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Psychometric Properties of the Portuguese Version of the Treatment Self-Regulation Questionnaire for Physical Activity (TSRQ - PA)

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Abstract

Aim: The aim of the present study was to analyze the reliability and factorial validity of the Portuguese Version of the Treatment Self-Regulation Questionnaire for physical activity (TSRQ-PA). *Method:* In this study, 148 healthy adults (Mean age = 44.70, 96.6% women) and 89 chronic fatigue patients (Mean age = 47.39, 97.8% women) filled out questionnaires related to behaviour regulation style (TSRQ – PA) and physical activity. *Results:* The confirmatory factor analysis adjustment indices of a two-factor structure (Autonomous Regulation scale and Controlled Regulation scale) of the TSRQ-PA were satisfactory and internal consistency estimates were acceptable for both factors. A higher degree of autonomous behaviour regulation was significantly associated with higher levels of physical activity. *Conclusion:* These findings provide support for the validity and reliability of the TSRQ – PA for measuring behaviour regulation style for engaging in physical activity, in different settings.

Keywords: physical activity, motivation, behaviour regulation style, validity, reliability

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Introduction

Engaging in regular physical activity is considered to be beneficial for the health and well-being of people of all ages (Weinberg & Gould, 2007). Nevertheless, 60% of the adults in the Western world are not physically active on a regular basis (Seefeldt, Malina, & Clark, 2002). In a recent “Eurobarometer” on physical activity (European Commission, 2010), 14% of the adults in EU countries reported not to engage in any form of moderate physical activity (e.g. cycling at a normal pace) and of those who reported to be physically active only 27% were regular exercisers.

Physical activity is a complex behaviour influenced by a variety of determinants, such as personal and physical activity characteristics, environmental factors, and cognitive variables (Dishman & Buckworth, 1997) such as motivation (e.g. behaviour regulation style).

Motivation is related to the selection, activation and sustained direction of behaviour toward certain goals (Bandura, 1997). Self-Determination Theory (SDT; Deci & Ryan, 1985, 2000), a general theory of human motivation that has been applied to health behaviours, focuses on the processes involved in the initiation and maintenance of

behaviours over time, such as the sense of autonomy (Ryan, Patrick, Deci, & Williams, 2008). SDT states that health related goals can be internal or set by the individuals themselves (autonomous behaviour regulation) or people can feel coerced by external or internal factors to attain a certain goal (controlled behaviour regulation). Moreover, SDT conceptualizes the behaviour regulation process as a continuum of degree of autonomy, consisting of *amotivation* – lack of intention to engage in a behaviour; *controlled regulation* – behaviour motivated by contingencies not inherent to the activity itself; and *autonomous regulation* – doing an activity for the enjoyment and satisfaction inherent in engaging in the behaviour itself. The degree of autonomy is seen as a major determinant of behaviour change (Deci & Ryan, 2007). It is considered that people who strive for personally important health goals (e.g. to do physical activity) and who are autonomously regulated, are more likely to attain and maintain their goal. Research has demonstrated that autonomous behaviour regulation is indeed an important predictor of physical activity and other health behaviours both in healthy populations (e.g. Fortier, Sweet, O'Sullivan, & Williams, 2007; Mullan & Markland, 1997; Thøgersen-Ntoumani & Ntoumanis, 2006), and chronic diseases (e.g. Hurkmans et al., 2010; Senécal, Nouwen, & White, 2000; Sweet et al., 2009).

Based on the behaviour regulation framework proposed by Deci and Ryan (1985), several measures of behaviour regulation style have been developed (Self-Regulation Questionnaires- SRQ; Ryan & Connell, 1989), namely for health behaviours (e.g. Exercise Self-regulation Questionnaire; SRQ-E) and health care (e.g. Treatment Self-regulation Questionnaire-TSRQ. The TSRQ is a self-report measure designed to assess the degree of autonomy of behaviour regulation towards specific behaviour changes in health care settings (example of stem: "I take my medication for diabetes and/or check my glucose because..."). The questionnaire was initially developed by Williams and colleagues (Williams, Grow, Freedman, Ryan, & Deci, 1996) for weight loss; at present, different versions of the questionnaire exist as it is considered that the stems and wording of the items should be adapted to the specific behaviour addressed, such as taking medication, following a diet and doing physical exercise in diabetes (Williams, Freedman, & Deci, 1998), making life style changes in chest pain patients (Williams, Gagné, Mushlin, & Deci, 2005), self-regulation of smoking behaviour (Williams, Gagné, Ryan, & Deci, 2002) and physical exercise in rheumatoid arthritis (Hurkmans et al., 2010; Knittle et al., 2011) and in the general population (Levesque et al., 2007).

The TSRQ has been widely used and validated across different health behaviours and settings (e.g. Levesque et al., 2007; Williams et al., 1996).

The main purpose of this study is to examine the factorial validity and reliability of a Portuguese version of the Treatment Self-regulation Questionnaire for Physical Activity (TSRQ-PA) across two different groups: a healthy population and a chronic fatigued (CF) population.

Method

Participants

CF Group — The sample consisted of 89 chronic fatigue patients, meeting the Center for Disease Control (CDC) criteria for Chronic Fatigue (CDC; Fukuda, Straus, Hickie, Sharpe, Dobbins, & Komaroff, 1994), aged between 18 and 65 (M = 47.39; SD = 10.96), 87 (97.8%) women and 2 (2.2%) men. Concerning their physical activity behaviour, 65% were physically active and 35% were sedentary (M = 97.44; SD = 189.99). To participate, patients needed to be fluent in spoken Portuguese and have the capacity to provide an informed consent. Exclusion criteria

were the presence of a concurrent somatic condition, which could explain the fatigue symptoms (e.g. cancer), and presence of a severe psychiatric disorder (e.g. psychosis).

Healthy Group — The sample consisted of 148 healthy adults, aged between 18 and 65 years old (*M* = 44.70; *SD* = 10.10), 143 (96.6%) women and 5 (3.4%) men. In terms of physical activity behaviour, 46.6% were physically active and 52.7% were sedentary (*M* = 233.78; *SD* = 364.09). Eligibility for participation was to be between 18 and 65 years of age, fluent in spoken and written Portuguese and with the capacity to provide an informed consent.

Measures

Treatment Self-Regulation Questionnaire — The TSRQ-PA is a self-reported questionnaire that assesses the degree of autonomy in engaging in physical activity. Participants are presented with the stem "The reason I want to be physically active is that…" and asked to rate on a 7-point Likert scale (from 0 = *Not at all true* to 7 = *Very true*) to what extent each of the 12 reasons presented currently apply to them. Seven items represent more controlled reasons ("I would be ashamed of myself if I didn't") and five items represent more autonomous reasons ("I personally think that physical activity is important in remaining healthy"). The TSRQ-PA derives from the diet and physical activity part of the TSRQ Concerning Diabetes (Williams et al., 1998), which consists of 11 items. Nine items from this questionnaire were included in the TSRQ-PA. The item "It's a challenge to learn how to live with diabetes" was excluded because it is specific for diabetes and the item "I've carefully thought about my diet and exercising and believe it is the right thing to do" wasn't included because it was considered to be too similar to another autonomous regulation item "I feel personally that watching my diet and exercising are the best things for me". Three items were added to the TSRQ-PA: the item "I really want to make some changes in my life" is derived from the TSRQ version used for weight loss interventions and the item "It is fun to do physical activity" was obtained from the Exercise Self-Regulation Questionnaire. The third item "I want to avoid problems with my doctor or other health care professional that advised me to be physically active" is an original item. For the chronic fatigue version a new item was developed "I believe physical activity can reduce my fatigue problems". Therefore, the TSRQ-PA version for CF contained 13 items. Autonomous regulation and controlled regulation scores can be obtained by calculating the average for each scale. Additionally, a total score indicating the degree of autonomy regulation can be obtained by calculating the z-scores for each subscale and then subtracting the z-score of controlled regulation from the z-score of autonomous regulation. Higher scores indicate a higher level of autonomy in physical activity engagement.

Physical Activity — Physical activity levels were assessed by (1) asking patients if they are currently physically active and (2) using the Short Questionnaire to Access Health-Enhancing Physical Activity (SQUASH; Wendel-Vos, Schuit, Saris, & Kromhout, 2003) sports subscale, in which participants indicate the types of physical activities they presently do (e.g. swimming), the frequency per week (e.g. 3 days per week) and duration per day (e.g. 50 minutes). Intensity of the activity (mild, moderate and vigorous) was calculated based on the Ainsworth's Compendium of Physical activities (Ainsworth et al., 2000). To score the physical activity measure, total minutes of activity is calculated for each activity by multiplying frequency (days/week) and duration (minutes/day). Secondly, each activity score is calculated by multiplying total minutes of activity by the intensity score. Finally, total physical activity scores for each participant were calculated by taking the sum of each activity score.

Procedure

CF Group — The CF participants were taking part in a self-regulation based physical activity randomized controlled trial for Chronic Fatigue patients. Participants were recruited trough several health care institutions in Portugal

and questionnaires were filled out during individual face-to-face sessions with the principal investigator at baseline. Written informed consent was obtained and confidentiality of the data was guaranteed by the research team.

Healthy Group — Participants were recruited through the chronic fatigue patients group that participated in a randomized controlled trial. Patients were asked to give two questionnaires to two friends or relatives with approximately the same age and gender. Participants were asked to complete the questionnaires and return them by prepaid mail. Written informed consent was obtained and confidentiality of the data was guaranteed by the research team. Of the 151 questionnaires returned, 3 participants were excluded because of incomplete data.

Cross Cultural Translation of the TSRQ

The original items from the TSRQ-exercise were adapted based on the procedure translate-translate back (Hill & Hill, 2005). Changes of wording were made so that the items would only reflect physical activity behaviour instead of physical activity and diet as it is stated in the original TSRQ for diabetes.

Data Analysis

Descriptive analysis (minimum, maximum, mean and standard deviations) were obtained for all TSRQ-PA items. Internal consistency of the TSRQ-PA questionnaire was calculated, using Cronbach's alphas. Subsequently, the validity of the TSRQ factorial structure was analyzed by conducting a Confirmatory Factor analysis (CFA; Arbuckle, 2005), using the maximum likelihood (ML) estimation method. The following goodness of fit indices were used to determine the adequacy of the model: Comparative Fit Index (CFI; Bentler, 1990), Root-Mean Square Error of Approximation (RMSEA; Steiger, 1990) and χ^2statistics. CFI values close to 1 indicate a very good adequacy of the measurement model (Bentler, 1990) and RMSEA values of .08 or less indicate a reasonable fit (Browne & Cudeck, 1993). Results less than 2 for the χ^2/df are considered to be adequate (Byrne, 1989). For further validation of the TSRQ-PA, Pearson correlation coefficients were calculated to examine associations between physical activity and behaviour regulatory style.

Data analyses were performed using the statistical software SPSS v19 and AMOS v20.

Results

Descriptive Statistics and Internal Consistency of the TSRQ – PA

The means, standard deviations, minimum and maximum of all items as well as the Chronbach's alphas of the two TSRQ – PA scales (Autonomous and Controlled Regulation) for both the CF and the healthy groups are presented in Tables 1 and 2, respectively.

Internal consistency of the autonomous regulation and controlled regulation scales, containing all items, were .69 and .73 for the CF group and .76 and .68 for the healthy group. Item 7 of the controlled regulation scale presented a low item-total correlation (.17 for the CF group and .19 for the healthy group). Based on the internal consistency analysis and factorial validity analysis, this item was excluded from the analysis. After this elimination, the internal consistency the internal consistency of the controlled regulation scale increased to .73 for the CF group and .68 for the healthy group and. Although these values are satisfactory, they were still inferior to those presented in previous studies (Levesque et al., 2007; Williams et al., 1998).

Table 1

Descriptive statistics and coefficient alphas for the Portuguese version of the TSRQ – PA for the CF group

Items	Min-Max	Mean	SD	α
Autonomous Regulation scale				.686
2. To remain healthy	5-7	6.64	0.61	
5. PA is the best thing	1-7	6.54	0.84	
9. A personal choice	1-7	6.08	1.18	
10. Changes in life	1-7	5.78	1.27	
12. It is fun	1-7	5.24	1.66	
*13. Reduces fatigue	1-7	5.21	1.64	
Controlled Regulation scale				.733
1. Others would be upset	1-7	2.03	1.57	
3. Would feel ashamed	1-6	2.25	1.56	
4. Easier to do what I am told	1-7	2.82	1.84	
6. Others see I am fit	1-7	3.62	2.09	
**7. Doctor advice	1-7	5.25	1.77	
8. Would feel guilty	1-7	3.99	2.15	
11.Avoid problems	1-7	3.28	2.08	

Note. * Item added only to the CF version. ** Excluded item.

Table 2

Descriptive statistics and coefficient alphas for the Portuguese version of the TSRQ – PA for the healthy group

Items	Min-Max	Mean	SD	α
Autonomous Regulation scale				.761
2. To remain healthy	1-7	6.54	0.93	
5. PA is the best thing	1-7	6.47	0.91	
9. A personal choice	1-7	6.18	1.30	
10. Changes in life	1-7	5.54	1.61	
12. It is fun	1-7	5.71	1.48	
Controlled Regulation scale				.681
1. Others would be upset	1-7	1.67	1.33	
3. Would feel ashamed	1-7	2.23	1.52	
4. Easier to do what I am told	1-7	2.65	1.90	
6. Others see I am fit	1-7	3.03	1.93	
*7. Doctor advice	1-7	4.54	1.94	
8. Would feel guilty	1-7	3.29	1.93	
11. Avoid problems	1-7	2.59	1.67	

Note. * Excluded item.

Factorial Validity of the TSRQ – PA

A two first-order inter-correlated factor structure was analyzed using the CFA procedure. Multivariate normal distribution was calculated by means of a standardized Mardia's (1974) coefficient and multivariate Kurtosis was observed in both models (*kurtosis/c.r.* = 3.88 for the CF group and *kurtosis/c.r.* = 3.04 for the healthy group). Nevertheless, the ML estimation method is robust even in the case of a non-normal distribution of the data (Marôco, 2010).

Initial results of the CFA for both groups, revealed low factor loadings for item 7 (.15 for the CF group and .19 for healthy group and) in their respective first-order factor. For the CF group, Lagrange Modification Indices (LMI>11) show that item 7 presented correlated errors with item 13, from the autonomous regulation scale. For the healthy group, item 7 presented negative correlated errors with item 3, belonging to the same factor. Based on these findings taken together with the results of the reliability analysis results, item 7 was excluded for further analysis.

In relation to the CF group, results revealed adjusted fit to the data (χ^2/df = 1.69; CFI = .87; RMSEA = .078, p = .114), with all items loading significantly on their factor (loadings ranging from .23 for item 12 and .89 for item 5). LMI revealed that no error terms were correlated. The estimated correlation between the autonomous and the controlled regulation factor was -.29.

For the healthy group, the two-factor structure also revealed adjusted fit to the data (χ^2/df = 1.31; CFI = .97; RMSEA = .047, p = .528). All items loaded significantly on their respective factor with factor loadings ranging from .37 (item 9) to .88 (item 2). However the model presents covariance errors between items 9 and item 12. The estimated correlation between the autonomous and the controlled regulation factor was .09.

Relation between Behaviour Regulation and Physical Activity

The results from the Pearson correlation coefficients revealed a weak positive association between autonomous regulation and physical activity behaviour (r = .17; p = .012). No significant association was found between controlled regulation and physical activity levels (r = .03; p = .703).

Discussion

This study aimed at determining the reliability and validity of a Portuguese version of the TSRQ (TSRQ – PA) in a sample of healthy adults and a sample of chronic fatigued patients. Overall, we found support for the two-factor structure of the TSRQ – PA, consisting of an autonomous behaviour regulation factor and a controlled behaviour regulation factor. Previous studies used the two correlated dimensions structure (e.g. Hurkmans et al., 2010; Knittle et al., 2011; Williams et al., 1998) and it reflects the scoring procedure recommended (consult www.psych.rochester.edu/SDT). Item loadings were moderate to high, with the exception of item 7 which was excluded from further analysis. Item 7, from the controlled regulation dimension, stating “Because my doctor advised me to” seems to be correlated with items from the autonomous regulation dimension, especially in the chronic fatigued population. One explanation may be that in chronic disease, doctors can prescribe physical activity as a form of treatment, which means that independently of having more autonomous or controlled reasons to be physically active, the advice of the doctor is considered an important reason. This is also reflected by the fact that the mean for this item was higher than the mean for the other controlled regulation scale items. The final Portuguese version of the TSRQ-PA for a healthy population consists of 11 items and the TSRQ-PA for chronic fatigue consists of 12 items.

Internal consistency of each scale was acceptable but results are lower than in previous studies. Williams and colleagues (1998) reported reliability values ranging between α=.81 to α=.85 for the autonomous regulation dimension and between α=.80 and α=.86 for the controlled regulation dimension. One explanation might be that within both scales, there are items reflecting different levels of internalization of the behaviour (e.g. external regulation), according to SDT theory. More studies are needed to analyze the validity of the two-factor structure and examine the possibility of a four-factor structure (Levesque et al., 2007).

Overall, autonomous behaviour regulation was positively associated with higher physical activity levels. This result is in line with the existing literature (Fortier et al., 2007; Hurkmans et al., 2010; Mullan & Markland, 1997; Senécal et al., 2000; Sweet et al., 2009; Thøgersen-Ntoumani & Ntoumanis, 2006) and points out the importance of the ownership of the physical activity goal in physical activity adherence.

Future studies should evaluate other psychometric properties of the TSRQ-PA, such as sensitivity to change. Moreover, concurrent and predictive validity should also be examined. Furthermore, future studies should validate the Portuguese version of the TSRQ-PA across different chronic diseases (e.g. diabetes).

Conclusion

Our findings indicate that the Portuguese version of the TSRQ-PA is a useful tool to examine behaviour regulation style for being physically active in healthy and chronic disease individuals.

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