	0.55	0.59	0.64	0.14*	0.63	0.61	0.66	0.52	---
Test-Retest Reliability		0.60	0.79	0.65	0.54	0.71	0.70	0.77	0.57	0.89

All p values <0.01; *p>0.05

Table 2. Correlations between Preference and Tolerance scores with characteristics of habitual physical activity and Godin Questionnaire scores

Characteristics of habitual physical activity	Preference		Tolerance	
	r	P	r	P
Intensity	0.48	< 0.01	0.57	< 0.01
Frequency	0.40	< 0.01	0.51	< 0.01
Session Duration	0.19	0.39	0.28	< 0.01
Duration of Life-time Involvement	0.16	0.71	0.24	< 0.01
Godin Questionnaire Scores	Preference		Tolerance	
	r	P	r	P
Total	0.20	0.03	0.40	< 0.01
Strenuous	0.29	< 0.01	0.49	< 0.01
Moderate	-0.02	0.87	0.13	0.16
Mild	0.04	0.69	-0.01	0.91

A total of 101 participants who had complete Preference and Tolerance data and indicated the highest prevalence of participation in strenuous, moderate, or mild exercise were identified. The Preference and Tolerance scores of the 24 participants who reported mostly strenuous, the 41 who reported mostly moderate, and the 36 who reported mostly mild exercise were compared. ANOVA was significant only for Preference ($F = 4.51$, $P = 0.013$, $\eta^2 = 0.08$). Post hoc comparisons showed that participants who performed strenuous exercise had significantly higher Preference scores (28.46), compared to those who performed moderate (24.76) or mild (24.86) exercise (Figure 2A). In contrast, the comparison between the Tolerance scores of those who performed strenuous (28.58), moderate (28.10), and mild (25.67) exercise did not reach significance ($F = 2.14$, $P = 0.12$, $\eta^2 = 0.04$). Additionally, those who reported exercising long enough to work

up a sweat “often” had higher Preference (27.47) and Tolerance (30.50) scores than those reporting “sometimes” (24.03 and 24.56, respectively) or “never/rarely” (22.17 and 23.09, respectively). ANOVA was significant for both Preference ($F = 11.11, P < 0.01, \eta^2 = 0.16$) and Tolerance ($F = 21.72, P < 0.01, \eta^2 = 0.27$). Post hoc comparisons showed that participants who reported “often” had significantly higher Preference and Tolerance scores than those reporting “sometimes” or “rarely/never” (Figure 2B).

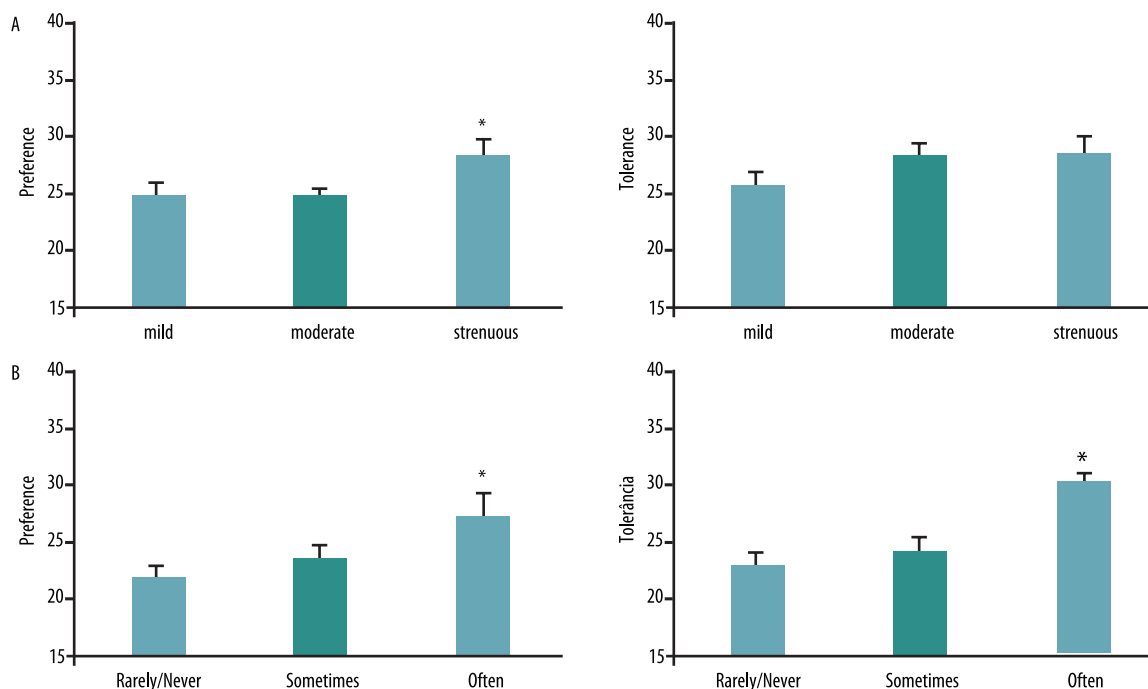


Figure 2. Differences (\pm standard error) in Preference (left) and Tolerance (right) scores among participants who reported higher prevalence of participation in mild, moderate or strenuous exercise (A) and among participants who reported being engaged in any regular activity long enough to work up a sweat (heart beats rapidly) “rarely/never”, “sometimes”, and “often” during a typical 7-day period (B). *Significant difference compared to mild and moderate (A) and to “rarely/never” and “sometimes” (B) ($P < 0.01$).

DISCUSSION

The American College of Sports Medicine²¹, one of the most important scientific and professional organizations in exercise science in the world, has recommended that individual differences in preference for and tolerance of exercise intensity should be considered in developing exercise prescriptions. Thus, the aim of the present study was to adapt the PRETIE-Q, a measure of these individual difference variables, for use in the Brazilian population. This effort is timely, since Brazil is heavily investing in policies to promote physical activity, especially through community exercise classes²².

The translators, the back translator, the lead author of the original questionnaire, and the committee of experts had only minor disagreements on the wording leading to the Brazilian Portuguese version of PRETIE-Q. Semantic, idiomatic, cultural, and conceptual equivalences²³ were all well rated, with no item requiring revision. Similar results were found for content validity, evaluated by the CVI (rated 0.90 out of 1.00). Psychometric

evaluation revealed that both the internal consistency and the test-retest reliability coefficients of the Brazilian Portuguese version were similar to or higher than those of the original questionnaire for both Preference and Tolerance scales¹⁶⁻¹⁸. Although the analysis of items revealed that question 7 (Tolerance scale) had a negative contribution to internal consistency, its removal would only slightly increase the alpha coefficient of internal consistency from 0.82 to 0.85. Thus, based on the appropriate equivalences and content validity ratings, it was decided not to exclude this item. Further investigations should explore the psychometric properties of this item in different populations. Analysis of the degree of understanding, response rate, and response time demonstrated that the Brazilian Portuguese version of PRETIE-Q is an easy, comprehensible, and practical instrument for the population studied (i.e., undergraduate students).

The initial evaluation of the construct validity of the Brazilian Portuguese version of PRETIE-Q demonstrated that both Preference and Tolerance scales were correlated with the intensity and frequency of habitual physical activity (Table 2). In addition, the Tolerance scale was correlated with session duration and the duration of lifetime involvement in physical activity. Ekkekakis et al. have also found a correlation between Preference scale and self-reported intensity¹⁶. Similar to results obtained with the original PRETIE-Q¹⁷, it was found that both Preference and Tolerance scales were correlated with the frequency of strenuous exercise and the Godin Leisure-Time Exercise Questionnaire scores, while no correlation was found with the frequency of moderate and mild exercise for the Preference scale (Table 2). Also consistent with the original PRETIE-Q¹⁷, the present study found associations between Preference and Tolerance scales and physical activity participation in the vigorous or strenuous domains (Table 2 and Figure 2).

Further psychometric evaluations of the Brazilian Portuguese version of PRETIE-Q are necessary to address some of the study limitations. The sample of the present study consisted of undergraduate students (mainly Physical Education students). It is unknown whether a sample with different characteristics (age, educational level, fitness level, physical activity habits, etc.) would yield similar results. Also, in addition to the construct validity tests already performed¹⁶⁻²⁰, further investigations are required to expand the scope of psychometric analyses of both Brazilian Portuguese and English versions of PRETIE-Q. Some of the strengths of the present study are the compliance with internationally established guidelines during the process of cultural adaptation^{23,24}, as well as the performance of initial psychometric evaluations consistent with the work on the original questionnaire^{16,17}, thus providing the opportunity for comparisons between the two versions.

Current guidelines for prescribing exercise intensity are based on a “recommended range” model. This “recommended range” is intentionally broad to take into account individual differences in preference and tolerance, and to allow exercise professionals sufficient flexibility in designing and customizing exercise interventions for individuals and groups of clients or patients. However, it is clear that this broad range includes intensities

that may be “too boring” for some participants and “too exhausting” for others⁸. When intensity is defined by an exercise professional, even small deviations from what an individual would have preferred could make the exercise feel less pleasant²⁹. Mounting evidence indicates that the degree of pleasure or displeasure that participants experience during exercise¹⁰ and the degree of enjoyment they report after exercise³⁰ predict subsequent physical activity. This evidence has led the American College of Sports Medicine¹³ to conclude that “exercise that is pleasant and enjoyable can improve adoption and adherence to prescribed exercise programs” (p. 1334) and to recommend the use of a measure of individual differences for preference for and tolerance of exercise intensity²¹, to “help identify what level of physical activity is appropriate to prescribe for different individuals” (p. 357). The cultural adaptation of the Brazilian Portuguese version of PRETIE-Q presented in this study, and additional psychometric studies with diverse samples to be completed in the future will allow exercise professionals, including personal trainers, clinical exercise physiologists, and rehabilitation specialists, to incorporate assessments of individual differences in intensity preference and tolerance in their daily practice. Taking these individual differences into account in designing exercise prescriptions, as recommended in current guidelines²¹, may facilitate the initial adoption of exercise and improve long-term adherence in programs such as “Academia da Saúde”.

For example, the American College of Sports Medicine¹³ specifies that the range of “moderate” intensity, which is commonly recommended for beginners, extends from 64% to 76% of maximal heart rate. An exercise professional working at “Academia da Saúde” may select participants scoring above and below the median in preference and/or tolerance in the PRETIE-Q and administer two different exercise programs, one with intensity closer to 64-70% and the other with intensity closer to 70-76% of maximal heart rate. Tailoring the prescription according to preference and tolerance should increase the probability that participants would be exercising closer to intensity yielding optimal affective responses, thereby increasing the possibility of adherence¹⁰. It is important to emphasize, however, that additional research is needed for such customization algorithms to be fully developed and validated.

Brazilian researchers and practitioners now have the opportunity to further study the promising constructs of preference for and tolerance of exercise intensity and to extend the process of psychometric testing beyond young adults. This study may also serve as a template for future adaptations of the PRETIE-Q in different languages. Next steps may include the exploration of specific participant’s characteristics (e.g., age and gender differences, differences between body mass index categories, or differences between groups with different health problems) and further determine the impact of preference for and tolerance of exercise intensity on exercise responses (e.g., affective responses, ratings of perceived exertion, and long-term exercise adherence).

CONCLUSIONS

The cultural adaptation and initial psychometric evaluation of the Brazilian Portuguese version of PRETIE-Q showed that the questionnaire retained its essential psychometric properties. Specifically, the Brazilian Portuguese version of PRETIE-Q (Appendix) demonstrated adequate internal consistency, good test-retest reliability, and meaningful cross-sectional correlations with several physical activity variables in a sample of young adults.

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APPENDIX

Questionário de Preferência e Tolerância da Intensidade de Exercício

- **Inventário de hábitos de exercício**

Por favor, leia cada uma das afirmações seguintes e então utilize a escala de respostas abaixo para indicar se você concorda ou discorda delas. Não há respostas certas ou erradas. Responda rapidamente e assinale a resposta que melhor descreve o que você acredita e como você se sente. Certifique-se de responder todas as questões.

1= Discordo totalmente 2= Discordo 3= Nem concordo nem discordo 4= Concordo 5= Concordo totalmente

- | | | | | | |
|--|---|---|---|---|---|
| 1. Sentir-me cansado durante um exercício é meu sinal para diminuir ou parar. | 1 | 2 | 3 | 4 | 5 |
| 2. Eu prefiro me exercitar em baixos níveis de intensidade por uma longa duração do que em altos níveis de intensidade por uma curta duração. | 1 | 2 | 3 | 4 | 5 |
| 3. Durante o exercício, se meus músculos começam a queimar excessivamente ou se eu percebo que estou respirando com muito esforço, é hora de diminuir. | 1 | 2 | 3 | 4 | 5 |
| 4. Eu prefiro ir devagar durante meu exercício, mesmo que isso signifique levar mais tempo. | 1 | 2 | 3 | 4 | 5 |
| 5. Durante o exercício, eu tento continuar mesmo depois de me sentir exausto(a). | 1 | 2 | 3 | 4 | 5 |
| 6. Eu prefiro realizar um exercício curto e intenso, do que um exercício longo e de baixa intensidade. | 1 | 2 | 3 | 4 | 5 |
| 7. Eu bloqueio a sensação de fadiga quando me exercito. | 1 | 2 | 3 | 4 | 5 |
| 8. Quando me exercito, eu geralmente prefiro um ritmo lento e constante. | 1 | 2 | 3 | 4 | 5 |
| 9. Eu prefiro diminuir ou parar quando um exercício começa a ficar muito difícil. | 1 | 2 | 3 | 4 | 5 |
| 10. Exercitar-me em baixa intensidade não me agrada nem um pouco. | 1 | 2 | 3 | 4 | 5 |
| 11. Fadiga é a última coisa que me influencia a parar um exercício; eu tenho uma meta e paro somente quando a alcanço. | 1 | 2 | 3 | 4 | 5 |
| 12. Quando me exercito, eu prefiro atividades que são de ritmo lento e que não requerem muito esforço. | 1 | 2 | 3 | 4 | 5 |
| 13. Quando meus músculos começam a queimar durante um exercício, eu geralmente diminuo o ritmo. | 1 | 2 | 3 | 4 | 5 |
| 14. Quanto mais rápido e difícil for o exercício, mais prazer eu sinto. | 1 | 2 | 3 | 4 | 5 |
| 15. Eu sempre continuo a me exercitar, apesar da dor muscular e fadiga. | 1 | 2 | 3 | 4 | 5 |
| 16. Exercício de baixa intensidade é entediante. | 1 | 2 | 3 | 4 | 5 |