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Development and Validation of the Theory of Planned Behavior Questionnaire in Physical Activity

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The Theory of Planned Behavior (TPB) is one of the main theoretical models in the study of the different variables, which influence in the practise of physical activity. The aim in this study was to develop a questionnaire based on TPB in physical activity context providing evidence for the validity of the obtained measures. The instrumental project included three independent studies. The first study entailed the construction and qualitative assessment of the items. In the second study, the analysis of factorial structure was performed by means of exploratory measures, and it showed that the reliability of measures was adequate. The third study provided evidence on the dimensionality of the scale. The confirmatory factorial analysis guaranteed the stability of factorial structure proposed by the TPB and provided evidence for the internal validity of the inventory. Moreover, this study provided evidence of its external validity.

Keywords: theory of planned behavior, physical exercise, instrumental study, validation.

La Teoría de la Conducta Planeada (TCP) es uno de los modelos teóricos más empleados para conocer las diferentes variables que influyen en la realización de ejercicio físico. El objetivo en este trabajo fue elaborar un cuestionario basado en la TCP en el contexto del ejercicio físico y aportar evidencias sobre la validez de sus mediciones. El trabajo instrumental incluyó tres estudios independientes. El primer estudio consistió en la elaboración y evaluación cualitativa de los ítems. En el segundo estudio se analizó la estructura factorial mediante procedimientos exploratorios y se mostró que la fiabilidad de las mediciones era adecuada. El tercer estudio aportó evidencias sobre la dimensionalidad del inventario. El análisis factorial confirmatorio avaló la estabilidad de la estructura factorial propuesta por la TCP, así como aportó evidencias de validez interna del instrumento. También se aportan evidencias de su validez externa.

Palabras clave: teoría conducta planeada, ejercicio físico, estudio instrumental, validación.

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According to the latest information from the World Health Organization (WHO), the majority of the adult population is either sedentary or not sufficiently active (WHO, 2002; 2004). In the case of the European Union, two-thirds of the adult population do not receive the recommended levels of physical activity. Spain would be between the European countries whose populations exercise less, where only 25% of adults can be considered sufficiently active (Sjöström, Oja, Hagströmer, Smith, & Bauman, 2006; WHO, 2006). Moreover, many people who begin exercise programmes abandon them after short periods of time and their inactivity returns within the first six months (Marcus et al., 2000; Sniehotta, Scholz, & Schwarzer, 2005). It has been sufficiently demonstrated that regular physical exercise plays an important role in combating stress and as a factor in improving a person’s quality of life. There is extensive literature indicating that regular exercise is an effective preventive strategy against non-communicable diseases like obesity, type 2 diabetes, breast cancer, cardiovascular diseases, hypertension, colon cancer and osteoporosis, among others (Blair & Brodney, 1999; Taras, 2005). These non-communicable diseases are those responsible for the largest percentage of morbidity and mortality in developed countries like Spain, and represent 60% of the world’s total mortality and 47% of its morbidity (WHO, 2004). Nevertheless, exercising regularly does not only have beneficial effects upon physical health; vast research endorses the benefits of physical exercise in different areas of psychological well-being: it improves subjective health, moods and emotion (Biddle, Fox, & Boutcher, 2000; Netz, Wu, Becker, & Tenebaum, 2005), reduces clinical depression (Lawlor & Hopker, 2001), diminishes levels of anxiety and stress (Jiménez, Martínez, Miró, & Sánchez, 2008) and increases self-esteem (McAuley, Mihalko, & Bane, 1997).

The high prevalence of physical inactivity shows the need to design interventions that increase the practice of physical exercise. In order to develop these interventions, it is necessary to understand the processes that lead the subject to initiate and maintain regular physical-sporting activity, including the motivations and different factors that may influence their fulfilment, with the objective of developing more appropriate intervention strategies. One of the most-employed theoretical models to learn about the factors that maintain or hinder the behavioral change necessary to improve a person’s quality of life is the Theory of Planned Behavior (TPB) (Ajzen, 1985), which developed out of the Theory of Reasoned Action (Fishbein & Ajzen, 1975). TPB postulates that the immediate precursor to behavior is intention, defined as the decision or firm intention to conduct the behavior in the immediate near future (see Figure 1). According to this theory, intention is, in turn, influenced by three basic determinants: two of a personal nature and another reflecting the social influence. One is the attitude towards the behavior, i.e. the positive or negative value the person holds towards fulfilling that action. The second, of a social nature, is the subjective norm, which is the perception that person has concerning the social pressures placed upon him or her to perform the action in question or not. Perceived behavioral control is the third, the extent that person believes to be in control over the behavior in question. This component adds greater power in the capacity to predict (and explain) the behavioral intention and the very behavior (Ajzen, 1991). In fact, this antecedent variable, unlike those previous, can directly predict the behavior depending upon whether this person is found to be under voluntary control or not and whether discrepancies exist between the control the person believes to be in possession of and that control the person actually has. So, the effect of the perceived behavioral control will be by the intention when the desired behavior is under personal control, while the effect will be direct if the behavioral conduct is not a personal decision. In fact, this factor is considered an estimation of the actual control one has over the behavior; however, certain differences can also exist between the control a person believes to have and the control he or she actually does. Therefore, the perceived behavioral control will be a good predictor of the behavior only if it is comparable with the actual control.

![Figure 1. Theory of Planned Behavior.](image-url)
Each of the variables of attitude, subjective norm and perceived behavioral control, are in turn influenced by other elements. With respect to the attitude regarding a behavior, this is a product of the beliefs about the results from such conduct, and of the assessment the person makes of such results. The beliefs underlying a person’s attitude towards a behavior receive the name behavioral beliefs. On the other hand, the subjective norm derives from a person’s beliefs that other people or specific groups think that that person should perform such action or not. These beliefs are called normative beliefs. But knowing the beliefs a person holds concerning their important referents is not sufficient for predicting or understanding their subjective norm. In order to do this we must also value their motivation to comply with each of these other people (Ajzen & Fishbein, 1980). Finally, the perceived behavioral control is in function of the beliefs about the confidence an individual possesses regarding their capacities, knowledge, and skills to conduct a behavior and the beliefs about the ease or difficulty in carrying out the action. It is based on an evaluation of the control upon factors that probably will facilitate or inhibit executing the behavior, multiplied by its occurring frequency. They include internal control factors (like information, personal deficiencies, skills, capacities, emotions) and external control factors (opportunities, dependence upon others, and obstacles) (Conner & Norman, 1995).

On the other hand, TPB considers such factors like attitudes towards objectives, personality characteristics, sociodemographic variables (sex, social class, age), the social role, status, intelligence, etc., as external values that, although they could without a doubt influence behavior, they do not have a direct relationship with it, or they are related with the intention by the variables included in the theory (Ajzen, 1991). For example, and within the specific context of this study as is the practice of physical exercise, two factors have shown to be related as much with the practice of physical exercise as with the TPB variables, those of self-efficacy and motivation (Bandura, 1997; Deci & Ryan, 2000). Self-efficacy, understood as that which I believe capable of doing with my skills and capabilities in specific situations, is related to behavioral control, while that of motivation is to attitudes (Maddux, 2005; Terry & O’Leary, 1995).

TPB has great empirical support showing the relationship between the variables of this theory and that of physical exercise (Anderson, Wojcik, Winett, & Williams, 2006; Eng & Martin-Ginis, 2007; Godin & Kok, 1996). For example, the recent meta-analysis study by Hagger, Chatzisarantis, & Biddle (2002) indicates how TPB explained 44.5% of the variance in physical activity intention and 27.4% of the variance in physical activity behavior. Ad-hoc questionnaires were used in the majority of these studies following Ajzen’s recommendations (1985; 1991) of evaluating the different variables included in TPB, as well as the proposals made for the “Manual for the construction of questionnaires based on TPB” (Francis et al., 2004). Such questionnaires presented adequate psychometric properties (Blanchard et al., 2003; Conner & Sparks, 1996; Jackson, Smith, & Conner, 2009; Latimer & Martin, 2005). Given that in Spain there are no validated rating scales integrating the measurement of the variables included in the TPB into one single instrument, we feel it opportune to make and validate this instrument for samples from the Spanish cultural environment. Because of this, the principal objective in this instrumental study was to create a tool that evaluates the antecedent variables of the TPB, i.e. attitude, subjective norm, control and intention, in getting physical exercise. This study presents the results from the three independent studies carried out to produce the Questionnaire of the Theory of Planned Behavior in Physical Exercise and to gather evidence concerning the measurements’ validity.

Study 1:
Construction and qualitative evaluation of items

The composition of the items used as a reference the manual for the construction of the questionnaire based on TPB by Francis et al. (2004) that supplies information about designing the questions from each of the variables in the Theory of Planned Behavior. As such, a data bank of items was created for the evaluation of the TPB variables in the practice of physical exercise. The qualitative evaluation of the items was based on the judgments from a group of experts.

Method

Participants

The panel of experts was formed by seven professionals in the study of variables involved in TPB or in the field of questionnaire development, five of whom possessed extensive knowledge about the different models that are generally applied to health psychology, and particularly to the TPB model. The remaining two professionals were experts in the area of methodology and questionnaire validation.

Procedure

A set of items for each one of the four variables the model includes was developed based on the previously cited manual. In all, 21 items were composed, keeping in mind the semantic definition of the variables under evaluation, grouped into four subscales: Attitude (eight items), Subjective Norm (four), Perceived Behavioral Control (five), and Intention (four). The difference between the number of items for each subscale is due to the necessity of attempting to encompass the distinct characteristics of the semantic definition for all the constructs, without forgetting about the minimum number of items the manual proposes.
for each variable either: a minimum number of three items for the variables subjective norm, perceived behavioral control and intention, and a minimum of four for attitude.

The manual also suggests the type of response scale for the variables. As such, the attitude subscale was evaluated with eight items that included eight pairs of bipolar adjectives on a response scale from 1 to 7. For the remaining subscales, the response scale for each one of the items was of graded response in accordance with quantifiers from 1 (highly disagree) to 7 (highly agree). The final score for each subscale was calculated as the average of the scores obtained for each one of the items in the subscales.

Once the initial bank of items was obtained, it was presented to the judges for evaluation in two aspects: first, with respect to the variable belonging to each one of the items; and second, referring to each item’s composition, referring to whether they were comprehensible or to point out aspects that could improve their composition.

Results

In general, the assessments from the group of experts allowed detecting some deficiencies, principally in the item composition, and they proposed possible alternatives for improvement, just like Table 1 shows.

As can be observed in Table 1, there were few item modifications. The judges indicated that their composition was quite adequate, although some were modified and some words eliminated to improve their clarity. One item was eliminated (If I wanted to, I would easily exercise at least 6 times in the next two weeks.), because it had the same meaning as another. Lastly, and following the judges recommendations, one item was added that reflected the individuals’ motivation to exercise, and it is an important element for evaluating the subjective norm variable. The 21 remaining items from the study with the group of experts shaped the set of items empirically proven in Study 2.

Study 2:
Item statistical analysis

In this study the authors had the objective of selecting the final set of the TPB questionnaire items for conducting physical exercise starting from the analysis of its psychometric properties.

Method

Participants

One hundred thirty-five people completed the questionnaire. The average sample age was 27.20 years (SD = 11.79, range 19-64 years). Out of the total participants, 76 were male (56.3%), 59 were female (43.7%), and 68.9% were university students.

Instruments

An initial set of 21 items finally constituted the questionnaire, grouped theoretically into four subscales: Attitude (eight items), Subjective Norm (four), Behavioral Control (five) and Intention (four).

Procedure

One hundred-fifty students enrolled in the psychology and sports sciences degree programs at the Universidad Miguel Hernández de Elche completed the questionnaire in a self-administered format. Questionnaires were also supplied to their parents and grandparents for completion. A total of 350 questionnaires were administered. After two weeks, 143 were returned, eight of which were discarded because they presented elevated numbers of omissions. Finally, the data from 135 questionnaires (38.57%) were introduced for the study.

Results

Exploratory factor analysis

In order to learn about the factorial structure of the TPB questionnaire on physical exercise, exploratory factor analysis was performed on the 21 selected items by extraction of principal components with Kaiser Normalization and Oblimin rotation afterwards, as relationships between the factors were presumed. The Kaiser-Guttman method (better known as the Kaiser or K1 rule) was used because it supplies factors that are capable of explaining, at least, as much variance as an individual variable. Although simulation studies have shown that its behavior varies in function of the conditions of application (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Hakstian & Muller, 1973; Humphreys, 1964; Jackson, 1993; Linn, 1968; Mote, 1970; Ruiz & San Martin, 1992; Zwick & Velicer, 1986), the results are not conclusive, this bias having appeared in situations having few subjects per variable or when the proportion of variables per factor increases. On the other hand, although other methods exist, like the scree plot or Bartlett’s Significance Test, among others, none has shown to be an unequivocal procedure in every type of situation. Because of this, the authors conclude that the K1 rule can be used as a first approximation in the number of underlying factors, complementing it with interpretability criteria of the structure, like is our case.

Both the results from Bartlett’s test of sphericity ($\chi^2_{(210)} = 1925.544, p < .001$) as well as the KMO index (.889)
### Table 1

**Modification of the initial set of items**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Original item</th>
<th>Modified item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wording unclear</td>
<td>For me, exercising at least 6 times in the next two weeks would be:</td>
<td>1.3. For me, exercising at least 6 times in the next two weeks would be:</td>
</tr>
<tr>
<td></td>
<td>Very important to me – No importance</td>
<td>Very important – Not important</td>
</tr>
<tr>
<td>Insignificant content</td>
<td>For me, exercising at least 6 times in the next two weeks would be:</td>
<td>1.8. For me, exercising at least 6 times in the next two weeks would be:</td>
</tr>
<tr>
<td></td>
<td>Very intelligent – Very stupid</td>
<td>Very absurd - Very intelligent</td>
</tr>
<tr>
<td>Item added for a variable</td>
<td>If I wanted to, I would easily exercise at least 6 times in the next two weeks.</td>
<td></td>
</tr>
<tr>
<td>Eliminated item</td>
<td>For me, exercising at least 6 times in the next two weeks would be:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extremely difficult – Extremely easy</td>
<td>Very difficult – Very easy</td>
</tr>
<tr>
<td>Modified items</td>
<td>For me, exercising at least 6 times in the next two weeks would be:</td>
<td>1.1. For me, exercising at least 6 times in the next two weeks would be:</td>
</tr>
<tr>
<td></td>
<td>The majority of the people that are important to me think I should exercise at least 6 times in the next two weeks.</td>
<td>2. The majority of the people important to me think I should exercise at least 6 times in the next two weeks.</td>
</tr>
<tr>
<td></td>
<td>The majority of the people that are important to me want me to exercise at least 6 times in the next two weeks.</td>
<td>5. The majority of the people important to me want me to exercise at least 6 times in the next two weeks.</td>
</tr>
<tr>
<td></td>
<td>The majority of the people that are important to me expect me to exercise at least 6 times in the next two weeks.</td>
<td>12. The majority of the people important to me expect me to exercise at least 6 times in the next two weeks.</td>
</tr>
<tr>
<td></td>
<td>How much personal control do you believe you have to exercise at least 6 times in the next two weeks?</td>
<td>8. How much control do you believe you have to exercise at least 6 times in the next two weeks?</td>
</tr>
<tr>
<td></td>
<td>I do not believe I have any difficulties to exercise at least 6 times in the next two weeks.</td>
<td>13. I do not have difficulties to exercise at least 6 times in the next two weeks.</td>
</tr>
<tr>
<td></td>
<td>I have planned to exercise at least 6 times in the next two weeks.</td>
<td>4. I have thought about exercising at least 6 times in the next two weeks.</td>
</tr>
<tr>
<td>Items maintained from the initial pool</td>
<td>For me, exercising at least 6 times in the next two weeks would be:</td>
<td>1.2. For me, exercising at least 6 times in the next two weeks would be:</td>
</tr>
<tr>
<td></td>
<td>Very bad – Very good</td>
<td>Very bad – Very good</td>
</tr>
<tr>
<td></td>
<td>For me, exercising at least 6 times in the next two weeks would be:</td>
<td>1.4. For me, exercising at least 6 times in the next two weeks would be:</td>
</tr>
<tr>
<td></td>
<td>Very unpleasant – Very pleasant</td>
<td>Very unpleasant – Very pleasant</td>
</tr>
</tbody>
</table>
confirmed the suitability of the correlation matrix to conduct this analysis. Four components were obtained with eigenvalues greater than one that explained overall 68.39% of the variance. The first component offered an eigenvalue of 8.76 that explained 41.74% of the total variance, grouping principally the loading from the items that evaluated Attitude. These second factor presented an eigenvalue of 2.76 explaining 13.14% of the total variance, grouping the items that evaluated Perceived Behavioral Control. The third factor attained an eigenvalue of 1.65 that explained 7.86% of the total variance. The items loaded principally in this factor corresponded to the Subjective/glyph817orm subscale. The last component offered an eigenvalue of 1.18 and explained 5.64% of the total variance, here primarily grouping the loading from the items evaluating Intention. Item 1.1. (For me, exercising at least 6 times in the next two weeks would be: very difficult — very easy) did not present a clear pattern of factor loadings as it was as highly saturated in the control factor as it was in attitude. Furthermore, conceptually it could be interpreted as an item as much about the capacity to exercise as one about the attitude toward physical exercise, and so it was decided to eliminate this from the final version of the questionnaire. Notwithstanding, the reliability of the attitude subscale was maintained.

Following this elimination, factor analysis for the final set of 20 items was conducted again, obtaining the factor loadings per item appearing in Table 2. The factor loadings adequately grouped together all the items from each one of the factors measured. As such, the Attitude component offered an eigenvalue of 8.15, explaining 40.75% of the total variance and grouped seven items together. Five items were grouped together in the Perceived Behavioral Control component, with an eigenvalue of 2.68 that explained 13.40% of the total variance. The Subjective/glyph817orm component presented an eigenvalue of 1.65 and explained 8.25% of the total variance, grouping four items together. In the last component, Intention, four items were grouped

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Original item</th>
<th>Modified item</th>
</tr>
</thead>
<tbody>
<tr>
<td>For me, exercising at least 6 times in the next two weeks would be: Very stressful – Very relaxing</td>
<td>1.5. For me, exercising at least 6 times in the next two weeks would be: Very stressful – Very relaxing</td>
<td></td>
</tr>
<tr>
<td>For me, exercising at least 6 times in the next two weeks would be: Very useless – Very useful</td>
<td>1.6. For me, exercising at least 6 times in the next two weeks would be: Very useless – Very useful</td>
<td></td>
</tr>
<tr>
<td>For me, exercising at least 6 times in the next two weeks would be: Very harmful – Very beneficial</td>
<td>1.7. For me, exercising at least 6 times in the next two weeks would be: Very harmful – Very beneficial</td>
<td></td>
</tr>
<tr>
<td>If I wanted to, I could exercise at least 6 times in the next two weeks.</td>
<td>3. If I wanted to, I could exercise at least 6 times in the next two weeks.</td>
<td></td>
</tr>
<tr>
<td>It depends entirely upon me whether I exercise at least 6 times in the next two weeks.</td>
<td>9. It depends entirely upon me whether I exercise at least 6 times in the next two weeks.</td>
<td></td>
</tr>
<tr>
<td>I believe I am capable of exercising at least 6 times in the next two weeks.</td>
<td>11. I believe I am capable of exercising at least 6 times in the next two weeks.</td>
<td></td>
</tr>
<tr>
<td>I will attempt to exercise at least 6 times in the next two weeks.</td>
<td>14. I will attempt to exercise at least 6 times in the next two weeks.</td>
<td></td>
</tr>
<tr>
<td>I will make an effort to exercise at least 6 times in the next two weeks.</td>
<td>10. I will make an effort to exercise at least 6 times in the next two weeks.</td>
<td></td>
</tr>
<tr>
<td>I will try to exercise at least 6 times in the next two weeks.</td>
<td>7. I will try to exercise at least 6 times in the next two weeks.</td>
<td></td>
</tr>
</tbody>
</table>
together with an eigenvalue of 1.17 that explained 5.86% of the total variance.

Therefore, the analyses of the psychometric properties allowed proposing a final set of 20 items grouped into four subscales: Attitude, Subjective Norm, Perceived Behavioral Control and Intention, which were adjusted to the theoretical specifications proposed by TPB.

Analysis of the responses to the items and estimation of the reliability

Statistical analysis was carried out for the items by calculating the average, the standard deviation (SD) and the item-total correlation index (R IT). The internal consistency index was also calculated by Cronbach’s alpha for each one of the subscales. Table 3 shows the psychometric properties for each item within each subscale.

As Table 3 shows, the internal consistency for the four subscales was very high. The Attitude subscale had an internal consistency of .878, its items presented average response values that oscillated between 5.58 for item 1.7, and 6.8 for items 1.4 and 1.6. All the items presented a sufficient item-total correlation, superior to .50 in all cases. The second subscale, Subjective Norm, obtained an internal consistency coefficient of .852, and the items having average scores that oscillated between 3.99 for item 6 and 5.14 for item 2. Moreover, the item-total correlation values were good, ranging between .54 for item 6 and item 5 at .77. For the third subscale, Perceived Behavioral Control, the average response values oscillated between 5.36 for item 8 and 6.05 for item 11. All the items presented sufficiently high item-total correlation, and additionally the internal consistency was adequate (α = .877). Lastly, the Intention subscale also presented high reliability (α = .891). The items offered average response values between 4.94 for item 10 and 5.37 for items 4 and 14. The items from this subscale also had high item-total correlations.
Study 3: Confirmatory factor analysis and external evidence of validity

This study provides evidence about the stability of the questionnaire’s dimensionality in a sample of the general population applying confirmatory analysis procedures while evidence was sought about its validity by means of the relationship between the scores obtained and other theoretically related external variables.

Method

Participants

The confirmatory study sample consisted of 944 subjects from the general population who participated in the evaluation voluntarily. Of these, 406 were men and 537 women, whose ages ranged from 17-92 years ($M = 42.14$; $SD = 18.89$; Range = 17–92). There were no age differences in function of gender ($t_{937} = 0.18$; $p = .857$; $δ = .01$).

Instruments

For the validity analysis, the subjects were administered the following instruments along with the refined version of the TPB questionnaire obtained in the preceding phase. This is shown in Annex 1.

The General Self-Efficacy Scale (GSE) (Jerusalem & Schwarzer, 1992), which assesses general perceived self-efficacy. This work utilized the Spanish adaptation by Baessler & Schwarzer (1996), which assesses general competency to efficiently handle a large variety of stressful situations. This scale obtained good internal consistency, additionally showing a high positive correlation with self-esteem and optimism, while it was negative with anxiety, depression and physical symptoms.

Table 3

Psychometric properties of the bank items of each subscales of TPB questionnarie of physical exercise

<table>
<thead>
<tr>
<th>Items</th>
<th>Subscale Attitude  ($α = .88$)</th>
<th>Subscale Subjective Norms  ($α = .85$)</th>
<th>Subscale Control  ($α = .87$)</th>
<th>Subscale Intention  ($α = .89$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>$SD$</td>
<td>R IT</td>
<td>$α_a$</td>
</tr>
<tr>
<td>1.2</td>
<td>6.41</td>
<td>1.01</td>
<td>.64</td>
<td>.85</td>
</tr>
<tr>
<td>1.3</td>
<td>5.81</td>
<td>1.22</td>
<td>.73</td>
<td>.83</td>
</tr>
<tr>
<td>1.4</td>
<td>5.77</td>
<td>1.39</td>
<td>.68</td>
<td>.84</td>
</tr>
<tr>
<td>1.5</td>
<td>5.57</td>
<td>1.31</td>
<td>.65</td>
<td>.84</td>
</tr>
<tr>
<td>1.6</td>
<td>6.26</td>
<td>.97</td>
<td>.68</td>
<td>.84</td>
</tr>
<tr>
<td>1.7</td>
<td>6.45</td>
<td>1.02</td>
<td>.58</td>
<td>.85</td>
</tr>
<tr>
<td>1.8</td>
<td>5.85</td>
<td>1.20</td>
<td>.61</td>
<td>.85</td>
</tr>
<tr>
<td>2</td>
<td>5.14</td>
<td>1.68</td>
<td>.72</td>
<td>.79</td>
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<tr>
<td>5</td>
<td>4.80</td>
<td>1.71</td>
<td>.77</td>
<td>.77</td>
</tr>
<tr>
<td>6</td>
<td>3.99</td>
<td>1.76</td>
<td>.54</td>
<td>.87</td>
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<tr>
<td>12</td>
<td>4.40</td>
<td>1.70</td>
<td>.75</td>
<td>.78</td>
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<tr>
<td>3</td>
<td>6.01</td>
<td>1.53</td>
<td>.69</td>
<td>.84</td>
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<tr>
<td>8</td>
<td>5.36</td>
<td>1.50</td>
<td>.66</td>
<td>.85</td>
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<tr>
<td>9</td>
<td>5.79</td>
<td>1.58</td>
<td>.63</td>
<td>.96</td>
</tr>
<tr>
<td>11</td>
<td>6.05</td>
<td>1.34</td>
<td>.78</td>
<td>.83</td>
</tr>
<tr>
<td>13</td>
<td>5.45</td>
<td>1.86</td>
<td>.76</td>
<td>.83</td>
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<td>4</td>
<td>5.37</td>
<td>1.80</td>
<td>.75</td>
<td>.85</td>
</tr>
<tr>
<td>7</td>
<td>5.18</td>
<td>1.88</td>
<td>.87</td>
<td>.81</td>
</tr>
<tr>
<td>10</td>
<td>4.94</td>
<td>1.85</td>
<td>.54</td>
<td>.93</td>
</tr>
<tr>
<td>14</td>
<td>5.37</td>
<td>1.70</td>
<td>.88</td>
<td>.81</td>
</tr>
</tbody>
</table>

SD: Standard Desviation; R IT: correlation item-total; $α_a$: Cronbach's alpha of scale when ítem is eliminated.
**BREQ-2 motivation scale** (Behavioral Regulation in Exercise Questionnaire-2), developed by Markland & Tobin (2004) and adapted to the Spanish context by Moreno, Cervelló, & Martínez (2007). This scale consists of 18 items with moderate reliability coefficients and an explained total variance of 68.8%. The response scale is Likert-type of 5 points (1= strongly disagree; 5= strongly agree). Its three factors are **intrinsic regulation**, assessed by four items indicating a subject’s commitment to an activity due to the pleasure and enjoyment it produces in the subject; **external regulation**, comprised of 10 items that assesses the performance of the individual by an external incentive; and lastly, **amotivation**, consisting of four items and measures the lack of intention for an individual to do something.

**Confirmatory Factor Analysis**

In order to confirm the questionnaire’s internal structure, factor analysis with structural equation models was used. The estimation of the models was carried out by the AMOS program, version 15.0. Given that the items deviated substantially from normality, the majority of their distributions being asymmetric and platykurtic ($K = 223.51$), the Asymptotic Distribution Free (ADF) estimation method by Browne (1984) was used, whose derivation is not based on the supposed multivariate normality. In that referring to atypical cases, these did not occur in the samples.

Student’s t-test for independent samples showed a lack of differences between men and women in all the questionnaire’s items, so the analysis was conducted jointly for both sexes.

In order to apply the analyses and having the intention of obtaining evidence with distinct samples, the total sample was randomly divided into two subsamples: Sample 1 ($N = 498$; average age = 42.37; $SD = 18.72$; 43.5% men) and Sample 2 ($N = 446$; average age = 41.88; $SD = 19.11$; 42.6% men). The division was made with the sampling procedure from SPSS V16.0. No statistically significant differences were observed between the age from either sample ($t = .396; p = .692; \delta = .03$).

The test model derived from the findings in the preceding study so it presented a structure of four factors: **Attitude**, comprised of seven items; **Norm**, formed by four; **Control**, with five; and **Intention**, having four.

The measurement model’s fit was assessed by the $\chi^2$ statistic of goodness of fit. Because $\chi^2$ tends to be significant in large samples, the $\chi^2$/gl ratio was calculated. If this ratio is inferior to 6, it is assumed that the model fit is adequate. This index is called the relative $\chi^2$, as it is calculated to look for the independence from the sample size. Carmine & McIver (1981) and Kline (1998) establish a value of 3 for an acceptable model. Furthermore, and following the recommendation that advises contrasting various indices to assure the fit of the proposed model, the following goodness of fit indices were kept in mind: (a) The Goodness of Fit Index, which represents the percentage of covariances observed that is explained by the implicit covariances by the model; it must reach a value equal or superior to .90 (Schumacker & Lomax, 1996); (b) The Comparative Fit Index, which compares the fit of the model with a null model supposing that the latent variables are not related, and requires values equal or super to .90 (Schumacker & Lomax, 1996); and, (c) the indices based on the noncentrality parameter, the Root Mean Square Error of Approximation (RMSEA), which supplies a measurement of the discrepancy by degrees of freedom. Values equal to or less than .05 indicate that the model based on the sample utilized represents the population, and when values are inferior to .08, the fit is considered acceptable (Browne & Cudeck, 1992; Jöreskog & Sörbom, 1993).

With regards to the individual fit or the fit of the model components, factor loadings were used. In this respect, it must be kept in mind that the sample distribution of the saturations is not known, which makes assessing the importance of each variable in relation to the factor difficult, commonly accepting that there is at least 15% shared variance by the factor and the variable (Martinez Arias, 1996), which represents saturations of .40.

Initially, the global fit shown by the model was improbable. The Chi-square test was significant ($\chi^2_{1(16)} = 1022, p = .001$) and the $\chi^2$/gl ratio of 6.2 was sufficiently superior to that expected. The GFI and CFI adopted values of .899 and .924, respectively, while the RMSEA estimation was .074. In the case of subsamples 1 and 2, the values obtained for the indices were similar to those from the global sample ($\chi^2_1 = 611, \chi^2_{gl1} = 3.7$; GFI$_1 = .888$, CFI$_1 = .924$, RMSEA$_1 = .074$; $\chi^2_2 = 605, \chi^2_{gl2} = 3.67$; GFI$_2 = .878$, CFI$_2 = .919$, RMSEA$_2 = .077$).

Due to the inadequate model fit, we explored various respecification possibilities that were settled in two modifications conducted in a sequential manner.

– The correlation between the error terms in items 1.3 (Very unpleasant – Very pleasant) and 1.4 (Very stressful – Very relaxing) was allowed, which is justified because the modification index reached a very high value and because it was easily interpretable from the content viewpoint.

– The modification indices also indicated a possible correlation between the error terms in items 1.1 (Very bad – Very good) and 1.6 (Very harmful – Very beneficial). Upon assessing the content of these items it was concluded they were redundant, and so item 1.1 was eliminated since it was that of the two with the lowest loading, as well as being the item involving the highest values in terms of the standardized residuals.

A new CFA was performed with the respecified 19-item model, whose results show a better fit with the data, in both the global sample ($\chi^2 = 821, \chi^2_{gl} = 5.6$; GFI = .914, CFI = .936, RMSEA = .067), as well as in the subsamples ($\chi^2_1 = 611, \chi^2_{gl1} = 3.7$; GFI$_1 = .888$, CFI$_1 = .924$, RMSEA$_1 = .074$; $\chi^2_2 = 605, \chi^2_{gl2} = 3.67$; GFI$_2 = .878$, CFI$_2 = .919$, RMSEA$_2 = .077$).
= 472, \chi^2/g_{l_1} = 3.2, \text{GFI}_1 = .909, \text{CFI}_1 = .941, \text{RMSEA}_1 = .067; \chi^2 = 504, \chi^2/g_{l_2} = 3.5, \text{GFI}_2 = .891, \text{CFI}_2 = .930, \text{RMSEA}_2 = .074). The graphic representation of this model is in Figure 2.

**Internal consistency**

The calculation of the internal consistency of the different dimensions obtained was performed utilizing Omega coefficient (\Omega) by Heise & Bohrnstedt (1970). Its calculation is based on the results of factor analysis and given by:

$$\Omega = \frac{n - \sum h_i^2}{n - 2 \sum r_{ij}}$$

The results obtained reflect high consistency, as much in the total sample as in samples 1 and 2. A value of .88 was reached in these three cases for the Attitude factor, while for Norm they were .85, .86 and .84; for Control, they were .79, .81 and .76; and lastly, they were .89 in the three samples for the Intention factor (See Figure 2). The internal consistency values were high for all the test’s dimensions.

**Correlation of factors and factor loadings of the items**

Given the specified relationships in the model, high correlations were expected between the four factors. Just as Figure 2 shows, high correlations are observed between the factors of Attitude, Intention and Control, whereas they are low in the relationships of all of them with the Norm factor. This result repeats itself as much in subsample 1 (\(r_{AI1} = .63; r_{AC1} = .58; r_{IC1} = .78; r_{ANI1} = .27; r_{INC1} = .34; r_{CNI1} = .24\)) as in subsample 2 (\(r_{AI1} = .55; r_{AC1} = .54; r_{IC1} = .77; r_{ANI1} = .22; r_{INC1} = .31; r_{CNI1} = .18\)).

With respect to the factor loadings, all are high, oscillating between .54 and .94 for the global sample, while between .55 and .94 for subsample 1. They are between .50 and .94 for subsample 2.

**Evidence of Validity**

This section provides evidence concerning the relationships between the measurements contributed by the written questionnaire and other external variables theoretically related to the constructs included in the TPB. In order to conduct these analyses we used Pearson’s correlation coefficient. To avoid bias in the sample sizes and as a measurement of the effect size, we followed the suggestions by Cohen (1988), who classifies the effect size as being small if \(r \approx .10\), medium if \(r \approx .30\), and large if \(r \approx .50\).

The results appearing in Table 4 show relationship patterns coherent with the theory. One the one hand, Self-efficacy presented the greatest relationship with the Control dimension, while the lowest occurred in the Norm factor. On the other hand, the motivation variables also presented the expected results. In this way, intrinsic motivation, which refers to the search for pleasure and satisfaction in sporting activity participation (Deci & Ryan, 1985), was related to the Norm factor. On the other hand, the motivation variables also presented the expected results. In this way, intrinsic motivation, which refers to the search for pleasure and satisfaction in sporting activity participation (Deci & Ryan, 1985), was related to the Norm factor. For its part, external motivation, which is the interest in participating in sporting activities for awards or compensation (Deci, 1975), presented positive relations with Norm: for the remaining dimensions they were negative. Lastly, amotivation, understood as the lack of motivation or intention to continue exercising, did not show a relationship with Norm, while it did do so with the other factors with negative signs.
Discussion

In this work the authors’ objectives were to develop an instrument to assess the different variables included in the TPB (attitude, subjective norm, control and intention) within the specific context of practicing physical exercise. This objective was covered with the implementation of the three studies presented that include the construction and qualitative assessment of the items (study 1), the analysis of the measurements’ psychometric properties, along with the estimation of their reliability (study 2), and the study of the instrument’s dimensionality, as well as obtaining external evidence of its validity (study 3). On one hand, the results from the different analyses carried out support the factorial structure of four factors proposed by the TPB model (Ajzen, 1985), showing all the goodness of fit index values within the ranges established as being adequate. Notwithstanding, in order to corroborate the good fit of the estimated model, the individual parameters were also assessed, given the existing controversy around the choice of cut-off points for the goodness of fit indices in a conventional or “routine” manner (Hu & Bentler, 1999). As it is known, these are highly contested due to a lack of empirical evidence and a logical convincing base for its acceptance (Yu, 2002), in addition to the variability in its behavior under distinct conditions, like the sample size, its distributional properties or the estimation method utilized (Bentler, 1990; Bentler & Yuan, 1999; Bollen, 1990; Curran, West, & Finch, 1996; Fan, Thompson, & Wang, 1999; Hu, Bentler, & Kano, 1992; Nevitt & Hancock, 2000; Sugawara & MacCallum, 1993; Yuan & Bentler, 1998).

On the other hand, the four subscales making up this instrument showed adequate internal consistency as much in the initial phase, estimated with the coefficient of Cronbach’s alpha, as in the confirmatory study with the Omega coefficient (Ω). Furthermore, these results are similar to those found in other work using an ad-hoc questionnaire (Chatzisarantis & Hagger, 2008; Jackson et al., 2009). The adequate psychometric properties that the items forming this questionnaire were shown to have can be due to the meticulous work done in the questionnaire’s preparation. This instrument, just like previously described, was accomplished in a systematic manner following the criteria proposed by the manual “Constructing Questionnaires Based on The Theory of Planned Behavior” (Francis et al., 2004), which in turn guarantees the validity of the instrument’s content.

Lastly, the analysis of the relationships with other variables showed evidence of convergent validity in the correlations of self-efficacy and motivation with the different subscales making up the TPB-based questionnaire, just like as was expected according to previous studies (Bandura, 1997; Neupert, Lachman, & Whitbourne, 2009; Rhodes, Blanchard, Matheson & Coble, 2006). Self-efficacy was related in a positive manner with control, attitude and intention, whereas amotivation was related in a negative form with attitude, control and intention. For its part, external motivation showed positive relationships with subjective norm.

To conclude, and although further research is still required, with samples from different sources to analyze in their full extent the psychometric guarantees of this test, we have an instrument coming to occupy an existing knowledge gap of great relevance today in the field researching the practice of physical exercise with the TPB. An instrument has been constructed that meets the objectives for which it was developed, providing research professionals from different health promotion fields a tool with which to acquire reliable and valid measurements. As a limitation of the study and following phase in this research, the assessment of the predictive validity of this scale should

<table>
<thead>
<tr>
<th></th>
<th>Self-efficacy</th>
<th>Intrinsic Motivation</th>
<th>Identify Motivation</th>
<th>External Motivation</th>
<th>Amotivation</th>
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<tr>
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<tr>
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<td>.39**</td>
<td>.38**</td>
<td>-.31**</td>
<td>-.31**</td>
</tr>
<tr>
<td>Intention</td>
<td>.16**</td>
<td>.30**</td>
<td>.42**</td>
<td>-.10**</td>
<td>-.30**</td>
</tr>
<tr>
<td>Sample 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>.16**</td>
<td>.49**</td>
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<tr>
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<td>.34**</td>
<td>.38**</td>
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<tr>
<td>Intention</td>
<td>.11**</td>
<td>.29**</td>
<td>.40**</td>
<td>-.17**</td>
<td>-.31**</td>
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<tr>
<td>Sample 2</td>
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<td>.40**</td>
<td>.31**</td>
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<tr>
<td>Intention</td>
<td>.22**</td>
<td>.30**</td>
<td>.44**</td>
<td>-.03</td>
<td>-.29**</td>
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</table>

**p < .01
be conducted specifically from its capacity to explain the practice of physical exercise. For this, some caution is recommended in the use of this instrument in the scope of the assessment of physical exercise as the scale’s validation is still incomplete and unfinished.

References


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APPENDIX

Questionnaire of the Theory of Planned Behavior regarding the practice of physical exercise.

Please read the following questions carefully and respond by circling the number that best describes your opinion.

1. For me, exercising at least 6 times in the next two weeks would be:

1.1. Very bad 1 2 3 4 5 6 7 Very good
1.2. Not important 1 2 3 4 5 6 7 Very important
1.3. Very unpleasant 1 2 3 4 5 6 7 Very pleasant
1.4. Very stressful 1 2 3 4 5 6 7 Very relaxing
1.5. Very useless 1 2 3 4 5 6 7 Very useful
1.6. Very harmful 1 2 3 4 5 6 7 Very beneficial
1.7. Very absurd 1 2 3 4 5 6 7 Very intelligent

2. The majority of the people important to me think I should exercise at least 6 times in the next two weeks.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

3. If I wanted to, I could exercise at least 6 times in the next two weeks.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

4. I have thought about exercising at least 6 times in the next two weeks.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

5. The majority of the people important to me want me to exercise at least 6 times in the next two weeks.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

6. I am motivated to exercise at least 6 times in the next two weeks because this is what the majority of the people important to me expect.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree
7. I will try to exercise at least 6 times in the next two weeks.

| Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |

8. How much control do you believe you have to exercise at least 6 times in the next two weeks?

| Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |

9. It depends entirely upon me whether I exercise at least 6 times in the next two weeks.

| Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |

10. I will make an effort to exercise at least 6 times in the next two weeks.

| Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |

11. I believe I am capable of exercising at least 6 times in the next two weeks.

| Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |

12. The majority of the people important to me expect me to exercise at least 6 times in the next two weeks.

| Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |

13. I do not have difficulties to exercise at least 6 times in the next two weeks.

| Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |

14. I will attempt to exercise at least 6 times in the next two weeks.

| Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |

* Eliminated item