VALIDATION OF THE BASIC PSYCHOLOGICAL NEEDS IN EXERCISE SCALE (BPNES)

VALIDAÇÃO DO QUESTIONÁRIO DE NECESSIDADES PSICOLÓGICAS BÁSICAS NO EXERCÍCIO (BPNES)

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RESUMO

O objetivo do estudo foi a validação transcultural do questionário de Necessidades Psicológicas no Exercício (BPNES) com alunos brasileiros. Participaram três tradutores envolvidos no processo de tradução, três especialistas em Psicologia do Esporte e 403 alunos. O instrumento utilizado foi o BPNES com 12 itens que avaliaram as necessidades psicológicas básicas dos alunos (autonomia, competência e relacionamento). Para análise dos dados utilizou-se os coeficientes de validade de conteúdo, kappa, alfa de Cronbach, correlação intraclasse e análise fatorial confirmatória. Os resultados mostraram que a versão para a língua portuguesa contém questões apropriadas para clareza de linguagem e relevância prática (CVC>,81), apresenta consistência interna (α=,83) e confiabilidade teste-reteste satisfatória (R=,87). A análise fatorial confirmatória apresentou coeficientes de ajuste adequados (X2/gl=2,10, GFI=,95, CFI=0,96, TLI =,95, RMSE=,05). Conclui-se que a versão na língua portuguesa para alunos brasileiros do BPNES mostrou-se válida para avaliar os construtos de motivação (autonomia, competência e relacionamento) no contexto educacional.
Palavras-chave: Motivação, Esporte, Psicológico, Questionário, Psicometria.

ABSTRACT

The study aimed to validate for Portuguese language (Brazilian population) the questionnaire Basic Psychological Needs in Exercise Scale (BPNES) in Physical Education. Attended three translators involved in the translation process, three doctors in Sport Psychology and 403 students. The instrument was the BPNES with 12 items that assessed the basic psychological needs (autonomy, competence and relationship). For analysis, we used the content validity coefficients, kappa, Cronbach's alpha, intraclass correlation and confirmatory factor analysis. The Results showed that the version for the Portuguese language contains appropriate questions for clarity of language and practical relevance (CVC>.81) and presents internal consistency (α=0.83), and satisfactory test-retest reliability (R = 0.87) . Confirmatory factor analysis presented adjustment coefficients (X^2/gl=2.10; GFI=0.95; CFI=0.96; TLI=0.95; RMS=0.05). We conclude that the version into Portuguese of BPNES proved to be valid to assessed the constructs of motivation (autonomy, competence and relationships) in the Brazilian educational context.
Keywords: Motivation, Sport, Psychological, Questionnaire, Psychometrics.

Introduction

The school has features that present a pressure environment and excessive charges related to student performance. Excess pressure interferes with the autonomy of the students and, consequently, in the process of teaching and learning[1]. Longitudinal studies assessing the aspects that can interfere with the learning process are very scarce[2].

Some behaviors may reveal a lack of student motivation, highlighting the need for monitoring and intervention in the field of educational psychology. Thus, to identify students do not realize the activities proposed by the teachers, do not participate in the most simple tasks, they feel constrained in certain routines, or turn away from his companions in the classroom, requiring parental support or expertise[3,4]. These behaviors can reveal that the basic psychological needs (competence, autonomy and relationship) are not being met, interfering with the motivation of school. Every human being is endowed with a capacity to develop their

own motivation[2]. For Deci e Ryan[2] from birth people engage in activities that allow them the satisfaction of these needs.

By stimulating behaviors that develop the active participation of students and provide intrinsically motivated activities, teachers can contribute to this process. Thus, when support for social relationships is linked to support for autonomy and competence, intrinsic motivation is increased[4]. Investigations in the educational context, and the theoretical basis of the Self-Determination Theory (TAD) showed that provide students a choice increases intrinsic motivation[5]. The TAD suggests that these aspects can enable them to satisfy the need for autonomy, resulting in an internal locus of causality perceived and, consequently, improving intrinsic motivation and perceived competence[2].

In Brazil, other educational problems, such as inadequate physical structure and poor material resources, increase difficulty in initial and continuing training of teachers. Also, problems related to bullying, drugs and violence, do not seem to allow studies and other public policies in motivational area. However, such themes are considered relevant in the international context[3,6,7].

Given the difficulty in assessing the motivational aspects of the students in the Brazilian context, this study aimed to validate for Portuguese (Brazilian population) the questionnaire Basic Psychological Needs in Exercise Scale (BPNES) in Physical Education, seeking to specifically evaluate the test-retest reliability, the reliability and factorial validity through confirmatory factor analysis of the instrument. The purpose of this instrument, and to facilitate the investigative process is to contribute to the evaluation of basic psychological needs in Physical Education.

Methods

Participants

The study included three translators involved in the translation process and three professors doctors in Sport Psychology (committee of experts) participating in the process of adaptation and version of content validation in the Portuguese language[8,9] of Basic Psychological Needs in Exercise Scale (BPNES).

To select the study participants schools was used a stratified random sample[10]; the sample test was composed of 403 students (252 primary and 151 secondary school). The study population was divided into four strata using the map of the city of Maringáconsists of 48 zones, 13 zones in stratum 1 (11 schools), 13 areas in stratum 2 (11 schools), 11 areas in the stratum 3 (4 schools) and 11 areas in stratum 4 (3 schools). They were drawn two zones of each layer, checking existing public schools in that area; a new draw was made when no school was found in that area; areas that had more than one school, participated in a new draw, so that only two schools per stratum participate in the study; were added to 08 schools to participate in the study, two per stratum.

Procedures

To participate in the study students verbally expressed their desire to participate.The persons responsible for the participants gave written informed consent after being informed about the possible risks of the activities. Thus, it was initially delivered an invitation letter to leaders and school directors that authorized the study. They attended two elementary school classes or high school each school to the test and retest. The sample test was composed of 403

students enrolled in 08 public schools in the city of Maringa-Pr, and 252 primary and 151 secondary school (11 to 18; X=14.30 years, SD=1.53) , with 204 students (50.62%) male and 199 (49.38%) female.

The Basic Psychological Needs in Exercise Scale (BPNES) validated initially by Vlachopoulos and Michailidou[11] contains 12 items with Likert scale from one to five points, related to basic psychological needs of human beings: autonomy (questions 3, 6, 9 and 12), competence (questions 2, 4, 7 and 10) and relationship (questions 1, 5, 8 and 11). The questionnaire has as objective to verify the basic psychological need that prevails in the behavior of students. The need for autonomy reflects a sense of will and self-assertion on the behavior of individuals; the need for competence refers to the need to properly interact with the environment and experience opportunities to express or develop the skills of a person; the need for relationship refers to situations where individuals feel they have a connection with significant others and experience a sense of belonging.

For the realization of the validation procedures applied to the author Symeon Vlachopoulos[11], the authorization for use of the instrument (Basic Psychological Needs in Exercise Scale). The study was approved by the Ethics Committee Research on Human Beings(n. 29369). The data were collected at two different times. The study participants were informed that a 14-day interval would be held the second data collection (retest); the period of time less than 14 days could contaminate the results by memory effect[12]. Thus, it performed test (n=403) and re-test (n=346) in order to increase the reliability of data (temporal stability). Samples were collected by the researcher, in previously arranged time at participating schools.

Statistical analysis

For analysis of the language of clarity, relevance practical and theoretical relevance was used the content validity coefficient (CVC) adopting>.8[13]; Kappa coefficient was used to analyze the theoretical dimension, considered> 0.6[14]; Cronbach's alpha coefficient for internal consistency, adopting α> 0.7[10,15] and intraclass correlation coefficient (R) for temporal stability by considering the following cutoff points: (below 0,2 = poor; 0 ,20 = weak; .21-.40 = probable; .41-.60 = moderate; 0.61 to 0.80 = substantial; and 0.81 to 1.00 = almost perfect)[14]. For confirmation of the model was used confirmatory factor analysis[10]: normal by the asymmetry coefficients (sk) and kurtose (ku) uni- and multivariate considering extreme violation sk$\geq$3 and ku$\geq$7. The quality of the overall adjustment factor model was analyzed by adjustment of quality indicators: X²/gl (<5 acceptable); Goodness of Fit Index (GFI>.9 good); Comparative Fit Index (CFI >.9 good); Tucker Lewis Index (TLI>.9 good); Root Mean Square Error of Approximation (RMSEA <.05 very good, considering p-value $\geq$,05). Convergent validity was analyzed by Average Variance Extracted (AVE$\geq$,5) and discriminant validity obtained by comparing the AVE values of each factor with the square of the correlation (r²) among the factors, should the values of the factors are higher comes that the correlation between them[10]. Data analysis was performed by AMOS software (Analysis of Moments Structures version 20) and SPSS (Statistical Package for Social Sciences, version 20) (SPSS, Inc, Chicago, IL).

Results

Table 1 shows the content validity criteria coefficients for clarity of language and practical relevance in BPNES validation.

Table 1. Content validity coefficient (CVC$_t$) for the criteria clear language and practical relevance of Basic Psychological Needs in Exercise Scale (BPNES).

Dimensions	CVC$_t$	
	Clear language	Practical relevance
Autonomy	.81	.88
Competence	.85	.93
Relationships	.86	.94

Fonte: Os autores

The results show (Table 1) that all BPNES dimensions obtained values greater than .81, indicating appropriate questions regarding clarity of language and practical relevance to the Portuguese language from the understanding of experts. The findings indicate that the translation and adaptation of the Brazilian version of BPNES may represent relevant to evaluation of the constructs (autonomy, competence and relationships) in the school environment.

The classification of theoretical dimension (BPNES) the dimensions autonomy, competence and relationships were assessed by the level of agreement between the committee of experts, presenting results of Kappa =.91. The results showed excellent concordance between the evaluators, showing the items of the questionnaire correspond to the dimensions indicated by the authors of the instrument.

Internal consistency

The internal consistency (reliability) of BPNES was performed using Cronbach's Alpha, which provides a reliable estimate of a test or of each dimension in a multidimensional test[16]. The overall internal consistency index BPNES was .83, considering the acceptable and high value obtained as the minimum accepted as satisfactory by the literature[10] is .70. Table 2 shows the internal consistency of the questionnaire dimensions and correlation item-dimension.

**Table 2.** Internal consistency (Cronbach's alpha) of BPNES dimensions and correlation item-dimension

BPNES dimensions	Item	α	Correlation item-dimension
Autonomy	3, 6, 9 e 12	.66	.72/.73/.65/.71
Competence	2, 4, 7 e 10	.80	.71/.82/.84/.79
Relationship	1, 5, 8 e 11	.80	.74/.82/.83/.77

Fonte: Os autores

The results of the intraclass correlation coefficient (R) of the 12 items BPNES obtained indices between .66 and .80 (Table 2) with an average value of 0.70 indicating substantial value; however values are considered appropriate[14,17]. The intraclass correlation is used to indicate the reliability test and retest[18], with variation from -1 to +1, measuring the average similarity scores of the subjects in both assessments (test and retest).

Confirmatory Factor Analysis of BPNES

The three-factor model of Psychological Basic Needs Scale Exercise (BPNES) conducted with a sample of 403 students of primary and secondary public schools in the city of Maringa-Pr showed good quality adjustment (x2/df=2.103; CFI=.962; GFI=.959; TLI=.951; RMSEA=.052; [rmsea≤0.05] =.370), as shown in figure 1.
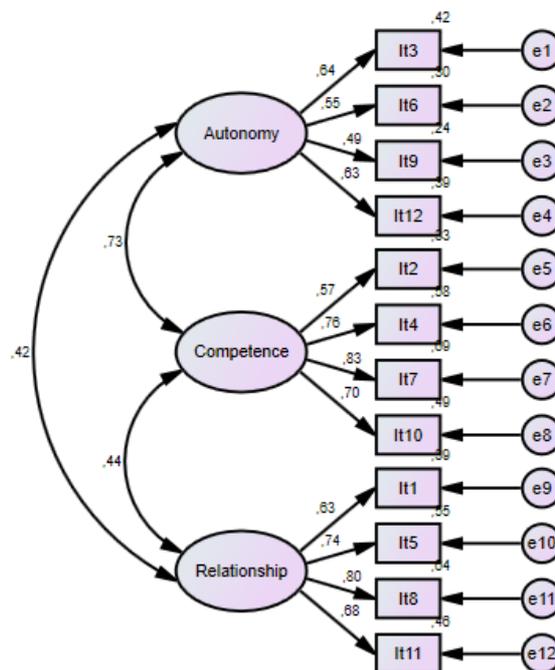
Figure 1. Trifactorial model necessities Basic Psychological Needs in Exercise Scale (BPNES) adjusted to a sample of 403 students (x^2/df=2.103; CFI=.962, GFI= .959; TLI=.951;RMSEA=.052).

Fonte: Os autores

Through the parameters estimated after the confirmatory factor analysis, it was found that the factor saturations showed values between .49 and .83 (Figure 1). The composite reliability of values was .66 for "autonomy" to .812 "Competence" and .806 for "Relationship". Convergent validity of these factors (dimensions) was verified by the average variance extracted (AVE), presenting as .33 for "autonomy" to .52 "Competence" and .51 for "Relationship". Despite not having checked the discriminant validity of all the factors in the sample, with values greater than .50; conceptually, they evaluate different facets of scale and was chosen for its maintenance[10].

Items related to Autonomy included "The way I do exercise is in accordance with my choices and interests", "I feel the way I do exercises is the way I want", "I feel like the way I express exercises truly who I am" and "I feel I have an opportunity to make choices about the way I exercise"; for competence, the items were: "I feel I have made much progress towards the goals I want to achieve", "I feel that successful performance exercises in physical education classes", "I feel that exercise is an activity I do very well" and "I am able to meet the requirements of exercises performed in Physical Education"; and for the following relationship was used: "I feel good with people who do exercise", "My relationships with people who do exercise are very friendly", "I feel I have excellent communication with people who do exercise" and "My relationships with people who do exercise are quite close". The numbering and the ordering of items of the dimensions were kept as original instrument: Autonomy (items 3, 6, 9 and 12); Competence (items 2, 4, 7 and 10) and Relationship (1, 5, 8 and 11).

The results of the intraclass correlation coefficient (R) of BPNES items were between .66 and .77 (Table 3), with a mean value of .70 (Table 4), indicating a substantial value[14].

Table 3. Intraclass correlation coefficient (R) of the 12 items BPNES

Item	R	Confidence interval (95%)
1	.68	.61 − .74
2	.68	.61 − .74
3	.67	.59 − .73
4	.73	.67 − .78
5	.68	.60 − .74
6	.72	.66 − .77
7	.74	.69 − .79
8	.69	.62 − .75
9	.77	.72 − .81
10	.69	.62 − .75
11	.66	.58 − .72
12	.69	.62 − .75
Mean	.70	

Fonte: Os autores

The intraclass correlation coefficient (R) of the three dimensions of BPNES was .84 for autonomy, competence and .89 to .88 for relationship, indicating an almost perfect correlation (Table 4).

Table 4. Intraclass correlation coefficient (R) of the three dimensions of BPNES

Dimensions	R	Confidence interval (95%)
Autonomy (It 3, It 6, It 9, It 12)	.84	.82 - .87
Competence (It 2, It 4, It 7, It 10)	.89	.87 - .90
Relationship (It 1, It 5, It 8, It 11)	.88	.86 - .90
Mean	.87	

Fonte: Os autores

Discussion

The aim of this study was to validate for Portuguese (Brazilian population) the questionnaire Basic Psychological Needs in Exercise Scale (BPNES) in Physical Education. This instrument has the objective of determining the personal assessment and the satisfaction of basic psychological needs of students and can be used before or after the process of teaching and learning. The results obtained after the psychometric analysis of instruments, such as test-retest, chi-square ($\chi 2$), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Standardized Root Mean Square Residual (SRMR) and the Root Mean Square error of Approximation (RMSEA), composite reliability and the normality of the variables were considered appropriate.

Regarding construct validity, the BPNES the Brazilian reality demonstrated the structure with three dimensions (autonomy, competence and relationship), as well the studies of Vlachopoulos & Michailidou[11] and Vlachopoulos[19].

All items and dimensions of BPNES were satisfactorily correlated after the completion of the retest. The analysis of reliability through the intraclass correlation coefficient showed that both the 12 items as the three dimensions of BPNES demonstrated the reliability of intraclass correlation values.

The results of intraclass correlation (R) indicated the temporal validity of the instrument to assess the basic psychological needs. No study to determine the temporal validity of this scale was found in the literature to date.

Conclusions

This is the first study to conduct a cross-cultural validation of an instrument that evaluates the basic psychological needs (autonomy, competence and relationship) specific to the Brazilian school context. Thus, this study is the first to demonstrate psychometric evidence for BPNES with a middle and high school students sample in Brazil.

The Brazilian version of BPNES presented satisfactory results in Cross-cultural adaptation and validation of the instrument, Internal Consistency and Validation Construct BPNES and Temporal stability, resulting in a valid and reliable instrument with 12 items (Appendix A) in the same way as the original model in English.

The limitation of this study is related to the geographic distribution of the sample: all subjects of the study were from a city in northwestern Paraná. Thus, further studies should replicate the psychometric properties of BPNES to other samples and other cultures in order to confirm stability, specifically with confirmatory factor analysis.

Finally, the BPNES in its draft of 12 items, proved to be a reliable and accurate measure for wider use in research with students in physical education classes, assessing the basic psychological needs of students.

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Appendix A. Escala de Necessidades Psicológicas Básicas para o Exercício (BPNES)

Instruções:Asseguintes frasesse referem asua experiência ao realizarexercícios.Utilizando aescala de 1 a 5, por favor indique até que pontovocê concordacom estas afirmações, circulando um númeropara cada item: 1. Eu não concordo em tudo; 2. Corcordo um pouco; 3. Euconcordoparcialmente; 4. Eu concordomuito; 5. Eu concordo completamente.

Nas minhas aulas de Educação Física quando faço exercícios:	Não concordo	Concordo um pouco	Concordo parcialmente	Concordo muito	Concordo completamente
1. Eu me sinto bem com as pessoas que faço exercício.	**1**	**2**	**3**	**4**	**5**
2. Eu sinto que tenho feito muito progresso em relação aos objetivos que quero alcançar.	**1**	**2**	**3**	**4**	**5**
3. A maneira que eu faço exercício está de acordo com as minhas escolhas e interesses.	**1**	**2**	**3**	**4**	**5**
4. Eu sinto que desempenho com sucesso os exercícios nas aulas de Educação Física.	**1**	**2**	**3**	**4**	**5**
5. Meus relacionamentos com as pessoas que faço exercício são muito amigáveis.	**1**	**2**	**3**	**4**	**5**
6. Eu sinto que o jeito que faço exercícios é da maneira que quero.	**1**	**2**	**3**	**4**	**5**
7. Eu sinto que o exercício é uma atividade que eu faço muito bem.	**1**	**2**	**3**	**4**	**5**
8. Eu sinto que tenho excelente comunicação com as pessoas que faço exercício.	**1**	**2**	**3**	**4**	**5**
9. Eu sinto que a maneira que faço exercícios expressa verdadeiramente quem eu sou.	**1**	**2**	**3**	**4**	**5**
10. Eu sou capaz de atender as exigências dos exercícios realizados nas aulas de Educação Física.	**1**	**2**	**3**	**4**	**5**
11. Meus relacionamentos com as pessoas que faço exercício são bastante próximos.	**1**	**2**	**3**	**4**	**5**
12. Eu sinto que tenho uma oportunidade de fazer escolhas com relação ao jeito que faço exercício.	**1**	**2**	**3**	**4**	**5**

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