

The Influence of Perceived Loci of Control and Causality in the Theory of Planned Behavior in a Leisure-Time Exercise Context

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The contribution that generalized locus of control and perceived locus of causality made to adolescents' intentions to participate in leisure-time physical activity was examined. A mediational model included constructs from three theoretical approaches: locus of control, self-determination theory (SDT), and the theory of planned behavior. A structural equation model revealed that the effects of generalized locus of control on attitudes, subjective norms, and intentions to participate in physical activity were mediated by intrinsic motives from SDT. Findings provide evidence in support of a motivational sequence in which locus of control influences situation-specific attitudes, subjective norms, and intentions mediated by the context-specific motives from SDT.

A key aim in the behavioral sciences is to understand the mechanisms behind individuals' motivation to participate in health behaviors (Godin & Kok, 1996). This goal is important in a physical activity context in light of research supporting the physiological and psychological benefits of regular exercise in adults (Williams, 2001) and young people (Gutin & Owens, 1996; Sallis & Patrick, 1994). As a result, social psychologists have applied theoretical approaches to the study of people's motivation to participate in physical activity (Brawley, 1993). Their focus has been on the identification of the key psychological antecedents of physical activity behavior so that their findings can be used as a basis for effective campaigns and strategies to promote a more active lifestyle.

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The Theory of Planned Behavior and Locus of Control

The locus of control constructs (Lefcourt, 1991; Wallston, Wallston, & DeVellis, 1978) and the theory of planned behavior (TPB; Ajzen, 1985, 1991) are two key theoretical models adopted from social psychology that have assisted in identifying the salient psychological predictors of physical activity behavior. Wallston et al.'s (1978) multidimensional health locus of control (MHLC), which was developed from Rotter's (1966) original conceptualization of locus of control, hypothesizes that generalized, dispositional expectancies of the source of control over health outcomes are at the center of behavioral persistence. Wallston et al. (1978) identified three sources of control orientations: internal, powerful others, and chance. An internal locus refers to an individual's judgments regarding personal control over his or her health, whereas a powerful others locus reflects judgments that the control over health is determined by significant and authoritative others, such as health professionals. A chance locus refers to the expectation that health is under the influence of unknown sources such as chance or fate. Scales determining these three sources of control have had a modest impact on health behavior but, typically, much variance in health behavior remains unexplained by the MHLC scales (Norman, Bennett, Smith, & Murphy, 1998). Critics of the MHLC scales have claimed that the low levels of prediction may be due to the generalized nature of the constructs (Ajzen, 2002).

A different approach to explaining health behaviors in specific situations is provided by the TPB (Ajzen, 1985). The focus of the theory is to identify the deliberative social-cognitive constructs that account for behavioral engagement. The TPB proposes that an individual's overtly stated intention is the most proximal predictor of behavioral engagement. Intention is, therefore, considered a person's statement of a plan to act and is motivational in nature. Intention is proposed to mediate the impact of three belief-based components on behavioral engagement. These three components are attitudes, subjective norms, and perceived behavioral control. Attitudes are an individual's summary of personal beliefs that a behavior will result in beneficial and desirable outcomes. Subjective norms are proposed to reflect the perceived beliefs of significant others regarding the individual's behavioral engagement. Perceived behavioral control comprises beliefs that the target behavior is easy to enact and is not subject to difficulties in terms of ability and barriers to behavioral engagement. The TPB has successfully explained the immediate, situation-specific influences on volitional behaviors (Armitage & Conner, 2001), especially in research on physical activity behavior (Hagger, Chatzisarantis, & Biddle, 2002b; Hausenblas, Carron, & Mack, 1997).

Despite the success of the TPB, it is not without its critics. Research has shown that the impact of the theory constructs is substantially reduced with the inclusion of past behavior in the model (Bagozzi, 1981; Bagozzi & Kimmel, 1995; Norman & Conner, 1996). These findings suggest that the theory is incomplete, and several

authors have recommended that additional variables be included in the theory to further explain behavioral consistency (for review, see Conner & Armitage, 1998). In addition, researchers have suggested that the constraints imposed by the boundary condition of correspondence limit the long-range predictive validity of the model (Chatzisarantis & Biddle, 1998; Hagger, Chatzisarantis, Biddle, & Orbell, 2001). Indeed, it has been argued that the restrictions placed on the TPB constructs—like intention, which must be stated in terms of action, target, behavioral context, and time frame—make the theory less effective in predicting behaviors that fall outside these specific guidelines (Chatzisarantis, Biddle, & Meek, 1997). As a consequence, the TPB provides a static view of the motivational processes underlying volitional behaviors because of the situation-specific nature of its components. However, Ajzen (1991) has stated that the theory should be viewed as a flexible framework for the study of volitional behaviors and that it is open to the inclusion of other constructs, provided that they make a meaningful addition to the explanation of the TPB variables.

In addition, attitude researchers have suggested that the strict correspondence conditions stipulated by decision-making theories such as the TPB not only limit their practical value, as outlined earlier in the discussion of long-range prediction, but also hinder progress in the understanding of attitude-behavior relations (Greenwald, Pratkanis, Lieppe, & Baumgardner, 1986). Greenwald et al. suggest that researchers tend to adopt corresponding measures in attitude research as a matter of course, without recognizing that the use of such measures introduces bias toward the relationships under scrutiny. Furthermore, such measures limit the generalizability of the relationships, given that their close correspondence makes the findings applicable only to specific behavioral and temporal contexts (Chatzisarantis et al., 1997). Adopting measures that do not conform to correspondence rules may permit researchers to establish the antecedents of attitudes and behavior that are not subject to the confirmation bias introduced in corresponding measures, and it may enable more far-reaching and generalizable predictions to be made on the basis of the findings.²

Recent research has attempted to address these limitations by including variables that may assist in augmenting the prediction of the TPB constructs using more generalized motivation-related constructs that violate the conditions of correspondence normally required in attitude-behavior theories. The purpose of such endeavors is to establish whether these generalized sets of constructs, which do not adhere to the boundary condition of correspondence, underpin the situation-specific motivational processes explained by the TPB. This would permit researchers to make more wide-reaching recommendations regarding the applicability of the research. For example, Conner and Abraham (2001) demonstrated

²We would like to thank an anonymous reviewer for suggesting this argument.

that personality variables and, in particular, conscientiousness were able to account for unique variance in attitudes and intentions. These findings lend support to the notion that situation-specific decision-making variables in the TPB mediate the impact of dispositional, trait-like constructs on intentions and behavior. Thus, a motivational sequence can be proposed such that individuals draw upon dispositional information when making decisions to enact a health behavior like physical activity. Such a sequence implies that the TPB mediates the impact of generalized, dispositional variables on intentions and behavior, a notion that is in keeping with the original formulation of the theory (Ajzen, 1985).

In the same vein, researchers have incorporated the locus of control constructs in social cognitive models like the TPB to provide a more comprehensive model of the psychosocial predictors of health behavior. Kristiansen and Eiser (1986) demonstrated that the MHLC constructs accounted for additional variance in behavioral intentions for alcohol use, exercise, and tooth-brushing, although the TPB variables themselves had a much greater impact. Similarly, Hamid and Cheng (1995) found that a general locus of control measure predicted intentions to engage in proenvironmental behaviors. Armitage, Norman, and Conner (2002) tested a mediation model in which the impact that generalized expectancies regarding control over health had on health intentions and behavior was mediated by the situation-specific, decision-making constructs from the TPB. Results indicated that the effects of MHLC on health behavior intentions were attenuated by the TPB variables. These results suggest that locus of control constructs make a unique, albeit small, contribution to behavioral intentions and provide support for the mediation hypothesis.

The Theory of Planned Behavior and Self-Determination Theory

Researchers have also focused on other motivational constructs from other theories of motivation, like self-determination theory (SDT; Deci, 1992; Deci & Ryan, 1985, 2000), to account for the origins of the situation-specific antecedents of health behaviors in the TPB (Chatzisarantis, Hagger, Biddle, Smith, & Wang, 2003; Sheeran, Norman, & Orbell, 1999). SDT posits that people have a need to be autonomous and that they seek out behaviors in which they will feel intrinsically motivated to satisfy this need (Deci & Ryan, 1987). The need for autonomy or self-determination is proposed to be global (Vallerand, 1997), stable (Guay, Mageau, & Vallerand, 2003), and universal across cultures (Chirkov & Ryan, 2001; Chirkov, Ryan, Kim, & Kaplan, 2003). The theory proposes that behavioral engagement can be characterized as being determined by four sources of perceived causation that form a perceived locus of causality (PLOC). Any health behavior can be perceived by an individual to have a locus of causality that lies at some point on a continuum ranging from intrinsic to external. At one extreme of the continuum lies intrinsic motivation, which is characterized as activities that

are spontaneously enacted out of enjoyment, interest, and free choice. Adjacent to intrinsic motivation and toward the intrinsic pole of the PLOC continuum lies the construct of identified regulation. A behavior can be termed *identified* if it is enacted because it gratifies a valued goal. Autonomous participation in leisure-time physical activity is often construed as being identified rather than intrinsically motivated because the activity may not be engaging like puzzles and games, but it may serve a value and satisfy needs for competence (Markland, 1999).

In contrast, external regulation and intrinsic motivation lie on opposite poles of PLOC. External regulation is experienced when a behavior is perceived to be performed because of external reinforcements such as rewards or punishment. In the absence of external reinforcement, the theory predicts that participation will cease. Leisure-time physical activity is unlikely to be characterized as being extrinsically motivated because such reinforcements are rare in such contexts, other than for sports teams. Rather, an external PLOC in a physical activity context is likely to arise from the activity being perceived as arising from personal pressure to engage in the behavior. This is known as an introjected locus of causality, and it lies adjacent to external regulation on the PLOC. Introjected experiences are often accompanied by feelings of guilt or shame resulting from a perception that the desires of significant others may be unfulfilled. Again, persistence may only continue if the perceived pressure is present. Since the experience is accompanied by negative emotions that do not fulfill the need for autonomy, the behavior is not undertaken spontaneously and is unlikely to be accommodated in a person's repertoire of need-satisfying behaviors (Deci, Eghrari, Patrick, & Leone, 1994).

Research in a physical activity context has supported the inclusion of PLOC constructs in the context of the TPB in order to identify the influence that motivation-related constructs from SDT have on decision-making prior to behavioral engagement. Chatzisarantis et al. (1997) demonstrated that autonomous intentions were able to extend the predictive validity of behavioral intentions. Moreover, a number of recent studies have provided further support for the influence of internal PLOC on intentions and behavior via the mediation of attitudes, perceived behavioral control, and intentions in a motivational sequence from generalized motives in the physical activity domain to the situation-specific decision-making variables of the TPB (Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002; Chatzisarantis, Hagger, Biddle, Smith, & Sage, in press; Hagger, Chatzisarantis, & Biddle, 2002a; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003; Standage, Duda, & Ntoumanis, 2003; Wilson & Rodgers, 2002, in press). This converging evidence suggests that the PLOC can provide a useful explanation of the relationships between the general motives from SDT and behavior observed across studies' physical activity context (Chatzisarantis et al., 2003). This is in accordance with Deci and Ryan's (1985) proposal that SDT can augment social cognitive theories to explain intention-behavior consistency. The

authors state that “cognitive theories begin their analysis with a cognitive representation of a future desired state (outcome). What is missing...is the consideration of the conditions of the organism that makes these states desired” (p. 228).

A Motivational Sequence

Given the relative success of the locus of control and PLOC constructs in augmenting the TPB and providing further explanation of the mechanisms behind intentional health behavior, the current study aims to examine the efficacy of a more complete theoretical model by incorporating both of these approaches. It is proposed that individuals will draw from both dispositional and contextual information when making situational judgments regarding intentions to participate in physical activity. Vallerand and Ratelle (2002) proposes a hierarchical model of motivation in which a top-down sequence exists for the impact of general motivational constructs on situational motives. In the hierarchy, global motivation-related constructs that are generalized, dispositional, and stable will influence context specific constructs that are relevant to a specific behavioral domain, such as physical activity. In turn, these contextual motivation-related constructs will influence motivation to participate in a given behavior in a given situation, such as physical activity toward a given target, in a specific context and at a given point in time as stipulated by the TPB. Given the support for general, dispositional constructs (Conner & Abraham, 2001; Guay et al., 2003) and context-specific constructs (Chatzisarantis & Biddle, 1998; Chatzisarantis et al., 1997, 2002; Hagger et al., 2002a, 2003; Standage et al., 2003) as predictors of situation-specific motivation-related constructs like intentions, the current study aimed to examine the influence of motivation-related constructs from the three levels of generality proposed by Vallerand and Ratelle (2002) on physical activity intentions. It is expected that generalized, dispositional control orientations derived from Rotter’s (1966) locus of control will influence situation-specific decision-making constructs related to physical activity intentions from the TPB (Ajzen, 1985) only via the mediation of context-specific motives from SDT (Deci & Ryan, 1985).

Specifically, it is hypothesized that an internal locus of control will positively influence intrinsic motives from the PLOC and negatively influence introjection and external regulation. Conversely, it is expected that external loci of control will predict external regulation from the PLOC and will negatively predict intrinsic motives. It is anticipated that these generalized control orientations will only affect the situation-specific variables from the TPB—namely, attitudes, subjective norms, and perceived behavioral control—by influencing context-specific motives from the PLOC, thereby forming a theoretically predictable motivational sequence in accordance with the hypotheses of Vallerand and Ratelle (2002) and Hagger et al. (2002a).

Method

Participants

The participants were pupils recruited from 10 schools in the East Midlands region of the United Kingdom. Consent was obtained from the schoolteachers and the parents of the participants prior to data collection. The sample comprised 1,198 adolescents; 579 were girls (M age = 13.45, SD = 0.78) and 619 were boys (M age = 13.47, SD = 0.82).

Measures

Locus of control. Perceptions of control from different sources in the physical domain were assessed by modified physical scales from Connell's (1985) multi-dimensional measure of children's perceptions of control, based on Rotter's (1966) and Lefcourt's (1976) conceptualization of locus of control. The measure assesses general perceptions of control in the physical domain that emanate from three sources: (a) internal—for example, "I can be good at sports and physical activities if I try hard enough," (b) powerful others—for example, "If I am successful at a sport or physical activity, it's because the other person played badly," and (c) unknown—for example, "When I am successful at a sport or physical activity, I don't know why." Four items are associated with each source and refer to generalized perceptions of control in the physical domain. The items were rated on 4-point scales ranging from 1 (*not true at all*) to 4 (*very true*). This measure has exhibited adequate construct validity and internal consistency in adolescents (Connell, 1985).

PLOC. The PLOC constructs were measured using an adapted version of the questionnaire developed by Ryan and Connell (1989) for adolescents in a classroom context. A common stem was presented at the beginning of the questionnaire that asked why the respondent participated in physical activities. The respondents were then required to rate several possible reasons that had been selected to represent the different styles of regulation or motivation. The PLOC measures: (a) intrinsic motivation—for example, "I do physical activities because I enjoy them," (b) identified regulation—for example, "I do physical activities because I value physical activity to keep me fit," (c) introjected regulation—for example, "I do physical activities because I will feel guilty if I do not," and (d) external regulation—for example, "I do physical activities because others say I should." These responses were measured on 7-point scales ranging from 1 (*not true at all*) to 7 (*very true*).

It is important to note that the locus of control and PLOC measures are generalized, domain-specific measures and, therefore, ask participants to rate their control orientation and motives toward leisure-time activities in the physical domain. In order to check that the participants had previous experience with

activities in this domain, which would mean that they could give meaningful responses to the items, we included a measure of past physical activity behavior. The measure of past behavior asked, "How many times per week have you normally participated in physical activities in the last 6 months?" Responses were evaluated on a 6-point Likert-type scale ranging from 1 (*none*) to 6 (*more than four times per week*). An analysis of the response frequencies indicated that only eight participants reported doing no physical activities in the previous 6 months. These participants were eliminated from subsequent analyses, which reduced the sample size to 1,190 (574 girls, M age = 13.45, SD = 0.78; and 616 boys, M age = 13.47, SD = 0.82).

TPB variables. Measures of intentions, attitudes, subjective norm, and perceived behavioral control from the TPB were developed according to published guidelines (Ajzen, 2003). Intentions to participate in physical activity were measured by four items (e.g., "I intend to do physical activities that make my heart beat faster at least three times during my spare time in the next week") using a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Attitudes were assessed by responses to the statement, "My doing physical activities that make my heart beat faster at least three times during my spare time in the next week is...." Responses were made on 7-point bipolar adjective scales with the following endpoints: *good–bad*, *interesting–boring*, and *pleasant–unpleasant*. Subjective norm was assessed by a single item: "Most people important to me want me to participate in physical activities that make my heart beat faster at least three times during my spare time in the next week." The response scale for this item was a 7-point Likert-type ranging from 1 (*unlikely*) to 7 (*likely*). Perceived behavioral control was assessed by three items (e.g., "How much control do you have over doing physical activities that make your heart beat faster at least three times during your spare time in the next week?") measured on 7-point Likert-type scales. These measures have been shown to satisfy multiple criteria for construct validity and internal reliability (Hagger, Chatzisarantis, & Biddle, 2001; Hagger et al., 2002a; Hagger, Chatzisarantis, Biddle, & Orbell, 2001).

Procedure

In a cross-sectional design, questionnaires containing all of the study measures were administered to the participants in quiet classroom conditions. Prior to administration and at frequent intervals during administration, the participants were reminded that the target behavior was leisure-time physical activities and not activity in school-time physical education. Physical activities were defined as vigorous pastimes that "make your heart beat faster" or "make you out of breath" for at least 20 min at a time.

Results

Confirmatory Factor Analysis

The a priori factor structure of the constructs from the current study was tested using confirmatory factor analysis (CFA) with a maximum likelihood method (Bentler, 1989). Ten latent constructs were formed for the internal locus of control, powerful others locus of control, unknown locus of control, intrinsic motivation, identified regulation, introjected regulation, external regulation, intention, attitude, and perceived behavioral control constructs. Each latent variable was set a priori to explain the covariances between the items pertaining to each scale.³ One item loading for each factor was arbitrarily set to unity to ensure that the model was properly identified. In addition, the nonlatent, observed measure of subjective norm was also included in the model. All model variables were set to correlate with each other, as is typical in CFA models (Bentler, 1989). Model goodness-of-fit was assessed using the comparative fit index (CFI; Bentler, 1990), the non-normed fit index (NNFI; Bentler, 1990), the standardized root mean square of the model residuals (SRMSR), and the root mean square error of approximation (RMSEA). The fit indexes should exceed .90 for adequate model fit, although values approaching .95 are recommended. Values of .08 and .05 for the SRMSR and RMSEA are also indicative of good model fit (Hu & Bentler, 1999).

The initial 10-factor model did not adequately describe the observed covariance matrix (Table 1, Model 1). Examination of the parameter estimates revealed that two factor loadings were below the recommended minimum of .40 (Ford, MacCallum, & Tait, 1986) for two factors: Internal Locus of Control and Introjected Regulation. This suggested that these factors were largely defined from the remaining items, so the items with unsatisfactory loadings were subsequently dropped from the analysis. Furthermore, the Lagrange Multiplier test, which identifies paths that would result in a significant decrease in the model goodness-of-fit χ^2 value, suggested that five error covariance terms be added. The inclusion of such terms is a controversial practice, but within-construct correlated errors are considered acceptable because they are indicative of redundant content in the measurement of the constructs rather than of misspecifications in the hypothesized model (Byrne, 1989). Therefore, these error covariances were included in the model. The revised model exhibited good fit with the data (Table 1, Model 2), with strong and significant factor loadings.

The correlation between the intrinsic motivation and identified regulation factors was very high ($\phi = .90, p < .01$). Given that previous research has found that these two constructs are typically highly correlated and difficult to differentiate

³Full covariance and zero-order correlation matrices for all of the individual items included in the scales for the current study are available upon request from the first author.

Table 1
Goodness-of-Fit Statistics for Confirmatory Factor Analytic and Structural Equation Models

Model	SB- χ^2	df	CFI	NNFI	RMSEA	SRMSR
Model 1: 10-factor CFA	3,115.636**	648	.855	.836	.057	.076
Model 2: 10-factor CFA, dropping parameters <.40	1,186.584**	500	.955	.946	.034	.053
Model 3: 9-factor CFA, amalgamated intrinsic motives factor	1,311.547**	511	.947	.938	.036	.055
Model 4: Full SEM including TPB augmented to include locus of control and PLOC	1,498.485**	516	.935	.925	.040	.066

Note. CFA = confirmatory factor analytic model; SEM = structural equation model; TPB = theory of planned behavior; PLOC = perceived locus of causality; SB- χ^2 = Satorra-Bentler scaled goodness-of-fit chi-square statistic; df = degrees of freedom for chi-square statistic; CFI = comparative fit index; NNFI = non-normed fit index; RMSEA = root mean square error of approximation; SRMSR = standardized root mean square residual.

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

in factor analyses (Hagger et al., 2002a; Ryan & Connell, 1989), these factors were combined to form a single Intrinsic Motives factor. The final 9-factor CFA model exhibited satisfactory fit with the observed data (Table 1, Model 3).

Factor correlations between CFA constructs and composite reliability coefficients (Bagozzi & Yi, 1988) are shown in Table 2. All correlations are strong and significant, but they are also significantly less than unity, thereby supporting their discriminant validity. The latter finding is important, given that it is essential to establish that the constructs from the TPB, SDT, and locus of control can be distinguished empirically. Furthermore, the composite reliability coefficients for the latent factors were satisfactory. Together, these results support the construct validity, discriminant validity, and internal reliability of the variables used in the current study.

Structural Equation Model

A structural equation model was estimated to test the hypothesized relations among the locus of control, PLOC, and TPB constructs. Free unidirectional parameters were released from the three locus of control variables to the three PLOC constructs. Unidirectional parameter estimates from the locus of control and the PLOC constructs to the TPB constructs were also freed. Attitudes, subjective norms, and perceived behavioral control were also made to predict intentions in accordance with the TPB. The model exhibited satisfactory fit with the data (Table 1, Model 4), and the significant structural parameters are shown in Figure 1. Attitudes and subjective norms significantly predicted intentions as expected; however, contrary to the hypotheses, perceived behavioral control did not significantly predict intentions. There was no significant direct influence of locus of control on intention and the TPB variables. This means that the significant factor correlations between the locus of control variables and the attitude and intention constructs observed in Table 2 were completely mediated by the PLOC constructs, supporting the hypothesized motivational sequence. The effect of an internal locus of control on intentions was mediated predominantly by intrinsic motives from the PLOC and attitudes from the TPB, as hypothesized. Furthermore, consistent with the hypotheses, unknown locus of control, which is an external locus, negatively predicted intrinsic motivation. The effect of intrinsic motives from SDT on intentions was shared by a direct path and an indirect path via the mediation of attitudes. Overall, 57.4% of the variance in intentions was explained by the model constructs.

Discussion

The current study integrated three different theoretical approaches to the study of physical activity intentions in young people: locus of control, the TPB, and PLOC. Based on previous research examining the effects of dispositional and contextual motivational variables on the situation-specific variables from the

Table 2
Factor Correlations and Composite Reliability Estimates for the Study Latent Factors

Factor	1	2	3	4	5	6	7	8	9	10
LOC-Internal	(.903)									
LOC-Powerful others	-.297**	(.877)								
LOC-Unknown	-.242**	.498**	(.875)							
TPB-Intention	.333**	-.274**	-.252**	(.702)						
TPB-Attitude	.379**	-.220**	-.245**	.715**	(.897)					
TPB-PBC	.022	-.070	-.013	.084*	.091*	(.753)				
TPB-Subjective norm (single item)	.220**	-.067	-.076	.366**	.332**	-.025	-			
PLOC-Intrinsic motives	.479**	-.256**	-.280**	.675**	.740**	.022	.345**	(.939)		
PLOC-Introjected regulation	.284**	-.124**	-.225**	.260**	.291**	-.010	.175**	.454**	(.900)	
PLOC-External regulation	-.087*	.249**	.175**	-.283**	-.270**	-.102**	-.025	-.278**	.138**	(.874)

Note. Composite reliability coefficients for the scales used are given on the principal diagonal in parentheses. LOC = locus of control; TPB = theory of planned behavior; PBC = perceived behavioral control; PLOC = perceived locus of causality.
 * $p < .05$. ** $p < .01$.

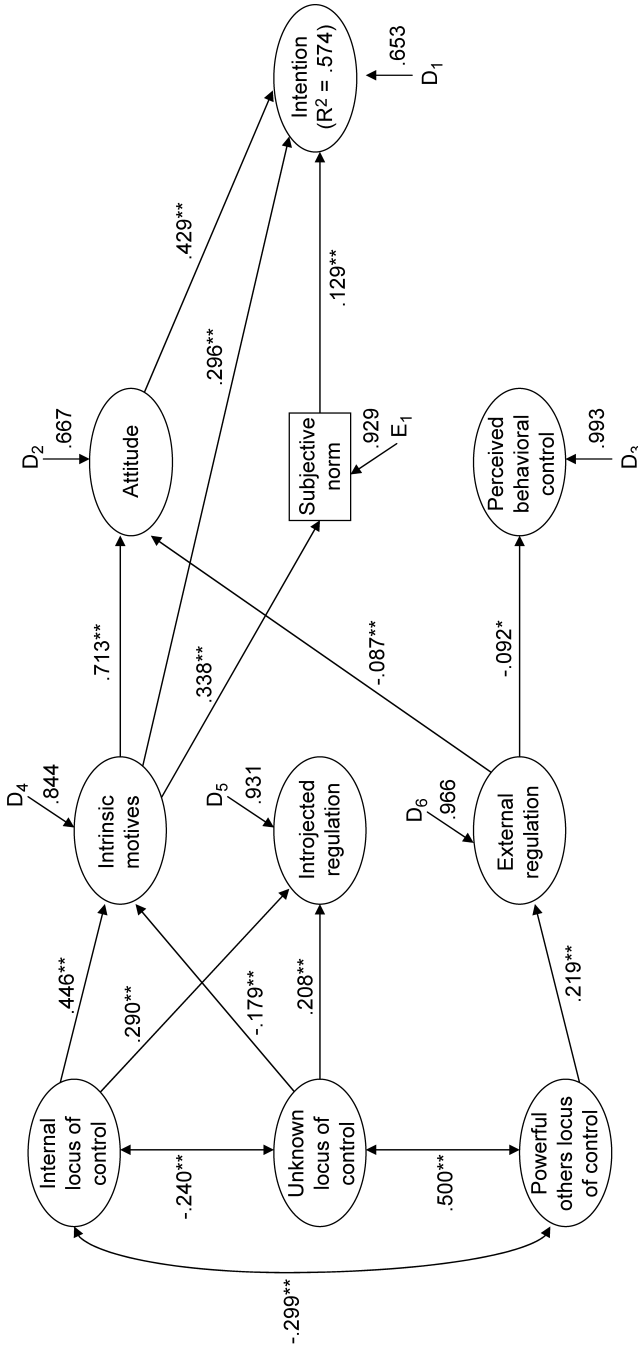


Figure 1. Structural equation model diagram of Model 4 showing the effect of the locus of control and perceived locus of causality constructs in an augmented version of the theory of planned behavior. Statistics given are standardized parameter estimates; nonsignificant parameter estimates omitted for clarity. * $p < .05$. ** $p < .01$.

TPB (Chatzisarantis et al., 2002, in press; Hagger et al., 2002a, 2003; Standage et al., 2003; Wilson & Rodgers, in press) and following Vallerand and Ratelle's (2002) hierarchical conceptualization of motivation, a motivational sequence was proposed. The sequence hypothesized that the generalized, dispositional locus of control constructs would affect the situational decision-making variables from the TPB via the mediation of context-specific variables from the PLOC. A structural equation model supported the proposed model, in which the impact of the locus of control constructs on attitudes and intention toward physical activity was mediated by the PLOC.

The current results indicate that a general tendency toward viewing control in physical situations as having emanated from internal sources provides information to assist in the estimation of intrinsic motives. Furthermore, these results serve to explain the reasons why internal dispositional control perceptions are linked to attitudes and intentions, in that young people are more likely to report intrinsic motives to participate in physical activity if they have a general tendency toward an internal locus of control in the physical domain. Together, these results integrate previous findings in behavioral research that have linked dispositional control-related constructs with attitudes and intentions (Armitage et al., 2002; Hamid & Cheng, 1995; Kristiansen & Eiser, 1986), as well as intrinsic motives from self-determination theory with attitudes and intentions (Chatzisarantis et al., 2002; Hagger et al., 2003). The order of prediction in the model is important since it supports the hypothesis of Vallerand and his colleagues (Guay et al., 2003; Vallerand & Ratelle, 2002) that relations between generalized and situation-specific motivation-related constructs are spurious and can only be explained by contextual-level motives.

One theoretical explanation for these findings is that perceptions of control are part of the formation of perceptions of the causality of events. Deci and Ryan (1985) suggest that control experiences are a necessary part of a competence system that is integral to an internal locus of causality. Since control perceptions form part of the process of forming intentions, it is not surprising that an internal locus of causality is able to account for the motivational impact of the internal locus of control construct. According to SDT and the motivational sequence proposed in this and other studies (e.g., Chatzisarantis et al., 2002; Hagger et al., 2003), locus of control only provides a partial account of control-related constructs on motivated behavior. Including the PLOC provides a more complete account of contextual influences on situation-specific motivation-related variables. Future research may adopt a more differentiated PLOC that reflects both global and situation-specific psychological needs (Vallerand & Ratelle, 2002).

A similar, albeit less influential, process is mapped by the mediation of the unknown locus of control-intention relationship in intrinsic motives and subjective norms. It seems that the variance shared by the unknown locus of control variable and intention is also shared by intrinsic regulation and subjective norms. This is

contrary to traditional conceptualizations of subjective norms as social pressures to engage in physical activity behavior. Instead, it seems that subjective norms are important in translating an external locus of control into intentions. Furthermore, it appears that intrinsic motives are integral to this process, which is indicative of this process being one that is intrinsically motivated and motivationally adaptive.

The indirect influence of the loci of control constructs on physical activity attitudes and intentions mediated by intrinsic motives is not only in keeping with the proposed motivational sequence, but also with the TPB. Ajzen (1985) proposes that attitudes, subjective norms, and perceived behavioral control will mediate the impact of other constructs on intentions because such variables are likely to be tied in with the belief systems that underlie these constructs. This is not surprising given that attitudes are a summary of a person's evaluation of the effectiveness of the target behavior in producing desirable outcomes. The mediation relationship, therefore, represents the translation of perceptions of control and intrinsic motives into plans to act in accordance with their effect on attitudes. The TPB constructs serve to explain how dispositional and contextual variables are translated into action, whereas the dispositional and contextual constructs in the current model explain the origins of the TPB constructs. The set of mediated relationships, therefore, serve to augment rather than confute the TPB.

Notwithstanding the attitude and subjective norm mediated route, intrinsic motives also had a direct influence on intentions. According to Ajzen (1985), a deliberative theory of volitional behavior like the TPB should be able to account for all aspects of motivation. That is, the antecedent variables of intention should account for variables such as intrinsic motives from SDT. Given that the effects of intrinsic motives are only partially mediated by the antecedents of intention, there are some aspects of intrinsic motives that are not accounted for by Ajzen's conceptualization of volition. Deci and Ryan (1985) view intrinsic motives as representing generalized, prototypical behavioral tendencies that emanate from an autonomous sense of self. Consequently, these results imply that Ajzen's view of the deliberative processes that occur prior to volitional action has only limited explanatory value. The current results suggest that plans to act are a function of traditional belief-based volitional components, as well as motivational orientations that arise from other sources, such as psychological needs (Deci & Ryan, 2000; Sheldon, Elliot, Kim, & Kasser, 2001) and locus of control (Armitage et al., 2002). It is also important to note that such motivational variables violate the TPB principle of correspondence. This provides evidence to support the hypothesis that the inclusion of constructs such as intrinsic motives, which do not adhere to the correspondence rule, can increase the predictive validity of the TPB.

An interesting finding in the current study was the nonsignificant influence of perceived behavioral control on physical activity intentions. This finding is contrary to the majority, but not all, of the findings from the TPB in an exercise context (e.g., Hagger, Chatzisaratis, Biddle, & Orbell, 2001). A recent meta-analysis

noted that the perceived behavioral control-intention relationship was likely to be significant, but it could not rule out the hypothesis that the relationship was zero (Hagger et al., 2002b). Ajzen's (1985) original conceptualization of the theory proposed that the relative impact of the theory variables is likely to vary across samples and contexts, and it appears that this was the case in the current study. It may be that the relatively narrow conceptualization of perceived behavioral control in the current study was responsible for the lack of prediction since it neglected other control-related aspects like self-efficacy (Armitage & Conner, 1999).

In conclusion, the current study provided unique evidence that dispositional locus of control influences attitudes and intentions in a motivational sequence mediated by intrinsic motivation from the PLOC. Overall, attitudes and intrinsic motives had the most pervasive direct effects on intentions, and internal locus of control and intrinsic motives had the strongest indirect effects on intentions via the mediation of attitudes. In practice, this means that the promotion of physical activity in the short term should focus on attitudinal interventions. However, changing the overarching motives from SDT may have as much success and may provide more stable behavioral changes if the motives are assumed to be more enduring than the situation-specific constructs from the TPB. Future studies should examine the proposed motivational sequence longitudinally, given the limitations of the cross-sectional design adopted in the current study. Such prospective studies should examine these effects with respect to actual behavior and should seek to establish the covariance stability and stationarity of the hypothesized relationships among the loci of control and causality, as well as TPB constructs. In addition, prospective designs that include actual behavior would enable researchers to examine whether direct effects of intrinsic motives on behavior, which are unmediated by intentions, exist. This would test the hypothesis that motivational orientations may bypass deliberative phases of action and tap a more impulsive processing of information that results in spontaneous behavioral engagement (Strack & Deutsch, in press).

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