Adaptation and construct validation of the Barratt Impulsiveness Scale (BIS 11) to Brazilian Portuguese for use in adolescents

Adaptação e validade de constructo da Escala de Impulsividade de Barrat (BIS 11) para o português do Brasil para o uso em adolescentes

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Abstract

Objective: Impulsivity is associated with different psychiatric disorders. The Barratt Impulsiveness Scale version 11 is one of the scales mostly used to measure impulsivity and it does not have a validated version for Brazilian Portuguese. The objective of this study is to adapt and conduct the construct validation of the Barratt Impulsiveness Scale version 11 for adolescents. Method: The scale was translated and adapted into Portuguese and then back-translated into English. The psychometric proprieties, factor analysis and construct validity were evaluated in two samples: 18 bilingual undergraduate medical students and 464 male adolescents between 15 and 20 years old from a well-delimited geographical area in the city of Canoas, southern Brazil. Results: The adolescent sample had a mean age of 17.3 ± 1.7 years. Intra-class correlation coefficient achieved a value of 0.90, and internal consistency had α of 0.62. Factor analysis did not identify the 3 factors of the original scale. Impulsivity scores from the Barratt Impulsiveness Scale version 11 had a correlation with scores for attention deficit/hyperactive disorder and oppositional defiant disorder and with number of symptoms of conduct disorder, suggesting an appropriate construct validity of the scale. Conclusion: Even considering some limitations in the Portuguese version, Barratt Impulsiveness Scale version 11 can be used in male adolescents and should be tested in other populations.

Descriptors: Impulsive behavior; Adolescents; Men; Psychometrics; Brazil

Resumo

Objetivo: A impulsividade está associada a diversos transtornos psiquiátricos. A escala de impulsividade de Barrat é uma das mais utilizadas para medir impulsividade mas não há uma versão validada em português. O objetivo do estudo é adaptar para o português e realizar a validação de construto da escala de impulsividade de Barrat para adolescentes. Método: A escala foi traduzida e adaptada para o português e retro-traduzida para o inglês. Foram avaliadas propriedades psicométricas, análise fatorial e validade de constructo em duas amostras: 18 estudantes de medicina bilíngües e 464 adolescentes masculinos, entre 15 e 20 anos, de uma região geograficamente delimitada de Canoas, sul do Brasil. Resultados: A média de idade dos adolescentes foi de 17,3 ± 1,7 anos. O coeficiente de correlação intraclasse foi de 0,90 e a consistência interna teve α de 0,62 para os 30 itens. A análise fatorial não identificou os três fatores da escala original. Os escores de impulsividade da escala de impulsividade de Barrat versão 11 foram correlacionados com os escores para os transtornos de déficit de atenção e hiperatividade, oposicional desafiante, e para o número de sintomas de transtorno de conduta, conferindo validade de constructo à escala. Conclusão: Mesmo considerando as limitações da versão brasileira, a escala de impulsividade de Barrat versão 11 pode ser utilizada em adolescentes masculinos e deve ser testada em outras populações.

Descritores: Comportamento impulsivo; Adolescente; Homens; Psicometria; Brasil

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Introduction

Over the last decades, many studies on impulsivity have highlighted the importance of this characteristic on various psychiatric disorders.[1] Impulsivity seems to be a basic part of some disorders - such as personality disorders, conduct disorder, aggression, bipolar disorder, suicidal behavior, attention deficit and hyperactivity and psychoactive substances abuse (see Moeller et al.[1]). There is no consensus in the literature about the best way to evaluate impulsivity. Laboratory behavioral measures[2] as well as self-report scales,[3-4] such as the Barratt Impulsiveness Scale 11 (BIS 11)[4] and Eysenck Impulsiveness Questionnaire (EIQ),[3] are the most used methods to measure impulsivity. None of these scales have been validated for Brazilian Portuguese, which generates difficulties for studies in this context.

The BIS 11 was used in Brazil on pathological gamblers[5] but with a version that had only been translated to Portuguese without validation. The BIS 11 is a self-applied scale composed of 30 items with Likert-type questions which provide a total score of impulsivity and three sub-scores: attention, lack of planning and motor impulsivity. Scores vary from 30 to 120 and there is no established cut-off point. It was validated into Japanese[6] and Italian[7] and the Italian version was also validated for adolescents.[8]

The objective of this study is to adapt the scale into Portuguese and to ascertain its construct validity in male adolescents.

Method

1. Translation and back- translation

The scales were translated independently into Portuguese by two psychiatrists (LVD and CMS), taking into account specific Brazilian cultural aspects. Two independent and parallels versions were generated. Translators compared both versions and each item of the questionnaire was evaluated, taking into account the best way to express it and which cultural aspects might influence the answers. A test version was applied to subjects of different ages and schooling. Further, some complex expressions were modified. A final version was then back-translated into English by a native North American with fluency in Portuguese Language, and sent to the author, Ernest Barratt MD, for approval.

2. Sample of bilingual subjects

The original scale in English and the last Portuguese version were applied in this order, with a two-week interval, to 18 undergraduate medical students, previously identified by a research assistant as proficient in English (self report information). Students were enrolled in the sixth semester of the medical school at the Universidade Federal do Rio Grande do Sul, and they had no previous knowledge of the scale.

3. Sample of male adolescents

The sample consisted of 464 male adolescents, ranging from 15 to 20 years old, and selected from a community sample of a well-delimitated geographical area in southern Brazil (a description of the sample is available in Szobot et al.[9]).

4. Statistical analysis and measures

The mean scores of impulsivity from the bilingual subjects were obtained from the Portuguese and English versions of the scale, and were analyzed through the calculation of the intraclass correlation coefficient (ICC). The internal consistency was assessed on the total sample of adolescents by means of

Cronbach's α, and an exploratory factor analysis was performed in order to identify the 3 sub-scores which are part of the original scale.[10] We used the varimax rotation method for factor solution and items that did not reach at least 0.3 for factor loading were excluded. For construct validity, a sub-sample of 126 adolescents was extracted from the total sample. A diagnostic clinical interview was performed by a psychiatrist with training in child and adolescent psychiatry and the Swanson, Nolan and Pelham questionnaire 4th revision (SNAP-IV)[10] was applied to this sample. Construct validity was assessed through the correlation of the scores between the BIS 11 and the SNAP-IV[10] for attention deficit/hyperactive disorders (ADHD) and oppositional defiant disorder (ODD), and number of positive symptoms for conduct disorders (CD) obtained from the clinical interview. The correlations were estimated using Pearson's test (p value < 0.05). The statistical package for social sciences version 13.0 (SPSS 13.0) was used for all analyses. The project was approved by the Institutional Review Board of the Clinical Hospital of Porto Alegre.

Results

In bilingual subjects, means and standard deviation from both English and Portuguese version were respectively: total score 62. 2 ± 11.6 and 62.2 ± 11.0, attention 17.3 ± 3.4 and 17.4 ± 2.3, motor 20.4 ± 5.2 and 20.9 ± 5.2 and lack of planning 24.4 ± 5.1 and 23.9 ± 5.2. ICC was 0.90 for the total score, 0.93 for lack of planning, 0.88 for attention and 0.90 for motor impulsivity, all with p value < 0.01. Figure 1 presents the total scores for the BIS 11 in the two versions, showing more divergent measures among more impulsive subjects, and more convergent measures on the least impulsive.

In the adolescent sample, mean age was 17.3 ± 1.7 years, median monthly family income was U$ 348, and the majority (69%) was white. The mean for completed years of schooling was 7.7 ± 2.2, only 23% had more than 8 years of schooling
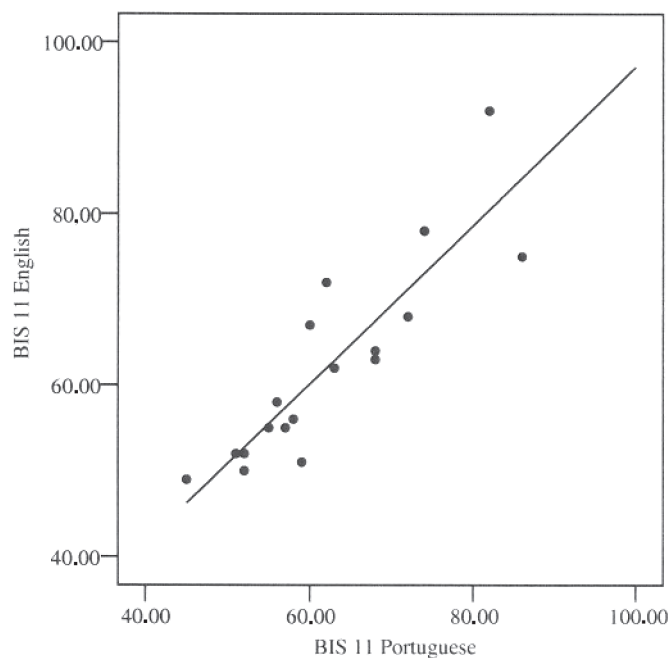

Figure 1 - BIS 11 total scores from English and Portuguese versions

completed, and 71.1% had at least one year of school failure. Internal consistency assessed in male adolescents through Cronbach's α was 0.62 for the 30 items of the scale. When the 5 items with a negative correlation were excluded from the scale for analytic purposes Cronbach's alpha reached a value of 0.71. Questions with a negative correlation were numbers 4 ("I have "racing" thoughts"), 18 ("I act on the spur of the moment"), 23 ("I walk and move fast"), 24 ("I solve my problems by trial- and-error") and 27 ("I have outside thoughts when thinking"). Factor analysis identified 3 factors (screen test) but the solution was different from the original version; questions 4, 17, 18, 23, 24, 26, and 27 were excluded from the factorial solution since they did not reach a factor loading of 0.3. Table 1 shows the best factorial solution had grouped the questions 1, 5, 6, 7, 10, 11, 13, 19, 22 and 30 in one factor (all questions were about lack of attention and lack of planning sub-scores), questions 2, 9, 12, 14, 15, 16, 20, 21 and 29 in another factor, and questions 8, 3, 25 and 28 in a third factor; in the second factor all items of the motor subscale were grouped, but it included items 14, 16 and 20, which were originally from the lack of attention and lack of planning sub-scales. In the third factor, all items were from the lack of planning sub-scale. From the 126 adolescents, 24 (19.0%) had symptoms of ADHD, 22 (17.5%) of CD and 18 (14.3%) of ODD. Total scores for impulsivity were significantly correlated to ADHD score ($r = 0.354$, $p < 0.01$), ODD score ($r = 0.347$, $p < 0.01$) and CD number of symptoms ($r = 0.343$, $p < 0.01$).

Discussion

Our findings suggest a good performance of the scale on undergraduate medical students, with ICCs around 0.90, which indicate similarity of both English and Portuguese measures. We also verified good scale stability, considering that the two versions were applied within a two-week interval. Greater differences on measures from both versions relied on the most impulsive subjects, as shown in Figure 1. Such result is in accordance with other studies that show worse performance of the scale in more impulsive subjects,[11] which might be justified by impulsivity itself when answering questions.

With regard to the internal consistency, the finding of α Cronbach's of 0.62 in the adolescent sample was below what is expected for good scale performance, which should be over 0.7.[12] It is important to mention that the adolescent sample came from a population with low education, what might have caused a worse performance of the scale due to a potential difficulty in understanding some questions. The author of the BIS 11[11] had already identified some problems with populations with a low schooling level. He reported that questions such as "I feel restless during lectures and presentations" are not quite appropriate and did not fit well in these cases. However, in the process of adaptation for Portuguese, these aspects were taken into consideration when translated. Some questions were modified enough to take cultural aspects into account, such as in question 17 - where its original form "I have regular medical and odontological check ups" was changed into "I take care of myself in order not to feel sick".

Exploratory factor analysis of the current version identified three factors, but these factors were different from the ones of the original scale in English. The motor sub-scale was more easily identifiable in the Portuguese version than the other sub-scales. However, in the BIS 11 validation process in English,[4] the authors identified mutually exclusive motor and non-planning subscales, but the "cognitive impulsiveness"

Table 1 - Factor Analysis for the BIS 11 items (n = 464)

VARIMAX Rotated solution	Factor 1 item loading	Factor 2 item loading	Factor 3 item loading
Eigenvalue	2.62	2.31	1,78
% of variance explained [a]	11.4	10.0	7.73
Scale items [b]			
1. I plan tasks carefully (P)[c]	0.52	-	-
5. I plan trips well ahead of time (P)	0.42	-	-
6. I am self-controlled (M)	0.52	-	-
7. I concentrate easily (A)	0.51	-	-
10. I am a careful thinker (A)	0.67	-	-
11. I plan for job security (P)	0.40	-	-
13. I like to think about complex problems (A)	0.45	-	-
19. I am a steady thinker (A)	0.48	-	-
22. I finish what I start (P)	0.53	-	-
30. I plan for the future (P)	0.42	-	0.38
2. I do things without thinking (M)	-	0.37	0.39
9. I find it hard to sit still for long periods of time (M)	-	0.37	-
12. I say things without thinking (M)	-	0.63	-
14. I change jobs (P)	-	0.48	-
15. I act "on impulse" (M)	-	0.51	-
16. I get easily bored when solving thought problems (A)	-	0.51	-
20. I change where I live (P)	-	0.40	-
21. I buy things on impulse (M)	-	0.42	0.31
29. I am restless at lectures or talks (M)	-	0.41	-
3. I am happy-go- lucky (P)	-	-	0.48
8. I save regularly (P)	-	-	0.41
25. I spend or charge more than I earn (P)	-	0.36	0.49
28. I am more interested in the present than in the future (P)	-	-	0.60

[a] Total variance explained 29.2%
[b] Factor loadings below .300 are not reported.
[c] () A = lack of attention P = lack of planning M = motor according to English version
Items 4, 17, 18, 23, 24, 26 e 27 were excluded because no loading scores reached above .299

items scored in more than one factor. They suggest that cognitive processes underlie impulsivity in general and that the other two factors are better delimited, quite similarly to what happened with the Brazilian version. Besides, the authors concluded[4] that the overall impulsivity score had a potential clinical utility, but they did not make a point about subscales. Another point is that total variance explained by three factors is low (29%), but in the original version the number found for the three factors was similar, around 32%.[4] Therefore, even considering the similarity between sub-scores in English and in Brazilian versions, they are not validated and should not be used with Brazilian adolescents. In the validation of the BIS 11 Italian version for adolescents,[8] factors were different from its original English version, confirming that factors are not a strong construct.

With regard to construct validity, BIS 11 scores were correlated to ADHD and ODD scores, and to CD number of symptoms. Although correlations were not strong, all three were in the same direction. Besides, high correlations could not be expected since they did not measure the same construct.

Our study has limitations, such as the fact that bilingual subjects were self-reported as proficient in English and no

other test was conducted to confirm that. Besides that, validity was assessed only in low-schooling male adolescents, which jeopardizes the generalization of findings. However, even in this sample - in which problems with validation were expected for reasons previously mentioned - the scale had a reasonable performance, suggesting that in other populations it might still perform better. The high ICC could corroborate this, since both English and Portuguese versions have produced very similar scores, including sub-scores.

In conclusion, the BIS 11 is a scale that has been proved to be useful for psychiatric research in many countries around the world and, even with some limitations in the Portuguese version, can be used in male adolescents and should be tested in other populations.

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