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Theory of Planned Behavior and physical exercise: Differences between people who do regular physical exercise and those who do not.

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Abstract

Objectives: The purpose of this study was analysed differences between attitudes, subjective norms, and PBC between groups of individuals who do physical exercise and those who do not.
Method: In order to investigate the different effects of attitudes, subjective norms, PBC on intention in both groups a structural equation modelling was employed. 886 subjects completed a questionnaire measuring the components of TPB model. The first group was formed by 332 people who did not practise and the second group was formed by 554 people who practised physical exercise.
Results: Results confirmed differences between two groups of people in the prediction capacity of TPB model. In the first group, all variables explained 65% of the variance in intention. In the second group subjective norm and perceived behavioural control had a significant impact on intention and the three variables explained 67% of its variance. t
Conclusions: Findings supported the important role of TPB in the context of physical exercise. In both groups, perceived behavioural control was the strongest predictor of intention to practise physical exercise. A possible intervention might lead to implement programs focused in increasing control perception of people to engage in physical exercise.
Keywords: Theory of planned behaviour; physical exercise; health behaviour; Multi-group analyses

Introduction

Physical exercise is an important component of a healthy lifestyle. Extensive scientific literature implicates regular physical exercise as a preventive strategy for different illnesses such as type 2 diabetes, breast cancer, cardiovascular disease, hypertension, colon cancer and osteoporosis (U.S. Department of Health and Human Services, 1996; Bouchard & Shephard, 1994; Blair & Brodney, 1999; American College of Sports Medicine, 2000; Taras, 2005). Physical exercise is not only beneficial to physical health but also to psychological well-being (Warburton, Whitney & Bredin, 2006). Vast amount of research supports physical exercise benefits in psychological well-being as subjective health (Graham, Kremer & Wheeler, 2008; Penedo & Dahn, 2005; Salmon, 2001), state of mind and emotions (Biddle, Fox & Boutcher, 2000), decrease in anxiety and stress (Jiménez, Martínez, Miró & Sánchez, 2008) and increase in self-esteem (McAuley, Mihalko & Bane, 1997). Netz, Wu, Becker and Tenebaum (2005) analyzed 36 studies which related physical activity to psychological well-being in adults who reported no clinical disorders, and the average global effect size in treatment groups was .24, almost three times higher than in the control groups.

However, in spite of the numerous social, personal and health advantages of doing physical exercise, the majority of the adult population is sedentary or not active enough (Dishman & Buckworth, 2001; World Health Organization, 2002; 2004). In the European Union, 27% of the population engages in no physical activity in their free time (Martínez-González et al., 2001) and according to this study, Spain is among the European countries whose population does the least physical exercise, as 64% of 15239 subjects interviewed did sport. This high prevalence of physical inactivity highlights the need to study the possible factors that influence doing or not doing physical exercise, so that adequate intervention strategies can be developed to increase the number of people who do physical exercise (Sherwood & Jeffery, 2000).

One of the most popular psychological theories in contemporary health and exercise psychology is the Theory of Planned Behaviour (TPB) (Azjen, 1991, 2001). Furthermore, empirical reviews of the TPB have supported a relationship for the prediction of many disparate health behaviours including exercise and physical activity (Godin & Kok, 1996; Hagger, Chatzisarantis & Biddle, 2002; Hausenblas, Carron & Mack, 1997). The core aspect of TPB is based on the assumption that the performance of any behaviour is related to *behavioural intention* and *perceived behavioural control (PBC)* (Ajzen, 1991). Behavioural intention refers to how individuals perceive plans of action and motivation for performing the behaviour, so that the more motivated people are to perform the behaviour, the more likely they are to carry it out. The intention-behaviour association is supported by meta-analytic reviews (e.g. Randall & Wolff, 1994; Sheppard, Hartwick & Warshaw, 1988). The perception of behavioural control reflects individuals' confidence in their skills for being able to perform a determined behaviour, and has been likened to the self-efficacy construct of Bandura (1997). On the other hand, behavioural intention is determined by three independent constructs: *subjective norms*, i.e., how a person perceives the social pressures put on them for carrying out an action or not; *attitude* towards the behaviour, which reflects the positive or negative evaluation that the person makes for performing this action; and finally, *PBC*, which seems to strengthen the ability to predict (and explain) behavioural intention (Ajzen, 1991). Therefore, it is more likely that people will try to do physical exercise if they think it is good for them, if they perceive social pressure on them to do it, and if they believe they are capable of it.

Different studies which apply TBP to analyze relationships between the intention to do physical exercise and subsequent behaviour have systematically found a relation between these variables. In this context, Hausenblas, Carron and Mack (1997) analyzed 31 exercise studies and found that intention had a large effect on exercise behaviour, and attitude had a large effect on intention. The effect of attitude was twice that of subjective norm. Similar findings were reported by Hagger, Chatzisarantis and Biddle (2002) in their meta-analysis of 72 studies where TPB had been applied. It showed that 44.5% of the variance in intention could be predicted by PBC, subjective norms and attitude, although only 27.4% of the variance in physical exercise behaviour was explained by intention. Jackson, Smith and Conner (2003) reported that attitude, subjective norm, perceived control and self-efficacy explained 40.8% of the intention to do physical exercise. Likewise, Armitage (2005), in a longitudinal study, showed that 49% of the variance in intention was explained by PBC, subjective norms and attitudes, while intention explained 22% of the variance in physical exercise behaviour. The results of the study by Mohiyeddini, Pauli and Bauer (2009) showed that the model's three variables explained 17% of the variance in intention, which in turn explained 49% of the variance in exercise behaviour. Thus, Nigg, Lippke and Maddock, (2009) supported that the TPB applied to physical activity is appropriate across sociodemographic variables such as gender, age and ethnicity.

A key issue in the TPB is that there is far from a perfect correlation between intentions and behaviour (Biddle & Fuchs, 2008). One approach that has been put forward to resolve the inadequacies of the intention-behaviour relationship in the TPB is "implementation intentions" (Gollwitzer & Sheeran, 2006). These are goals and plans that involve specifying when, how, and where performance of behaviour will take place.

A great deal of research evaluates the relations between the variables proposed in TPB and the behaviour of doing physical exercise (Courneya & Friedenfreich, 1999; Hamilton & White, 2008; Stiggelbout, Hopman-Rock, Crone, Lechner & van Mechelen, 2006). Our aim is to go deeper into this topic, analysing differences between attitudes, subjective norms, and PBC in groups of individuals who do physical exercise and those who do not. Finally, we analyzed how these differences influenced intention. The final goal is to provide valuable information useful in designing interventions for encouraging physical exercise in the population in general.

Method

Participants and design of the study

This study was administered in accordance with the ethical principles for conducting research with human participants of the Miguel Hernandez University Ethics Committee. Completion of the study questionnaire by participants was taken to indicate their informed consent.

The data was collected using a single self-report questionnaire that contained all the items used for measuring the TBP variables (attitude, subjective norm, perceived behavioural control and intention). The study questionnaire was mailed to a randomized sample of 1500 participants of the province of Alicante, Spain. In total, 886 (59%) subjects were returned. Their average age was 42.50 (*SD*: 18.77). Of these respondents, 43.4% were men and 56.6% were women. Participants answered whether they did regular exercise (it was defined as performing physical activities with moderate intensity, doing at least 30 minutes minimum per session) or not on a dichotomous scale. Five hundred and fifty four (62.5%) of the subjects did regular physical exercise, while 332 (37.5%) of the subjects did not.

Variables and Instruments

The model's variables, based on TPB, were measured by the TPB questionnaire on physical exercise (Tirado, Neipp, Quiles & Rodríguez-Marín, in press) validated in a Spanish population. It consists in 19 items answered in a Likert-type 7-point response scale. This questionnaire evaluates the four variables of TPB model (attitude, subjective norm, PBC and intention):

Attitude was measured using 6 items that included 7 pairs of bipolar adjectives on a scale of 1 to 7 (e.g. Very stressful – very relaxing, not worthwhile (at all) – very worthwhile, not important at all – very important. The sentence preceding the adjectives was "Doing exercise at least 6 times in the next two weeks would be". Internal consistency of the subscale was .90.

Subjective norm was evaluated using 4 items which were answered on a scale of 1 (completely disagree) to 7 points (completely agree). The four items were: "The majority of people who are important to me think I should do exercise at least 6 times in the next two weeks"; "The majority of people who are important to me want me to do exercise at least 6 times in the next two weeks"; "I am motivated to do exercise at least 6 times in the next two weeks because that is what the majority of people who are important to me expect"; and "The majority of people who are important to me expect me to do exercise at least 6 times in the next two weeks". The internal consistency of the items was .85.

Perceived Behavioural Control (PBC) was measured using 5 items: "If I wanted to I could do exercise at least 6 times in the next two weeks"; "It is completely up to me whether I do exercise at least 6 times in the next two weeks"; "I believe I am able to do exercise at least 6 times in the next two weeks"; and "I have no difficulties in doing exercise at least 6 times in the next two weeks". They were answered on a response scale of 7 points (from 1 completely disagree to 7 completely agree). And "How much control do you believe you have for doing exercise at least 6 times in the next two weeks" is answered on a scale of 1 (no control at all) to 7 (a lot of control). Internal consistency of the items was .83.

Intention of performing an exercise behaviour was measured using 4 items on a 7-point response scale, from 1 point (completely disagree) to 7 points (completely agree), with a subscale reliability of .90. The items were: "I have thought about doing exercise at least 6 times in the next two weeks"; "I will try to do exercise at least 6 times in the next two weeks"; "I will make an effort to do exercise at least 6 times in the next two weeks"; and "I will attempt to do exercise at least 6 times in the next two weeks".

Statistical analysis

In order to investigate the effects of attitudes, subjective norms, and PBC on intention, Structural Equation Modeling (SEM) was performed using AMOS 18. In accordance with TPB, four latent variables were specified in order to prove their validity as a causal model: attitude (6 items), subjective norms (4 items), PBC (5 items) and intention (4 items). It is a confirmatory technique that identifies the strength and direction of causal relations between the variables proposed in the model.

SEM was performed using the method of maximum likelihood estimation. It is the most widely used fitting function for general structural equation models. The most common test for the assessment of model fit is the chi square goodness-of-fit test (χ^2). A combination of fit indices in conjunction with the χ^2 statistic were used to determine the adequacy of model fit: General fit index (*GFI*), the comparative fit index (CFI), the standardized root-mean-square residual (*SRMR*) and the root-mean-square error of approximation (RMSEA) are used as indicators of model misspecification (Hu & Bentler, 1998, Steiger, 1989). It is suggested that cut-off values of $SRMR \leq .08$, $RMSEA \leq .08$, $GFI \geq .95$ and $CFI \geq .95$ indicate a relatively good fit between the hypothesized model and the observed data (Jöreskog & Sörbom, 1993; Marsh & Hau, 1996; Shumacker & Lomax, 1996). Another minimum sample discrepancy function, the χ^2/df ratio, is considered to be a useful criterion. Bollen and Long (1993) suggest a χ^2/df ratio no larger than 2-5 times degrees of freedom. For multi-group analysis, *TLI* and change in *CFI* (ΔCFI) indices were used. The cut-off value of $\Delta CFI \leq .01$ indicate the null hypothesis of invariance cannot be rejected (Chen, 2007; Cheung y Rensvold, 2002). To analyze the hypothesized model the methodology suggested by Byrne (2001) were followed.

Results

TPB model in both groups

The model presents a good fit with the data in both groups, just like Table 1 shows. However, in order to go for the fit reached, the modification indices suggested the re-specification of both models. In the case of the non-exercise group, the correlation between the error terms was allowed for the following pairs of items: 1.3-1.4, 6-12 and 8-13, while in the group that did exercise, the recommendations were to covary the errors in items 1.3-1.4, 1.1-1.6 and 1.2-1.6.

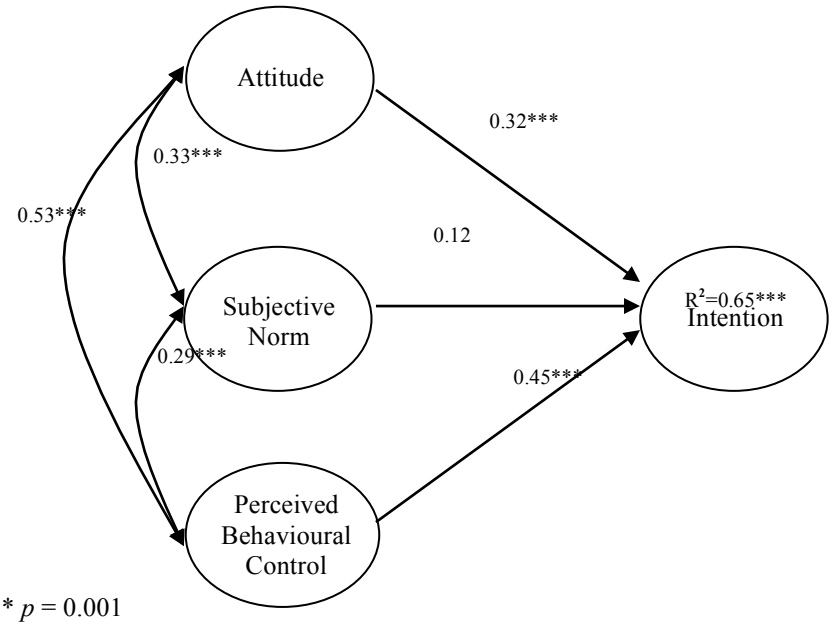
Table 1: Models fit indices

Model	χ^2 (df)	p	χ^2/df	CFI	GFI*	RMSEA	SRMR
Do NOT exercise	407.5 (161)	.00	2.53	.933	.969	.070	.0691
Do exercise	554.0 (161)	.00	3.44	.915	.970	.069	.0585

On the other hand, the results of the analysis of the parameters are different in both groups. The model variables together explain 65% of the variance in the intention in the non-exercise group (Figure 1). Of these, it is the PBC that contributes a larger quantity of variance (.45), followed by the attitude (.32), and lastly, the subjective norm (.12). The weight of the subjective norm was not significant.

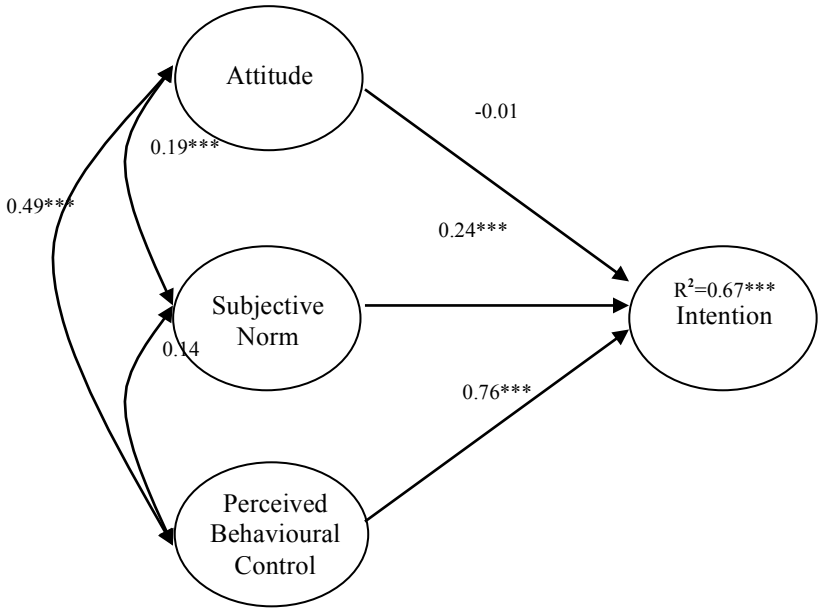
In the group that did exercise, (Figure 2), the total variance explained by the model is 67%, being, again, the PBC that which explains more variance (.76), followed in this case by the subjective norm (.24), and lastly, the attitude, whose weight was not significant, something totally expected if we keep in mind that its influence on the intention is practically null (-.01).

These differences found in both groups, both in that referring to the re-specification of the models, as well as the patterns of relationships found, make that, *a priori*, it is presumed that the complete invariance is not met in the multi-group analysis.



Note. *** $p = 0.001$

Figure 1 : People who do not practice physical exercise. Model 1 with standardized regression coefficients



Note. *** $p = 0.001$

Figure 2 : People who practice physical exercise. Model 2 with standardized regression coefficients

Once the fit of the model in the groups is confirmed separately, the multi-group analysis was conducted. These results are shown in Table 2.

First tested was the invariance or equality of the measurement coefficients, i.e., the weights of the routes between the exogenous and endogenous variables of the model. The second row in Table 2 shows the fit indices suggesting that, despite the statistic χ^2 being significant, the hypothesis of equal weights from one sample to another is acceptable, since these maintain values that are acceptable and similar to the model without restrictions. The *CFI* decrease is less than .01, the TLI value is superior to .90, and the residuals are close to .05. This means that the coefficients describing the relationship between the observed and latent variables can be considered equal in the two samples.

The third row in Table 2 shows the indices for the structural invariance model. Despite the decrease in the *FI* and *TLI* and the increase in the *RMSEA* and *SRMR*, this change is very small so that they are maintained within values that are indicative of a good fit, which show, again, that the structure is invariant in the two groups.

However, the critical reasons for the difference between parameters indicate that, despite the overall invariance of the structural loads or weights, two of the parameters are different between groups. These parameters are the following:

- The parameter corresponding to the route of attitude to intention, which presents typified values of -.15 for the group that exercised and .32 for the non-exercise group, with a critical reason of 4.29, clearly superior to 1.96, which indicates a significant difference between the groups.
- The route going from the control variable to the intention variable, with a critical reason of -3.24, and with typified parameters of .76 and .45 for the groups that exercise and those who do not, respectively.

The third hypothesis establishes that not only are the structural weights invariant, the structural covariances are as well, namely the model's variances and covariances. In the third row of Table 2, the fit indices for this hypothesis show an important decrease in the fit: *RMSEA* and *CFI* worsen, remaining within acceptable values, although the latter decreases above the value of .01 indicated by Chen (2007) and Cheung and Rensvold (2002), and *TLI* and *SRMT* reach a value indicating a poor fit. These results are not conclusive, although they question the equality hypothesis of these parameters between the samples.

In the fourth hypothesis, the residual invariance is proposed, i.e. the variances and covariances of the model's error variables. Said another way, all the parameters are fixed to be equal. In the fifth and sixth rows of Table 2, the fit indices of this hypothesis worsen considerably, supporting the conclusion that the totally restricted model is not stable between independent samples.

In conclusion, the results indicate that the invariance holds for the weights of the model measured (the factor loadings), while we could speak of partial invariance in the structure of regression weights between both samples, except for in the routes already indicated.

Table 2: Goodness of fit indices of multi-group analysis

MODEL	χ^2(df)	P	χ^2/df	$\Delta\chi^2$(df)	p	CFI	ΔCFI	TLI	RMSEA	SRMR
No restrictions	924 (319)	.00	2.9			.927		.914	.048	.0577
Weight of measure	967 (334)	.00	2.9	43 (15)	.00	.924	.003	.914	.048	.0603
Structural Weight	997 (337)	.00	2.9	30 (3)	.00	.921	.003	.911	.049	.0614
Structural Covariances	1116 (343)	.00	3.2	119 (6)	.00	.907	.014	.897	.052	.0891
Structural Residual	1149 (344)	.00	3.3	33 (1)	.00	.904	.003	.893	.053	.0882
Residual weight	1986 (364)	.00	5.5	837 (20)	.00	.806	.098	.797	.73	.0768

Discussion

The results of the study supported TPB in the prediction of intention to do physical exercise. Attitude, subjective norm and PBC explained 67% of the variance in intention of the physical exercise group and 65% of the variance of the non-exercise group. These data, explaining the variance in intention, were higher than those found in other studies, where, for example Jackson et al. (2003), 40.8% explained variance was found; in another more recent study by Mohiyeddini et al. (2009), 17% explained variance was obtained. Likewise, in the meta-analysis carried out by Hagger et al. (2002) of 72 studies, a value of 44.5% was obtained. However in all these studies, the data of all subjects were analyzed without separating them into groups of physical exercise and non exercise. In this sense, we consider that our data have a closer fit to reality, since they deal with this distinction in more detail.

In this study, the results found showed that the strongest predictor for model 2 was PBC, indicating that the more control those who do exercise have over doing physical exercises, the greater their intention is to do so. However, in model 1, it was both control and attitude that predicted the intention of doing exercise.

Subjective norm had a little predictive capacity on intention in model 2 and did not appear as a predictor in model 1, which is consistent with other studies that find this variable a very weak predictor of intentions to do physical exercise (Godin, 1993; Blue, 1995; Hagger et al., 2002; Hausenblas, Carron & Mack, 1997; Hoyt, Rhodes, Hausenblas & Giacobbi, 2009; Kwan & Bryan, 2010). A meta-analysis by Carron, Hausenblas & Mack (1996) showed that social influences generally have a small or moderate positive effect on the cognitions for doing exercise, including intention and subsequent behaviour. One of the possible explanations of the weak relation that exists between variables has and intention is the way that TPB is measured (Conner & Armitage, 1998; Hausenblas et al., 1997; Sheeran & Orbell, 1999).

Some authors, such as Cialdini, Kallegren & Reno (1991), have made a distinction between injunctive norms (whose definition is similar to that of subjective norms in TPB) and descriptive norms, defined as perceptions of what the majority of people are doing, rather than a perception of what the majority approve or disapprove of, by indicating to individuals what is "normal" to do. This statement is supported by the Social Cognitive Theory (Bandura, 1977, 1986) which identified the importance of considering the behaviour of others as a model for their own behaviour. In future research, it would be necessary to include this variable for observing the predictive capacity it has regarding the intention of people to do exercise.

The PBC, following revisions of Ajzen (2002, 2005), includes control beliefs and PBC. The latter concept is similar to the construct perceived Self-efficacy proposed by Bandura (1997) and it includes the perception of individual competence for performing the behaviour. On the other hand, control beliefs make reference to the perception of factors that facilitate or inhibit the development of the behaviour, here internal control factors; information, skills, emotions, as well as external controls: opportunities, barriers and dependence on others are included (Conner & Armitage, 1998). Therefore, in model 2, where individuals already did physical exercise, behavioural control was a dominant predictor of intention to do physical exercise, a result which is consistent with previous data (Armitage, 2005; Hagger & Chatzisarantis, 2009; Mohiyeddini et al., 2009). Instead, in model 1, where individuals did not do physical exercise, both attitude and control proved to be dominant predictors of intention. The difference between both models could lie in the fact that, in the first case, those doing sport already perceived themselves as competent and did not give any importance to the possible barriers for performing behavior. Besides, in this group, the attitude component is minimized by control. On the other hand, those who did not do sport needed an adequate attitude to perform a behavior as well as a perception of ability itself to overcome difficulties that could arise when performing it.

This study has various limitations which should be solved in subsequent research. In the first place, the variables are included through self-report measures, and therefore, susceptible to becoming affected by social undesirability. Secondly, one improvement that we have considered is the addition of new measurement times which would permit checking the continuity or change in the variables evaluated. Finally, we believe future research should make an in-depth analysis of the possible differences in relation to the type of exercise done.

In sum, the results of the study support the importance of the TPB in the context of doing physical exercise. Furthermore, the PBC variable proved to be the most important in the prediction of doing exercise. For this reason, one of the possible interventions derived from the study would consist in designing and implementing different intervention programs for the general population, focusing on increasing participants' perception of both personal and external control.

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