

Self-identity as a component of the Theory of Planned Behaviour in predicting physical activity

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Abstract

This study aimed to investigate the role of self-identity, defined as salient and enduring aspects of one's self-perception (Sparks, 2000), in relation to adolescent physical activity (PA) intentions within the Theory of Planned Behaviour (TPB). School students aged 12 to 18 from two cultural groups (Estonia and Spain) completed measures of attitudes, subjective norms, perceived behavioural control, self-identity, and intentions for PA. Four weeks later participants completed self-reported measures of PA. A structural equation model showed that self-identity had a direct effect on PA intention ($\beta = .33, p < .01$) and PA behaviour ($\beta = .31, p < .01$). The model accounted for 45% of the variance of PA behaviour from which 4% can be attributed to self-identity. The effect of self-identity on PA was also partially mediated via intention. The multi-group comparison between two cultural groups indicated that no invariances existed between the models of the observed samples.

Keywords

Self-identity, Theory of Planned Behaviour, physical activity, motivation

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Introduction

Theory of Planned Behaviour (TPB) is a popular and valuable social-psychological model that has been employed to increase our understanding of physical activity (PA) behaviour at the level of decision-making (Ajzen, 1985, 1991). It states that intentions to engage in behaviour are the primary determinants of actual behaviour. Briefly, intentions are conceptualized as the summary motivations to perform behaviour and mediate the influence of the three main TPB constructs on behaviour (Ajzen, 1991). Attitude is the first determinant which reflects an individual's personal beliefs about enacting a target behaviour, such that an individual who has a positive attitude toward PA will be much more likely to plan to exercise than a person who believes that exercise has no value. The second determinant is subjective norms, which reflect the perceived expectations of specific individuals or groups regarding the adoption of a given behaviour and which may have various sources: whether the individual's culture values and promotes PA; whether significant others practise PA; and how they react to this behaviour. The final determinant, perceived behavioural control (PBC), reflects perception of the ease or difficulty of performing the behaviour (Ajzen, 1991). Further, Ajzen (1991) hypothesized that PBC primarily influences behaviour through intentions but, to the extent that behavioural control reflects actual control, it can also influence behaviour directly.

Systematic reviews (Armitage and Conner, 2000) and meta-analyses (Conner and Sparks, 2005; Hagger et al., 2002) have demonstrated that the TPB is useful for the prediction of health behaviours. In general, there is strong confirmed support for TPB predicting exercise intentions and behaviour (Downs and Hausenblas, 2005; Hagger et al., 2002; Hagger et al., 2007). Recently in Spain several studies (Espí, 2004; Gil et al., 2004; Montil, 2004; Ries et al., 2009) employed the TPB in a PA domain, whereas in Estonia other researchers (Hagger et al., 2007; Hagger et al., 2009; Pihu et al., 2008) have used the constructs of TPB to predict PA behaviour among schoolchildren. Results with Estonian schoolchildren indicated that attitudes and perceived behavioural control had a main role in predicting their intention to be physically active in their leisure-time (Hagger et al., 2007). Further, intention predicted self-reported PA behaviour, and mediated the impact of attitudes and PBC on behaviour as suggested by Ajzen (1985). There was no effect of subjective norms on intention among Estonian schoolchildren. The results of this study indicated that the explained variance of the exercise behaviour was 52%. It has been found (Sutton, 1998) that the TPB typically explains the variance of intention between 40% and 50%, and the variance in behaviour between 19% and 38%. However, a large amount of the variance remains unexplained; hence leading researchers suggest the addition of other variables to improve the predictive capacity of the TPB. The option of including more predictors was unequivocally left open by the 'fathers' of the theory as long as there would be a strong theoretical justification for their inclusion and they would capture a significant portion of unique variance in intentions or behaviour (Ajzen, 1991; Fishbein, 2000; Fishbein and Ajzen, 2010). A significant number of studies have identified additional variables that might improve the predictive power of the TPB, e.g. planning and post-intentional volitional process (Darker et al., 2010), self-identity (Hagger and Chatzisarantis, 2006), past behaviour, self-identity, group norms, family social support, friends' social support, and social provisions (Hamilton and White, 2008), descriptive norms, moral norms, anticipated regret, self-concept and past behaviour (Jackson et al., 2003), and perceived parental support and parents' physical activity (Ries et al., 2009).

Also, in many studies the TPB and Self-Determination Theory (SDT) have been integrated with the purpose of providing more explanations of the processes that related to PA. SDT represents a broad framework for the study of human motivation and personality (Deci and Ryan, 1985a, 2000).

Central to the theory is the distinction between autonomous and controlling forms of motivation. Deci and Ryan (2000) have suggested that autonomous motivation should provide a basis for the formation of social cognitive judgments toward specific behaviours. Measures of the motivational orientations from SDT reflect an individual's 'current' perceived motivational status, while the constructs of the TPB are measures of expectancies regarding 'future' behavioural engagement. Research has found that generalized autonomous motives act as an information precursor involved in the formation of judgments and expectations regarding future behaviour. Several researchers (Ajzen, 1991; Conner and Abraham, 2001; Hagger et al., 2006) have proposed that the formation of the social cognitive constructs from the TPB draws from dispositional constructs like personality, as well as beliefs regarding the behaviour. The results of the integrated model of TPB and SDT have shown that autonomous motivation predicts intentions via the mediation of attitudes and PBC (Chatzisarantis et al., 2002; Hagger et al., 2006; Hagger et al., 2009; Pihu et al., 2008).

Many theories of social cognition and motivation propose that their predictions represent universal motivational and decision-making processes, and should be consistent across samples (Ajzen, 1985; Deci and Ryan, 1985b). Cross-cultural research is therefore important to establish whether effects in models are universal, as proposed by social cognitive and motivational theorists (Ajzen, 1985; Chirkov and Ryan, 2001; Deci and Ryan, 1985b), or are affected by individual differences in cultural orientations, as proposed by the culture-centric approach (Markus and Kitayama, 1991). The present study also aims to add to existing knowledge by analysing the results in samples that either have predominantly collectivist (Spain) or predominantly individualist (Estonian) cultural norms. This will provide evidence as to whether the model processes are universal and can be applied across national groups.

The present study aims to test an integrated model, where motivational construct from SDT will predict intentions via the mediation of TPB constructs and the role of self-identity in relation to adolescent PA intentions within the TPB.

Self-identity as a component of the TPB

The interest for adding self-identity as a predictor in the TPB derives at least in part to the conclusion that measures of subjective norms often account for less variance in intentions that might be estimated (Ajzen, 1991; Hagger et al., 2006). Self-identity is conceptualized as the salient and enduring aspects of one's self-perception (Sparks, 2000) and it reflects the extent to which a person sees him- or herself as fulfilling the criteria for any societal role (Conner and Armitage, 1998). Self-identity is considered to tap into a wider social context than the TPB (Charng et al., 1988). The more salient the self-identity is, the greater the probability that the person will consequently behave with that identity. In other words, someone who strongly sees himself as a sporty person is more likely to take every opportunity to practise PA (Jackson et al., 2003). Self-identity is one of the crucial aspects that most influence the performance of certain behaviours; it exerts a similar influence independent of social references and attitudes, having no reason to be consistent with them. On the other hand, the repetition of behaviour influences self-concept and self-identity, so that behavioural practice transforms the individual identity – that is, there is a two-way dialogical relationship of development and construction between them (Sparks, 2000; Sparks and Shepherd, 1992).

Based on hypotheses from the Role Theory (Biddle, 1979) and the Social Identity Theory (Charng et al., 1988), self-identity has been found to be an independent predictor of intentions in several studies (Campbell and Sheeran, 2001; Charng et al., 1988; Conner and Armitage, 1998; Sparks and Shepherd, 1992), whereas other researchers have not found this effect on behavioural

intentions (e.g. Fekadu and Kraft, 2001). In a recent meta-analysis of 40 data sets from studies concerning the prediction of intentions (Rise et al., 2010) self-identity had a medium-sized average correlation with behavioural intentions. A two-step hierarchical regression analysis intended to clarify whether self-identity improves the prediction of behavioural intentions beyond that produced by the TPB on its own. The inclusion of self-identity captured 6% ($p < .001$) additional variance in intentions above and beyond that presented by the main TPB constructs (attitude, subjective norms, and PBC) and raised it by 9% ($p < .001$) when past behaviour was also controlled. The same study suggested that the influence of self-identity on behavioural intentions is mostly, and maybe entirely, mediated by the strength of the target behaviour. The findings concluded that self-identity is a vital predictor of intentions and behaviour and should therefore be incorporated into the TPB.

Although there is important support for the influence of self-identity on behavioural intentions, there is a lack of research examining the role of self-identity in relation to adolescent PA intentions within the TPB. Lau et al. (2005) found that, when adolescents identify themselves as being sporty persons, this presence of an important sport identity strengthens sport behaviour. Our study, therefore, wanted to evaluate the influence of self-identity on adolescent PA intentions and to test the validity of an extended TPB model, incorporating self-identity as an additional variable, for predicting and understanding adolescent PA.

Method

Participants and design

Participants were 397 school students (175 boys and 222 girls, mean age = 15.67, SD = 1.4, range: 12 to 18) studying in five different state high schools in Estonia (boys = 55, girls = 91; M age = 16.47, SD = .08) and in three different government-run secondary schools in Spain (boys = 120, girls = 131; M age = 15.69, SD = .07). The school headmasters gave information on the socio-economic status of the participants. The schools draw their students from an area characterized as 'middle-class' and matched the distribution of socioeconomic status levels among town-dwelling school children in both Estonia and Spain.

Students were taking Physical Education (PE) as a required course (two times a week, 45–50 minutes per lesson). Consent for school pupils' participation in the study was obtained from parents and the school principals prior to data collection. Students were informed that they would be asked to complete a short questionnaire over the coming four weeks as part of a survey on young people. They were told that participation was voluntary and they could choose to opt out if they desired. Students completed the questionnaires in lesson time; to preserve confidentiality, participants were asked not to report their names. Prospective responses were matched with baseline responses using dates of birth, gender and class identification as matching indexes.

In the first wave of data collection, the PBC, attitudes, subjective norms, self-identity and intention components from the TPB and motivation in a leisure-time PA context were measured. After four weeks, in the second wave of data collection, PA behaviour was assessed. A four-week inter-test period was employed, because it represents a long-range prediction of behaviour relative to the comparatively short-range effects previously studied using the TPB (Hagger et al., 2002).

Measures

Motivation in leisure-time contexts. Motivation for the leisure-time PA was assessed through the subscales from Mullan and Markland (1997). Responses to each item were measured on seven-point

scales ranging from 'not true at all' (1) to 'very true' (7). The four motivational constructs measured by items from the Behavioural Regulation in Exercise Questionnaire (BREQ) were integrated into a single index of motivation by calculating a relative motivation index (Vallerand and Ratelle, 2002).

The theory of planned behaviour. Attitude, perceived behavioural control, subjective norms and intention subscales from the TPB questionnaire were used. Three items drawn from Courneya and McAuley (1994) and Ajzen and Madden (1986) were used to measure behavioural intentions. Three items measured behavioural intentions (e.g., 'I intend to do active sports and/or vigorous physical activities in the next four weeks...') on seven-point Likert-type scales anchored by 'strongly disagree' (1) to 'strongly agree' (7). Attitudes were assessed in response to the following statement: 'Participating in active sports and/or vigorous physical activities during my leisure time in the next four weeks is...' Responses were measured on four seven-point semantic differential items with the following end points: bad-good, harmful-beneficial, unenjoyable-enjoyable. PBC was assessed through three items (e.g. 'I feel in complete control over whether I do active sports and/or vigorous physical activities in my leisure time in the next five weeks') measured on seven-point Likert-type scales ranging from 'no control' (1) to 'complete control' (7). Subjective norms were assessed by three items (e.g., 'People important to me think that I should do active sports and/or vigorous physical activities during my leisure time in the next four weeks') on seven-point scales with 1 ('strongly disagree') to 7 ('strongly agree') endpoints.

Self-identity. Self-identity was measured by the three items presented by Jackson et al. (2003) The items were: 'I see myself as sporty', 'I see myself as fit and healthy', 'I see myself as a physically active person'. The items were assessed on seven-point Likert-type scales anchored by 'strongly disagree' (1) to 'strongly agree (7)'.

Self-reported physical activity behaviour. PA behaviour was assessed at the second wave of data collection through an adaptation of the second item from Godin and Shephard's (1985) Leisure-Time Exercise Questionnaire (LTEQ). The period of the activity was adapted from 'the last week' to 'the last four weeks' and the scale specified the frequency of the activity during this period. The questionnaire asked two questions regarding how many times and how often the individual had engaged in vigorous exercise or active sports for at least 20 minutes in the past four weeks. The statement for the first behaviour item was: 'in the course of the past 4 weeks, how often have you participated in active sports and/or vigorous physical activities for 20 minutes at a time?' with scale points labelled *almost never, a few times, a few times but less than half, on about half the days, most days, almost every day, every day*.

The second item read: 'I engaged in active sports and/or vigorous physical activity for 20 minutes at a time with the following regularity...' with the following scale labels: *every day, most days, some days, occasionally, very seldom, hardly ever, never*. In keeping with definitions of leisure-time activities (Godin et al., 1986), the questionnaire did not include PA that was performed during normal school time since PE is compulsory. Independent evaluations of the LTEQ have found it an easy to administer self-report measures with satisfactory validity and reliability statistics (e.g., Sallis et al., 1993). In addition, this two-item version of the LTEQ has demonstrated satisfactory construct validity and reliability in confirmatory factor analyses (Hagger and Chatzisarantis, 2005; Hagger et al., 2006).

Table 1. Descriptive statistics and correlations among study variables.

		α	Mean	SD	1	2	3	4	5
1.	Attitude	.88	5.59	1.34	—				
2.	Perceived behavioural control	.84	5.00	1.34	.74*	—			
3.	Subjective norms	.82	5.19	1.35	.50*	.57*	—		
4.	Intention	.91	4.42	1.08	.70*	.79*	.41*	—	
5.	Self-identity	.90	4.77	1.67	.66*	.69*	.40*	.71*	—
6.	Motivation index		6.53	5.08	.61*	.58*	.36*	.57*	.56*

* $p < .05$

Translation procedures

Standardized back-translation techniques (Brislin, 1986) were used to translate the questionnaires into Estonian and Spanish. The first step consisted of getting the items translated by a bilingual translator into Estonian and Spanish, and then translated back into the source language by independent bilingual translators who were blinded to the original questionnaires. These versions were then compared with the original English version and any inconsistencies and errors were highlighted. The back-translation procedure was repeated iteratively until the original and back-translated English versions of the questionnaires were virtually identical, as recommended by Bracken and Barona (1991).

Data analysis

The LISREL 8.8 statistical software was employed to conduct the confirmatory factor analysis (CFA) and structural equation modelling (SEM). Firstly, multiple imputations were used to replace missing observations with observations from cases with a similar profile of scores. Multiple imputations were chosen to generate estimates that better reflect true variability and uncertainty in the data than do regression methods. In this method the results are combined and the average is reported as the estimate. Adequacy of the CFA and SEM models were estimated by using recommended incremental goodness-of-fit indexes: the comparative fit index (CFI), the non-normed fit index (NNFI), and the root mean square error of approximation (RMSEA). For the CFI and NNFI cut-off values of .90 are generally considered to represent acceptable fit (Bentler, 1990). Browne and Cudeck (1989) suggest that a RMSEA value of 0.05 or less indicates good fit, and that values up to 0.08 represent errors that approximate to those expected in the population.

Results

As shown in Table 1 all the subscales reached adequate internal consistency ($\alpha > .80$). The mean scores were higher than the considered mid-range value in all of the study variables, with the Motivation index being the one with the highest average (6.53), whereas Intention scored lowest (4.42), ranging measures of dispersion around 1.36. As for the correlations between study variables, all had a large-sized effect according to Cohen's (1992) criteria, remaining significant at $p < .05$, with the exception that the relationship between Motivation index and Subjective norms, although significant ($p < .05$) only had a moderate correlation ($r = .36$). On the other hand, higher correlations

Table 2. Fit indexes of measurement model and structural equation modelling.

Models		df	CFI	RMSEA	CI ₉₀ RMSEA	NNFI
Model 1	375.22	137	0.98	0.067	0.059 - 0.075	0.98
Model 2A	716.60	327	0.97	0.078	0.071 - 0.086	0.097
Model 2B	689.73	307	0.97	0.078	0.072 - 0.088	0.097
Model 3	427.87	175	0.93	0.077	0.067 - 0.086	0.91
Model 4	322.79	175	0.93	0.076	0.063 - 0.088	0.92
Model 5	513.02	175	0.94	0.070	0.063 - 0.077	0.93
Model 6	532.87	176	0.94	0.073	0.065 - 0.079	0.92
Model 7	558.67	177	0.93	0.074	0.067 - 0.081	0.91

Note: Model 1 = Measurement model with all study variables for both samples together. Model 2A = Baseline model; Model 2B = Factor loading coefficients and factor variance constrained; Model 3 = Structural model for Spanish sample (motivation in leisure time, perceived self-identity, attitudes, perceived behavioural control, subjective norms, intention, and PA); Model 4 = Structural model for Estonian sample; Model 5 = Structural model for Estonian and Spanish samples together; Model 6 = Structural model in which the path from self-identity to PA is fixed to zero. Model 7 = Structural model in which the paths from self-identity to intentions and PA are fixed to zero.
CFI: comparative fit index; RMSEA: root mean square error of approximation; CI₉₀RMSEA: 90% confidence interval; NNFI: non-normed fit index.

were revealed between intention and PBC ($r = .79, p < .05$) and the lowest between self-identity and subjective norms ($r = .40, p < .05$).

Distributional properties of the responses to all items were examined. Results revealed skewness values greater than unity, which indicated that not all variables were normally distributed. Therefore, normal scores were computed for ordinal variables before the estimation of the measurement model and the structural equation model with a maximum likelihood method (Jöreskog et al., 2001). The CFA with all Spanish and Estonian students produced a well-fitting measurement model (Table 2, Model 1) where each factor was adequately explained by the set of indicator items.

A multi-sample measurement model was conducted to explore the degree to which the model was equivalent for Spanish and Estonian samples. An initial baseline model was estimated to test whether the factors are feasible across the samples. As shown in Table 2 (Model 2A), the baseline model produced a good fit to the data. Subsequently, we estimated a nested model in which the factor loadings and factor variance were constrained to be invariant across the two samples. Goodness-of-fit indexes for this model are given in Table 2 (Model 2B). These models demonstrated a good fit with the data and the chi-square differences between the Spanish and Estonian samples were not significant. Thus multi-group comparison indicated that no invariances existed between the measurement models of the observed samples.

Structural equation model

The purpose of the present study was to test the influence of motivation and self-identity on adolescent PA intentions and leisure-time PA. Additionally, the aim was to test the validity of an extended TPB model, incorporating self-identity as an additional variable, for predicting and understanding adolescent PA. It was expected that self-identity has a significant role in predicting PA intention and behaviour. To test the hypothesis and the differences between cultural groups (Spain, Estonia) several structural equation models (SEM) (Figure 1) were constructed.

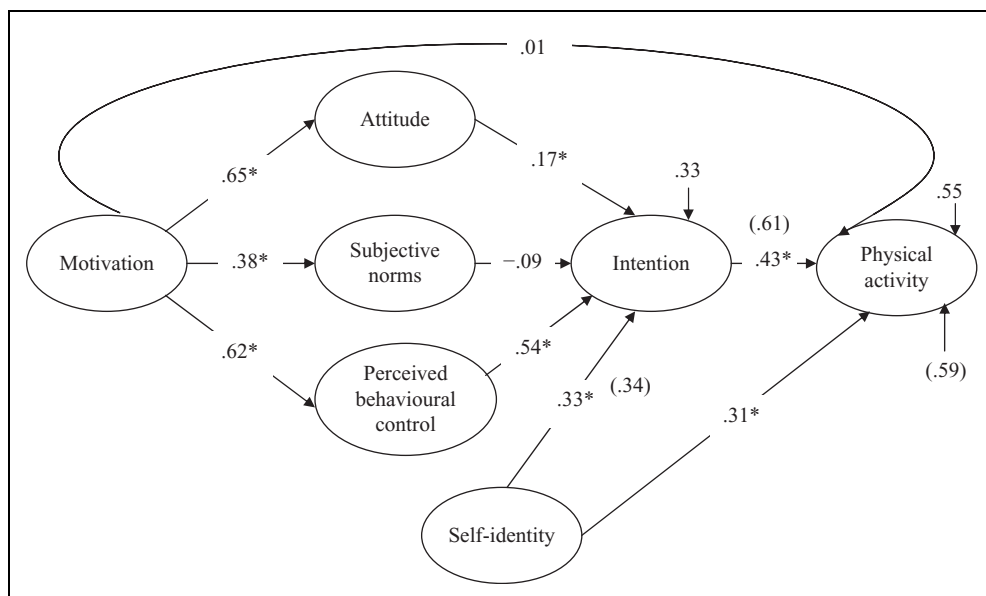


Figure 1. Hypothesized structural equation model of leisure-time PA motivation and self-identity predicting PA intention and behaviour together with TPB constructs ($p < .05$). The standardized estimates present the results of the structural equation model where Estonian and Spanish samples are together. The path coefficients in parentheses represent the effect of self-identity in the alternative models in which the path from self-identity to PA behaviour was fixed to zero (Table 2, Model 6).

Note: Estonian and Spanish samples together; Model 6 = Structural model in which the path from self-identity to PA is fixed to zero. Model 7 = Structural model in which the paths from self-identity to intentions and PA are fixed to zero.

SEM for Spanish and Estonian samples specified structural relationships between constructs in accordance with the hypothesis that self-identity has a significant role beside TPB constructs in predicting estimated PA intention and behaviour. Goodness-of-fit statistics for both samples were acceptable (Table 2, Model 3; 4).

The hypothesized SEM that shows the role of self-identity in predicting PA intention and behaviour in accordance with TPB constructs is presented in Figure 1. Goodness-of-fit statistics are presented in Table 2, Model 5. Self-identity had a direct effect on PA intention ($\beta = .33, p < .01$) and PA behaviour ($\beta = .31, p < .01$). The model accounted for 67% of the variance of intention and 45% variance of PA behaviour. To confirm the hypothesis that intention mediated the effect of self-identity on PA behaviour, the direct path from self-identity to intention was fixed to zero (Table 2, Model 6). After this the effect of intention on PA behaviour increased ($\beta = .61, p < .01$) indicating that partial mediation occurred. The significant differences in chi-square ($\Delta\chi^2 = 19.85, \Delta df = 1, p < .01$) was followed between Model 5, which included this path as a free parameter, and Model 6, which did not (Table 2). This restricted model accounted for 4% of variance in PA behaviour, which is the amount of variance that can be attributed to self-identity. In addition, the Sobel test (1982) indicated that the indirect effect of self-identity on PA via intention was significant.

To test the role of self-identity in the extended model of the TPB, the influence of self-identity to PA intention and leisure-time PA was fixed to zero (Table 2, Model 7). After this the direct

effect of motivation on PA behaviour changed significantly ($\beta = .12, p < .01$), indicating that self-identity explains significant variance of the integrated model.

Discussion

The present study aimed to test the validity of an extended TPB model, including additional self and motivational influences, for predicting and understanding adolescent PA. The results offer support for the TPB in the sense that its constructs predicted intentions to engage in regular PA at a four-week follow-up. For the additional self-influence variable, this study supports the inclusion of self-identity as a significant predictor of intention and behaviour (PA). The result that self-identity appears as a significant predictor of behavioural intentions and performance suggests that adolescents who identify themselves as physically active persons are more likely to practise regular PA than those who do not have a PA self-identity (Lau et al., 2005). These results are consistent with those of other studies, like Jackson et al. (2003), who confirmed the significant relationship between self-identity and behavioural intention ($r = .50$). Theodorakis (1994) revealed a lower correlation ($r = .31$), whereas Thompson and Rise (2002) found the highest correlation between both variables in college students ($r = .61$). The present research highlights how the extension of the model of the TPB by indicators of self-identity and motivation derived from the SDT permits the capture of a greater percentage of the total variance and how it increases the predictive power of the existing proposals in relation to PA in adolescents of Spain and Estonia. Thus, the present study reveals that the inclusion of this perspective has led to incorporate current indicators that predict, under the mediation of the constructs of the TPB, the adolescents' future involvement in PA. The extended model of the TPB, already sponsored by the authors of the theory (Ajzen, 1991; Fishbein and Ajzen, 2010), explains 67% of the variance in intention and 45% of the variance in PA behaviour, amounts that exceed significantly the results reported previously in the literature (Rise et al., 2010). In this case, it should be noted that the contribution of self-identity is not merely anecdotal, but it is responsible for a substantial increment in variance explained in behavioural intention, and its influence does not occur in isolation but in interaction with the basic constructs of the TPB (mediated by intention). Consistently, Rise et al. (2010) provided the strongest evidence to date that the concept of self-identity is distinct from the TPB constructs and showed that the relation between self-identity and intention is similar to or even surpasses the strength of the attitude–intention relation (as it happened in the present study). This leads us to the conclusion that self-identity is an important predictor of intentions and behaviour and should therefore be incorporated into the TPB.

However, as shown in Hagger et al. (2007), the relation of one of the TPB constructs, namely the subjective norms on intention, was not significant in both samples of Spain and Estonia (although its relationship with motivation revealed a large effect), questioning to some extent the integration of this construct when considering additional explanatory variables. The role of self-identity in the TPB provides an explanation of the failure of subjective norms (e.g. the social influence component of the TPB) as a predictor of intentions, as compared with attitudes and PBC (Ajzen, 1991).

Finally, as we can see from the analysis of structural invariance, the extension of the original model of TPB with self-identity forms a common factor structure for both countries (Spain and Estonia) as a result of the robustness of the studied model (no significant differences in terms of chi-square analysis of invariance were found among the two samples) and provides evidence of cross-cultural validity for its application in both countries.

Overall, the present study focuses on the importance of a multidimensional approach incorporating attitudinal, normative, control and self-influences when planning interventions to reinforce PA intentions and, therefore, improve PA behaviour in adolescents. Assuming the result that self-identity predicted both intentions and PA behaviour, encouraging the adolescent population to adopt an identity of being a physically active person would show many benefits in promoting adolescent PA. Given the decline in adolescent PA, defining the relevant features in predicting PA is important to facilitate the enhancement of strategies to struggle against adolescent sedentary behaviour.

However, this study is not without limitations. Firstly, this study involves a cross-sectional design which precluded the inference of causality. Secondly, a random-stratified sampling technique was not used which may affect the generalizability of the results. Thirdly, PA behaviour was measured by self-report. Although the concurrent validity of such measures with more 'objective' measures such as heart rate monitoring has been supported (Godin and Shephard, 1985), and previously widely used among school students (Hagger et al., 2002, 2007, 2009) these measures may be subject to response bias and estimation error.

Finally, due to a small sample size no gender differences were analysed. However, according to a previous study based on the self-determination theory in a PE context, there are no gender variations in the structure of the study measures (Standage et al., 2005).

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