Autonomy and Control : Augmenting the Validity of the Theory of Planned Behaviour in Predicting Exercise

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Augmenting the Validity of the Theory of Planned Behaviour in Predicting Exercise

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Abstract

This study examined the utility of the theory of planned behaviour (TPB) along with additional constructs in predicting exercise, and explored the motivational antecedents of exercise intentions. Participants included 162 Canadian University College students (61% females). Measures of TPB, autonomous and controlling intention, perceived autonomy support and core autonomous intention were completed during phase 1 of data collection. Two and three weeks later behaviour was assessed. Hierarchical regression analyses revealed that: (a) attitude and perceived behavioural control significantly predicted TPB intention and core autonomous intention; (b) subjective norm predicted controlling intention; and (c) perceived autonomy support predicted autonomous and core autonomous intention. TPB intention significantly predicted behaviour. TPB is a fairly useful model for predicting behaviour and important information can be gained when other measures of intention are explored.

Keywords

- *autonomous social influence*
- *motivation*
- *self-determination*

REGULAR PARTICIPATION IN exercise contributes positively to physical and psychological health (Armstrong, Bauman, & Davies, 2000). It is therefore important to understand what motivates people to exercise at a level of participation that meets recommended health standards. This understanding can then be used in the promotion of exercise among those who are inactive and those who do not exercise at a sufficient level, and therefore reduce the incidence and severity of health problems, decrease health-care costs and enhance quality of life.

Theory of planned behaviour

The theory of planned behaviour (TPB; Ajzen, 1985, 1988, 1991), and its predecessor the theory of reasoned action (TRA; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), is a model that has guided much research on exercise behaviour. The model assumes that the most important predictor of behaviour is a person's intention to perform or not to perform behaviour. Exercise intentions are a representation of a person's immediate behavioural orientation towards exercising and reflect their motivation towards exercise behaviour (Ajzen & Fishbein, 1980). Because in the present study several different measures of intention are used, the term 'TPB intention' is used with reference to intention derived from the philosophy underlying TPB. TPB intention accounts for the extent to which a person plans to or intends to exercise for a specific period of time.

TPB also posits that a person's normative beliefs about support from significant others (subjective norm) and their attitudes towards exercising influence TPB intention (Fishbein & Ajzen, 1975). Attitudes are derived from behavioural beliefs pertaining to the likelihood that performing behaviour will result in a desired outcome, and whether or not the outcome will be rewarding. Subjective norm is based on perceptions of social pressure or influence to perform or not to perform behaviour based on its acceptability or appropriateness and motivation to comply with this pressure (Ajzen & Madden, 1986).

Perceived behavioural control was included to overcome problems the model originally had with volitional control (i.e. situations where behavioural control was incomplete). Perceived behavioural control represents the relative controllability of behaviour and is based on perceptions of ease or difficulty in performing behaviour. It is believed to be related to past experience, skill, ability and confidence, and to be a reflection of perceived barriers, such as time, opportunity and money. It predicts both intention and behaviour (Ajzen & Madden, 1986).

TPB is reported as a reliable model for predicting and explaining exercise behaviour (Courneya & McAuley, 1995; Kimiecik, 1992; Wankel, Mummery, Stephens, & Craig, 1994). In general, attitude is a consistent predictor of intention, but not subjective norm (Bozionelos & Bennett, 1999; Courneya & McAuley, 1995; Hagger, Chatzisarantis, & Biddle, & Orbell, 2001). Meta-analysis has demonstrated that the addition of perceived behavioural control increases the explained variance in intention and behaviour (Hagger, Chatzisarantis, & Biddle, 2002; Hausenblas, Carron, & Mack, 1997).

Support for the link between intention and exercise behaviour is consistently reported (Bozionelos & Bennett, 1999; Chatzisarantis & Biddle, 1998; McAuley & Courneya, 1993). In a meta-analytic review, Hagger et al. (2002) found that TPB intention accounted for 25 per cent of the variability in exercise behaviour. However, other research has found that it accounts for less than 10 per cent (Dzewaltowski, 1989; Dzewaltowski, Noble, & Shaw, 1990; Godin & Shephard, 1986) and correlations between TPB intention and exercise behaviour are typically reported in the .30 to .40 range (Courneya & McAuley, 1993). Furthermore, the effects of intentions on behaviour reduce considerably when effects from other variables such as past behaviour are taken into consideration (see Hagger et al., 2002).

Autonomous and controlling intentions

Chatzisarantis and colleagues (Chatzisarantis, Biddle, & Frederick, 1998; Chatzisarantis, Biddle, & Hagger, 1996; Chatzisarantis, Biddle, & Meek, 1997) suggested that the mixed results for TPB intention might be attributed to the measure. Chatzisarantis et al. (1996) argued that TPB intention was too general and failed to

capture the multidimensional nature of intentional behaviour. They proposed that a measure of intention should recognize different types of intentional behaviour that vary in their degree of relative autonomy and control. By adopting self-determination theory (SDT; Deci & Ryan, 1985) as a framework, it was proposed that the predictive ability of intention could be improved if the relative autonomy of intention was assessed.

Self-determination theory is an organismic theory that posits that humans are active in their pursuit of behaviours and activities which will result in positive growth and a unified, coherent sense of self (Deci & Ryan, 1985). The theory postulates that intentional human behaviour can be described in a parsimonious way, through two processes of intrinsic motivation and internalization. Self-determination theory also attempts to understand factors that facilitate and undermine intrinsic motivation and internalization. It has been postulated that intrinsic motivation is engendered when people are in conditions that support three innate psychological needs for self-determination, competence and relatedness (Ryan & Deci, 2000b).

Chatzisarantis et al. (1996) proposed that the relative autonomy of intentions should be measured through reasons that people give for their intentions. If people report that they intend to exercise for extrinsic reasons (i.e. 'because others say so') then it is assumed that intentions are controlling. If people report that they intend to exercise for intrinsic reasons (i.e. 'for enjoyment'), it is assumed that intentions are autonomous.

According to Chatzisarantis and colleagues (Chatzisarantis & Biddle, 1998; Chatzisarantis et al., 1997, 1998), autonomous and controlling intentions promote qualitatively distinct behaviours. Autonomous intentions promote intrinsically motivated or self-determined activity, which is associated with choice, enjoyment, effort, satisfaction and motivational persistence over time. Controlling intentions promote extrinsically motivated behaviour. They do not provide emotional support, and lead to defiance, tension, dissatisfaction and reduced motivational persistence over time. Research has demonstrated that autonomous intention is more likely to predict behaviour than controlling and TPB measures of intention (Brickell & Pretty, 2001; Chatzisarantis et al., 1997, 1998).

Core autonomous intention

Although autonomous intention has been reported as a better predictor of exercise than TPB intention, previous research (Chatzisarantis, Brickell, & Pretty, 2002a) found poor discriminant validity between autonomous intention and a measure designed to assess varying degrees of intrinsic and extrinsic forms of regulation of exercise behaviour (the Behavioural Regulation in Exercise Questionnaire, Mullan, Markland, & Ingledew, 1997), indicating that autonomous intention may not differentiate from other instruments that measure relative autonomy in behaviour. This may be due to problems with the operational definition underlying autonomous intention's item content, in that it may not measure the type of intention that accurately reflects intrinsically motivated or self-determined behaviour. For example, previous research has shown that experiences of energy and vitality parallel experiences that characterize intrinsic motivation (Nix, Ryan, Manly, & Deci, 1999; Nowlis & Green, 1964), yet autonomous intention does not include vitality-related items.

Furthermore, autonomous intention may produce biased responding because it fails to capture innate motivational desires and automated behaviour. According to SDT, intrinsic motivation stems from environments that support three innate psychological needs; the need for self-determination, competence and relatedness (Ryan & Deci, 2000a, 2000b). Due to their innate nature, psychological needs are assumed to be chronic and enduring over time, and therefore result in frequent and persistent performance of goals in a similar situation, aimed at satisfying these needs. According to automatic processing theorists, the more frequently and consistently behaviour is performed, the less conscious attention it requires, until eventually it becomes automatic and can be performed without conscious guidance (Bargh, 1997; Bargh & Barndollar, 1996). It is believed that with automated behaviour the activation of intentions becomes delegated to the environment. Behaviour is then under environmental control and can be automatically

activated by environmental features, independent of conscious processing (Bargh & Barndollar, 1996; Bargh & Chartrand, 1999). Goals become automatically activated by a situation and conscious intent is bypassed entirely (Bargh, 1990; Bargh & Chartrand, 1999; Bargh & Gollwitzer, 1994).

If goals can be automatically elicited by environmental cues without conscious intent, it is plausible that a person might be unaware of having pursued the goal. It is therefore conceivable that autonomous intention, as it was previously conceptualized (Brickell & Pretty, 2001; Chatzisarantis et al., 1996), may not be capable of assessing the pursuit of goals that bypass conscious intent. For example, by asking participants to respond to the likelihood that they 'intend to exercise for fun', the level of conscious choice for engaging in exercise is assessed, however not the intent for which people are unaware. It is proposed that a new measure of autonomous intention, comprised of more distinct indicators of intrinsic motivation and altered to account for less conscious processing, might be a better predictor of behaviour. A new measure of autonomous intention will be devised in this research and will be referred to as core autonomous intention.

Revisiting the predictiveness of subjective norm

It was noted earlier that subjective norm has not received a great deal of support in predicting TPB intention (Bozionelos & Bennett, 1999; Hagger et al., 2001; Terry & O'Leary, 1995). Chatzisarantis and Biddle (1998) proposed that this was due to the operationalization of the construct. According to Ajzen and Madden, subjective norm refers to 'the perceived social pressure to perform or not to perform the behaviour' (1986, p. 454). Accordingly, subjective norm is commonly operationalized to reflect perceptions of pressure from significant others, and a tendency to comply with this pressure (Chatzisarantis & Biddle, 1998; Courneya & McAuley, 1995; Norman & Smith, 1995; Terry & O'Leary, 1995).

According to SDT, the quality of social influence affects the motivation and performance of those to whom it is intended. Autonomy supportive forms of social influence, such as encouragement and choice, facilitate self-determined motivation and optimal performance. Controlling forms of social influence, such as compliance and pressure, impede motivation rather than enhance it (Brehm & Brehm, 1981; Ryan & Deci, 2000a, 2000b). A number of studies demonstrated that greater autonomy support was more reliably related to health behaviour (Williams, Gagne, Ryan, & Deci, 2002; Williams, Grow, Freedman, Ryan, & Deci, 1996).

A reason why subjective norm does not predict intention is that the construct of subjective norm reflects pressuring forms of social influence rather than non-pressuring forms. This study will therefore include a measure designed to reflect non-pressuring social influence. It will be referred to as perceived autonomy support.

In summary, this study will build upon previous research by incorporating a measure of core autonomous intention designed to reflect accurate indicators of intrinsic motivation and account for less conscious processing. This study will also incorporate a measure of perceived autonomy support, which will reflect the autonomous dimension of social influence. The purpose of the study is to examine the utility of TPB and determine if: (a) the addition of perceived autonomy support to the formation of TPB intention; and (b) the addition of autonomous, controlling and core autonomous intention to the prediction of behaviour, can augment the predictive utility of the model. A second purpose is to examine the contribution of attitude, subjective norm, perceived behavioural control and perceived autonomy support in the formation of autonomous, controlling and core autonomous intentions.

Method

Participants

The initial sample consisted of 253 Canadian university college students (99 males, 153 females, 1 did not answer). The attrition rate over three phases of data collection was 91 (35.97%), leaving a total of 162 participants (63 males, 99 females). The average age was 23.15 years (SD = 6.05, age range = 18 to 44 years). The ethnicity of the sample was 43.8 per cent Caucasian, 13.6 per cent Asian, 21.6 per cent South Asian, 5.6 per cent from other ethnicities

and 15.4 per cent who did not record their ethnicity.

Procedure

Data collection occurred in three waves. In the first wave, participants completed a questionnaire including TPB variables, autonomous, controlling and core autonomous intentions and perceived autonomy support. A measure of behaviour was completed during the second and third waves. The time gap between the first and second wave of data collection was two weeks, and three weeks between the second and third.

Participation was voluntary with no credit offered. Completion of questionnaires occurred during normal lecture times for each course. Courses across several disciplines were sampled to ensure that a variety of people from each discipline were sampled (i.e. Marketing, English and Psychology). To preserve confidentiality in responding, demographic information (i.e. sex, course, date of birth, height and weight) were used to match questionnaires completed by the same participant over the three phases. Same questionnaires were coded by number.

Materials

Items were phrased specifically to be congruent with the behavioural criterion in terms of action, target, context and time (i.e. 'participation in moderate to vigorous exercise and sport for at least 30 minutes, 5 days per week during leisure-time, over the next 5 weeks'). This intensity, duration and frequency were based on current recommendations from the National Physical Activity Guidelines for Australians (Commonwealth Department of Health and Aged Care (DHAC), 1999), and the report of the United States Surgeon General on physical activity and health (United States Department of Health and Human Services (USDHHS), 1996).

TPB intention Based on Ajzen and Madden (1986), Courneya (1994) and Courneya and McAuley (1993), TPB intention included six items,'I intend to','I am determined to' and'I plan to', measured on a 7-point Likert scale with the anchors 'unlikely' (1) to 'very likely' (7); 'I intend to . . . with the following regularity', scored from 'not at all' (1) to 'every day' (7); 'I intend to . . .,— days per week' (open-ended response format); and 'I intend to', scored from 'definitely not' (1) to 'definitely' (7). TPB intention was the average of the items. An alpha coefficient of .96 ($M = 4.38$, SD = 1.84) was reported.

Attitude Following the recommendations of Ajzen and Fishbein (1980), attitude was measured through five bipolar adjectives measured on a seven-point semantic-differential scale. Two adjectives reflecting an affective dimension (unenjoyable/enjoyable, boring/interesting), two reflecting an instrumental dimension (harmful/beneficial, useless/useful) and one item reflecting a moral dimension (bad/good) were included in the scale (Ajzen & Driver, 1991; Bagozzi, 1986). Attitude was the average of the items. An alpha coefficient of .82 ($M = 5.68$, SD = 1.13) was reported for this variable.

Subjective norm Following the guidelines of Ajzen (1985, 1988, 1991) and Ajzen and Madden (1986), subjective norm was assessed with two items ('others who are important to me think that I should do', and 'most people who are important to me pressure me to do'), measured on a 7-point Likert scale with the anchors 'strongly disagree' (1) to 'strongly agree' (7). Subjective norm was the average of the items. The inter-item correlation for this measure was .72 ($M = 4.16$, SD = 1.62).

Perceived behavioural control As used by Chatzisarantis and Biddle (1998), four items assessed perceived behavioural control ('how much control do you have over whether you do', 'if I wanted to I could do', 'it is really up to me whether or not I could do' and 'I feel in complete control over whether I will do'). All items were measured on a 7-point Likert scale with the anchors 'very little control' (1) to 'complete control' (7), 'strongly disagree' (1) to 'strongly agree' (7), 'not at all' (1) to 'very much' (7) and 'completely false' (1) to 'completely true' (7), respectively. Perceived behavioural control was the average of the items. For this variable an alpha coefficient of .91 ($M = 5.42$, SD = 1.52) was reported.

Autonomous and controlling intentions Following the recommendations of Chatzisarantis et al. (1996), autonomous and controlling intentions were measured alongside motives varying in their relative autonomy. Autonomous

intention was assessed with 10 items (e.g. I intend to do exercise/sport for 'fun', 'escaping the daily routine', 'the benefits' and 'a sense of achievement') and controlling intention with five (e.g. I intend to do exercise/sport to 'please others', 'prevent disappointing others' and 'avoid feeling sad or shameful'). All items were assessed on a 7-point Likert scale with the anchorings 'not at all true' (1), 'in between' (4) and 'very true' (7). Autonomous and controlling intention scales were the average of the items. For autonomous intention, an alpha coefficient of .87 (M = 4.58, SD = 1.21) was reported, and .74 (M = 2.90, SD = 1.33) for controlling intention.

Core autonomous intention The measurement of core autonomous intention consisted of two parts. In the first part, participants were requested to recall up to three of the most important goals they wanted to achieve from their leisure-time exercise. In the second part, participants were requested to imagine that they had already achieved all their goals, and that these were no longer a reason for exercising. They were then requested to think about the extent to which they would maintain exercise intentions for four intrinsically motivated reasons; 'feel alive', 'feel energetic', 'feelings of completeness' and 'feelings of fulfilment' (Ryan & Frederick, 1997; Sheldon & Kasser, 1995; Sheldon, Ryan, & Reis, 1996; Waterman, 1993). Although enjoyment is traditionally used to measure intrinsic motivation (McAuley, Duncan, & Tammen, 1989; McAuley, Wraith, & Duncan, 1991; Ryan, Mims, & Koestner, 1983), it was found to lack discriminant validity (Chatzisarantis et al., 2002a) and was therefore not included. Core autonomous intention was the average of the four items. An alpha coefficient of .90 (M = 4.90, SD = 1.58) was reported.

Perceived autonomy support Perceived autonomy support was adapted from the short form of the Sport Climate Questionnaire (e.g. 'I feel that my coach provides me choices and options', Deci, 2001). The six items (e.g. 'I feel that others who are most important to me provide me with choices and options about whether to do exercise/sport during my leisure-time') were assessed on a 7-point Likert scale with the anchorings 'strongly disagree' (1), 'neutral' (4) and 'strongly agree' (7). Perceived autonomy support was the average of the six items. An alpha coefficient of .81 (M = 4.60, SD = 1.21) was reported.

Exercise behaviour Behaviour was measured with an adapted version of the Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985). One item assessed how many days moderate and vigorous exercise and sport was performed for at least 30 minutes over the past 2 weeks. This was assessed on a 6-point Likert scale with the anchorings 'not at all' (1) to 'most days of the week–6 to 7 days of the week' (6). To maximize reliability, this study used a 2 and 3-week recall period. Behaviour was the average of the 2 measurements. A correlation coefficient of .72 ($p < .05$, n = 162) was reported between the second and third phases of data collection.

Results

Preliminary analyses

There were no significant motivational differences between those who completed all three phases of data collection and those who did not, $F(8, 220) = .69$, $p > .05$. A significant multivariate effect for sex and the motivational constructs was found, $F(9, 137) = 2.67$, $p < .05$, with males scoring higher than females on measures of TPB intention and autonomous intention. Consistent with previous research (Courneya & McAuley, 1995; Terry & O'Leary, 1995; Wankel et al., 1994), sex and phase differences were not found for the majority of the variables, and therefore the data were pooled for the remainder of the analyses.

Results from a correlation analysis are reported in Table 1. TPB intention was significantly correlated with perceived behavioural control, attitude and subjective norm. Behaviour was significantly correlated with TPB intention, and perceived behavioural control. These findings support the validity of TPB.

Predicting intention[1]

Four hierarchical regression analyses were conducted to test the utility of attitude, subjective norm, perceived autonomy support and perceived behavioural control to predict each measure of intention. Using TPB as a guide, attitude, subjective norm and perceived autonomy

Table 1. Pearson's correlation coefficients

	TI	*PBC*	*A*	*SN*	*PAS*	*AI*	*CI*	*CAI*	*B*
TI	1.00								
PBC	.35**	1.00							
A	.56**	.22**	1.00						
SN	.19*	.09	.10	1.00					
PAS	.27**	.06	.31**	.15	1.00				
AI	.62**	.08	.68**	.04	.33**	1.00			
CI	.27**	.02	.15	.33**	.10	.25**	1.00		
CAI	.53**	.18*	.40**	.08	.29**	.65**	.30**	1.00	
B	.69**	.32**	.49**	.11	.26**	.50**	.22**	.40**	1.00

n ranges from 149–162. TI = TPB intention, PBC = perceived behavioural control; A = attitude; SN = subjective norm; PAS = perceived autonomy support; AI = autonomous intention; CI = controlled intention; CAI = core autonomous intention; B = exercise behaviour

*$p < .05$; **$p < .01$

support were entered into the equation in the first step. Perceived behavioural control was entered in the second step. In Table 2, the unstandardized regression coefficients (B), standardized regression coefficients (β), R and R^2 are reported for the final step of each regression.

Predicting TPB intention In the first step, a model including attitude, subjective norm and perceived autonomy support contributed to the prediction of intentions ($R = .58$, $F(3, 144) = 25.13$, $p < .05$), accounting for 34 per cent of the variance. An examination of the beta coefficients revealed that attitude ($t = 7.40$, $p < .05$) made a significant contribution to the prediction of TPB intention. Subjective norm ($t = .92$, $p > .05$) and perceived autonomy support ($t = 1.74$, $p > .05$) did not. In the second step, the inclusion of perceived behavioural control ($t = 3.52$, $p < .05$) significantly increased the prediction of TPB intention by 6 per cent, $R = .63$, $F(4, 143) = 23.43$, $p < .05$.

Predicting autonomous intention After step 1, a model including attitude, perceived autonomy support and subjective norm contributed to the prediction of autonomous intention ($R = .71$, $F(3, 144) = 49.10$, $p < .05$), accounting for 51 per cent of the variance. Attitude ($t = 10.79$, $p < .05$) and perceived autonomy support ($t = 1.99$, $p < .05$) made a significant contribution, but not subjective norm ($t = –.81$, $p > .05$). The multiple correlation did not significantly improve when perceived behavioural control ($t = .51$, $p > .05$) was included in step 2, $R = .71$, $F(4, 143) = 36.70$, $p > .05$.

Predicting controlling intention After the first step, the multiple correlation was significant ($R = .34$, $F(3, 146) = 6.15$, $p < .05$). Subjective norm ($t = 3.66$, $p < .05$) made a significant contribution to the prediction of controlling intention, accounting for 11 per cent of the variance. Attitude ($t = 1.37$, $p > .05$) and perceived autonomy support ($t = .44$, $p > .05$) did not. The inclusion of perceived behavioural control ($t = .01$, $p > .05$) in the second step did not significantly increase the prediction of controlling intention, $R = .34$, $F(4, 145) = 4.58$, $p > .05$.

Predicting core autonomous intention After step 1 the multiple correlation was significant, $R = .41$, $F(3, 145) = 9.83$, $p < .05$. Attitude ($t = 3.84$, $p < .05$) and perceived autonomy support ($t = 2.49$, $p < .05$) made a significant contribution to the prediction of core autonomous intention, accounting for 17 per cent of the variance. Subjective norm ($t = –.03$, $p > .05$) did not. With perceived behavioural control ($t = 1.97$, $p < .05$) entered in step 2, the prediction of core autonomous intention significantly increased by 2 per cent, $R = .44$, $F(4, 144) = 8.49$, $p < .05$.

Predicting behaviour

Hierarchical regression analysis was conducted to test the utility of the four measures of intention and perceived behavioural control to

Table 2. Final statistics for hierarchical regression of intention measures

	B	β	*R*	R^2
TPB intention				
Attitude	.74	.48*		
Subjective norm	–.06	.05		
Perceived autonomy support	.21	.12		
Perceived behavioural control	.30	.23*	.63	.40
Autonomous intention				
Attitude	.72	.66*		
Subjective norm	–.04	–.05		
Perceived autonomy support	.15	.12*		
Perceived behavioural control	.03	.03	.71	.51
Controlling intention				
Attitude	.12	.11		
Subjective norm	.24	.29*		
Perceived autonomy support	.04	.04		
Perceived behavioural control	.00	.00	.34	.11
Core autonomous intention				
Attitude	.40	.27*		
Subjective norm	–.01	–.01		
Perceived autonomy support	.31	.20*		
Perceived behavioural control	.17	.15*	.44	.19

*$p < .05$

predict behaviour after five weeks. Using TPB as a guide, TPB intention was entered on the first step and perceived behavioural control on the second. On the third, autonomous and controlling intentions were entered, followed by core autonomous intention on the fourth step.

The unstandardized regression coefficients (B), standardized regression coefficients (β), R and R^2, for the final step of the regression can be viewed in Table 3. At the end of step 1, TPB intention ($t = 11.17$, $p < .05$) made a significant contribution to the prediction of behaviour accounting for 46 per cent of the variance, $R = .68$, $F(1, 145) = 124.79$, $p < .05$. With perceived behavioural control ($t = 1.90$, $p > .05$) added in the second step the multiple correlation did not significantly improve, $R = .69$, $F(2, 144) = 65.32$, $p > .05$. The inclusion of autonomous ($t = 1.07$, $p > .05$) and controlling intentions ($t = .94$, $p > .05$) in the third step did not significantly improve the multiple correlation, $R = .70$, $F(4, 142) = 33.25$, $p > .05$. When core autonomous intention ($t = –.40$, $p > .05$) entered in the fourth step the multiple correlation did not significantly improve, $R = .70$, $F(5, 141) = 26.47$, $p > .05$.

Discussion

This study examined the utility of TPB in predicting exercise behaviour at a level deemed sufficient to confer health benefits, and determined if the addition of other motivational constructs could add to this prediction. It also explored the contribution of attitude, subjective norm, perceived behavioural control and perceived autonomy support in the formation of autonomous, controlling and core autonomous intentions.

Predicting intentions

Consistent with previous research, attitude and perceived behavioural control significantly predicted TPB intention, while subjective norm did not (Biddle, Goudas, & Page, 1994; Brickell & Pretty; 2001; Terry & O'Leary, 1995). Similar findings were reported for autonomous and core autonomous intention.

As anticipated, subjective norm significantly predicted controlling intention, while perceived autonomy support predicted autonomous and core autonomous intentions. This supports the

Table 3. Final statistics for hierarchical regression of exercise behaviour

	B	β	*R*	R^2
TPB intention	.41	.57*		
Perceived behavioural control	.12	.13*		
Autonomous intention	.11	.10		
Controlling intention	.07	.06		
Core autonomous intention	–.03	–.03	.70	.47

*$p < .05$

notion that subjective norm reflects the controlling dimension of social support and perceived autonomy support the autonomous dimension.

Why attitude did not predict controlling intention might be explained by applying concepts from the theory of trying (Bagozzi & Kimmel, 1995). Bagozzi and Kimmel argue that success and failure attitudes involve evaluative responses conditioned from success or failure at a task. Process attitudes involve evaluative responses conditioned from deliberations over the way behaviour is to be performed. Because controlling intentions are directed towards achieving specific outcomes, success and failure attitudes are more likely to affect the attitude–intention relationship for controlling intentions. However, autonomous intentions are aimed at skill mastery and competence, and therefore process attitudes are more likely to influence the attitude–intention relationship for autonomous and core autonomous intentions. It may have been the case that participants' attitudes were conditioned more from process cues than success and failure cues, and thus predicted autonomous and core autonomous intentions, but not controlling intentions.

The finding that perceived behavioural control predicted variance in core autonomous intention, might be explained on the basis of assumptions underlying self-determination theory. The nature of autonomous intention indicates there is choice and freedom in the way a person intends to exercise. Therefore, when barriers such as time, money or fatigue stand in the way of behaviour, perceived control is less likely to be affected. In contrast, controlling intentions are not aimed at satisfying needs for self-determination, and therefore by their very nature do not allow for volitional control or freedom over behaviour. Accordingly, perceived behavioural control did not significantly predict controlling intention (Chatzisarantis & Biddle, 1998).

It therefore appears that attitude and perceived behavioural control are more akin to autonomous regulation, a finding that is consistent with previous research (Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002b; Sheeran, Norman, & Orbell, 1999). Interestingly, perceived behavioural control did not significantly predict autonomous intention. This was most likely a reflection of several problems associated with the measure (i.e. not comprised of distinct indicators of intrinsic motivation or designed to account for less conscious processing), and these will be discussed in greater detail in a later section.

Predicting behaviour

Consistent with previous literature, TPB intention predicted behaviour (Bozionelos & Bennett, 1999; Brickell & Pretty, 2001; Chatzisarantis & Biddle, 1998; McAuley & Courneya, 1993). However, the finding that independent of TPB intention, perceived behavioural control did not emerge as a significant predictor of behaviour, is in contrast with the majority of previous research (Kerner & Grossman, 1998; Kimiecik, 1992; Norman & Smith, 1995; Terry & O'Leary, 1995). There are several explanations for why perceived behavioural control did not predict behaviour. Ajzen and Madden (1986) proposed that perceived behavioural control predicts behaviour in situations where behaviour is not under complete volitional control, and when the measure of control is representative of the degree of actual control the person has over behaviour (i.e. must be reasonably realistic). Thus, participants may have felt they had complete control over their behaviour. This

assumption was supported by a relatively high mean score for perceived behavioural control, suggesting that participants perceived exercise as being under volitional control. They may also have felt there was insufficient information available to permit accurate perceptions of behavioural control five weeks into the future, causing problems predicting whether future barriers (i.e. university commitments) would hinder the potential for set intentions to translate into behaviour in five weeks time.

As anticipated, controlling intention did not add to the prediction of behaviour. Contrary to expectations autonomous and core autonomous intentions did not contribute to the prediction of behaviour. A possibility for why autonomous and core autonomous intentions did not predict behaviour could stem from limitations with the measures of autonomous and core autonomous intentions. With regard to autonomous intention, it was suggested that the measure may be flawed and produce biased responding. Results from the correlation analysis (see Table 1) revealed that Pearson's correlations between autonomous intention and TPB intention, and autonomous intention and attitude were relatively high, indicating there were similarities in items used to measure autonomous intention, and attitude and TPB intention. Therefore, when autonomous intention was used in conjunction with other measures, the predictions were effectively low.

Core autonomous intention was designed to overcome these problems, yet it did not predict behaviour. It is proposed that the non-significant findings stem from a faulty design. First, the measure did not request participants to make a decision about whether they intended to continue or not after having achieved their goals. It simply presumed they would continue, and therefore may be irrelevant for people who do not intend to continue. Second, there may be completely different reasons for why people continue to exercise once goals are partialed out, other than the choices provided in the measure (i.e. energy, vitality, completeness and fulfilment). Therefore, the measure may have failed to capture the full range of reasons people continue to exercise after goal achievement has been achieved. It may be wise for future research to request participants to report their tendency to continue on intention scales, and if they do intend to continue, ask them to generate reasons for this intention in an open-ended format, and then rate these in terms of importance.

There may also have been limitations with the behavioural measure, thus affecting the prediction of behaviour. Previous research has suggested that sport and exercise may have different motivational underpinnings and should be measured separately (Ajzen & Driver, 1991; Frederick & Ryan, 1995). In the present study, sport and exercise were assessed together with a single item and this may have resulted in a confound between the different types of underlying motivation. Future research may wish to employ a behavioural measure that separately assesses sport and exercise participation.

In summary, this study demonstrated that TPB is a fairly useful model for predicting exercise behaviour, and that the addition of other variables did not augment TPB's prediction. Nevertheless, some useful information was obtained when exploring the formation of core autonomous and controlling intentions. For example, perceived autonomy support contributed to the formation of core autonomous intention, while subjective norm contributed to the formation of controlling intention. This suggests that autonomous support from significant others is more likely to lead to the development of autonomous intentions, which in theory promotes intrinsically motivated behaviour that is more stable, effortful and enjoyable than TPB or controlling intention. On the other hand, controlling forms of social influence support the development of controlling intentions, which are assumed to promote extrinsically motivated behaviour that is less stable, effortful and enjoyable than autonomous or TPB intentions. It is therefore too early to discredit the usefulness of SDT in predicting exercise, and if future research considers the limitations put forward for the measures of exercise behaviour and core autonomous intention, the findings may be more positive.

This study found some interesting results that could impact upon the strategies used to motivate people to exercise and play sport at a level deemed sufficient to confer health benefits. For example, by assessing attitude and perceived behavioural control, an indication of where

intention formation is problematic could be obtained. Also, an assessment of intention prior to programme commencement could indicate when intent is low. Health-care professionals could then express concern about low motivation, and assist in cognitive restructuring of intention, attitude and perceived control. Also, by promoting positive attitude, perceived control and intention formation for a sufficient level of exercise, it may assist those who do not meet recommended health standards to increase their level of physical activity to a sufficient level to confer health benefits.

Note

1. A principal components factor analysis (both oblique and varimax) was performed to determine if the different measures of intention were empirically distinct. It was found TPB and controlling intentions differentiated well, but some of the core autonomous intention items did not differentiate from the autonomous intention items. A second PCA was performed retaining the items that differentiated. Four clear factors were determined. However, the correlation between core autonomous intentions and autonomous intentions was larger than with all items ($r = .786$). A regression analysis predicting behaviour was performed with measures containing new items that differentiated well, and similar results were found. Because the majority of items differentiated fairly well; the regression findings with items that differentiated well did not largely differ from the regression with all items; and the correlation between autonomous and core autonomous intentions was greater with measures containing items that differentiated well, the regression analyses performed with all items were retained.

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