

# The Processes by Which Perceived Autonomy Support in Physical Education Promotes Leisure-Time Physical Activity Intentions and Behavior: A Trans-Contextual Model

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The trans-contextual model proposes that young people's perceived autonomy support in physical education will affect their perceived locus of causality, intentions, and physical activity behavior in leisure time. High school students completed measures of perceived autonomy support and perceived locus of causality in physical education. One week later, participants' perceived locus of causality and constructs from the theory of planned behavior were assessed in leisure time. Leisure-time physical activity behavior was measured 5 weeks later. Perceived autonomy support in physical education affected leisure-time physical activity directly and indirectly through a motivational sequence involving internal perceived locus of causality, attitudes, perceived behavioral control, and intentions. Results support the trans-contextual model indicating that perceived autonomy support in an educational context influences motivation in a leisure-time context.

One of the primary aims for physical education is to provide young people with the necessary skills, knowledge, and competence to choose and participate in health-related physical activity in their leisure time (National Standards for Physical Education, 1996; Ntoumanis, 2001; Pate et al., 1995). Physical education stands in an advantageous position for promoting the benefits of extramural physical activity as it addresses young, diverse, and captive audiences (Fox & Biddle, 1988; National Standards for Physical Education, 1995). Importantly, it is through physical education that young people experience a variety of physical activities, and it is these experiences that may determine involvement in leisure time (Pate et al., 1995). Nevertheless, there is relatively little research outlining how physical education teachers or physical education programs can effectively orient young people toward regular leisure-time physical activity outside of school.

In the present study, we propose and evaluate a theory of social cognition, known as the *trans-contextual model*, to explain the psychological processes by which young people transfer motivation during physical education into physical activity behavior during leisure time. The trans-contextual model uses a unique

multitheory approach, adopting constructs from two social-cognitive models of motivation—self-determination theory (Deci & Ryan, 1985, 1995, 2000) and the theory of planned behavior (Ajzen, 1985, 1988, 1991). The model will contribute to present knowledge by establishing how perceived autonomy in physical education is translated into leisure-time physical activity intentions and behavior. In terms of implications for physical education practice, the model will provide evidence that autonomy-supportive physical education teachers are those who are more likely to foster intrinsic motivation and behavioral continuity in their students in extramural contexts.

## Perceived Locus of Causality

Self-determination theory is a key explanatory system for the understanding of the motivation behind volitional behaviors (Deci & Ryan, 1985). The theory posits that humans are active in their pursuit of behaviors and activities, which will result in positive growth and a unified, coherent sense of self (Deci & Ryan, 1985, 1995). The process that leads to these perceptions of self-worth is the integration of intrinsically motivated or autonomous behaviors (Deci, Eghrari, Patrick, & Leone, 1994; Ryan & Connell, 1989). If, however, motivation toward behaviors is thwarted by overcontrolling and negative emotion-evoking forces such as extrinsic rewards (Deci, 1971) or negative feedback (Deci, 1980), then negative emotional states and low motivation or avoidance will be the outcome (Deci & Ryan, 2000; Ryan, 1995). In both laboratory (Grolnick & Ryan, 1987) and classroom (Deci, Schwartz, Sheinman, & Ryan, 1981) settings, for example, students are more motivated, interested, and actively involved when tasks are presented in an autonomy-supportive fashion.

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Self-determination theory posits that behaviors can be characterized by an individual as lying at some point on an intrinsic–external continuum. This continuum is known as the perceived locus of causality, and it reflects the relative degree of autonomy of the behavior perceived by the individual (Ryan & Connell, 1989). Behaviors that are engaged in spontaneously, for enjoyment and interest alone and with no external reinforcement or perceived contingency, are characterized as *intrinsically motivated*. Behaviors that are valued positively, but are not necessarily enjoyed, are characterized as being *identified*. These two types of regulation lie adjacent to each other at the *internal* end of the perceived locus of causality. Self-determination theory acknowledges that many of the mundane activities that people pursue are not intrinsically motivated (Deci & Flaste, 1995), nor are they characterized as having personal value, or an internal perceived locus of causality (Ryan & Connell, 1989). Rather, they are done because they are perceived as activities that should be done because of the perceived demands or expectations of external forces, known as *introjected regulation*, or because significant others are responsible for forcing the enactment of the behavior, termed *external regulation*. The latter two types of regulation lie at the external end of the perceived locus of causality (Ryan & Connell, 1989). Thus, four types of regulation make up the perceived locus of causality, and a person's perception of the relative degree of autonomy for any activity can be located on this continuum.

The motivational climates adopted by teachers can have a pervasive effect on the level of intrinsic motivation and identified regulation of students and hence promote more autonomous and persistent behavioral patterns (e.g., Ames & Archer, 1988; Dweck, 1992; Nicholls, 1984; Williams & Deci, 1996). This is particularly relevant to the promotion of health-related behaviors such as activity in physical education classes. If the environment is such that an internal perceived locus of causality can be fostered in a school context, then students are more likely to pursue those activities out of choice in their free time and in the absence of external persuasion from teachers.

### The Theory of Planned Behavior

The theory of planned behavior (Ajzen, 1985, 1988, 1991) has been used extensively to understand volitional and intentional behavior, and its value has been supported by a number of meta-analyses (e.g., Armitage & Conner, 2001; Hagger, Chatzisarantis, & Biddle, 2002a). According to the theory, people's overt statement of intention is the strongest predictor of behavior. Intention is proposed to summarize a person's general affective and cognitive orientation toward the behavior or attitude, the perceived pressure placed on them by significant others to participate in the target behavior or subjective norm, and their competence-related evaluation of their faculties and capacities toward the behavior or perceived behavioral control. The impact of these three key constructs on behavior is proposed to be completely mediated by intention, with the exception of perceived behavioral control that is envisaged to have a direct effect on behavior to reflect the actual constraints on behavior. The attitude, subjective norms, and perceived behavioral control constructs reflect underlying sets of beliefs that people hold toward their performance of the target behavior. Although the theory has performed well in explaining variance in intention and behavior across studies (Armitage &

Conner, 2001), it does not provide a complete account. This may be due to the omission of other, unmeasured factors (Albarraacín & Wyer, 2000; Bagozzi & Kimmel, 1995) and could be addressed by incorporating constructs from other theories such as self-determination theory (Sheeran, Norman, & Orbell, 1999).

### Integrating the Theories

The integration of self-determination theory and the theory of planned behavior provides a complementary explanation of the unexplained processes within each theory. The inclusion of self-determination theory constructs has assisted researchers in explaining the quality of the relationships in the theory of planned behavior (Chatzisarantis & Biddle, 1998; Chatzisarantis, Biddle, & Meek, 1997; Sheeran et al., 1999) and the antecedents of the theory of planned behavior variables (Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002; Hagger, Chatzisarantis, & Biddle, 2002b). Furthermore, the theory of planned behavior provides a basis for the translation of general motives from the perceived locus of causality into intentional action (Chatzisarantis et al., 2002; Hagger et al., 2002b). In this way, the theory of planned behavior complements the perceived locus of causality by explaining how people convert their generalized motives into specific actions. Although previous research has established links between self-determination theory and the theory of planned behavior within a given context (Chatzisarantis et al., 2002; Hagger et al., 2002b), little research has been conducted to evaluate the impact of perceived autonomy support on perceived locus of causality, and no study has examined such a relationship across different contexts. We aim to address these gaps in education research by introducing the trans-contextual model.

From its outset, research on intrinsic motivation and self-determination theory has demonstrated the importance of context in influencing perceived locus of causality (Deci, 1980; Deci & Ryan, 1985). Self-regulated persistence in behavior can be enhanced by an environment that supports intrinsic motivation or an internal perceived locus of causality (Deci & Ryan, 2000). Following this, the hypothesized links among perceived autonomy support, motivation, and behavior have been supported empirically (e.g., Lepper & Greene, 1975; Lepper, Greene, & Nisbett, 1973). Vallerand (1997) proposed a motivational sequence in which perceived autonomy support affects the perceived locus of causality, which in turn influences motivation and behavior. Following this, school students' perception of the motivational climate in physical education as being autonomy supportive is hypothesized ( $H_1$ ) to enhance their internal perceived locus of causality (see Figure 1).

Vallerand and coworkers (Vallerand, 1997, 2000; Vallerand & Ratelle, 2002) have suggested a hierarchical model that illustrates the processes by which contextual factors affect the perceived locus of causality. An important tenet of this model is that cross-contextual interplay occurs, such that intrinsic motivation in one context, like school physical education, can affect intrinsic motivation in another, such as leisure time. Thus, promotion or support of behaviors, such as physical activities, in an educational context can lead to participation in related activities in a different context. Alternatively, if the educational context is not autonomy supportive, such as when performance-related or controlling feedback is given, and intrinsic motivation is thwarted, compensatory behaviors can result (Vallerand, 2000). It is therefore hypothesized ( $H_2$ )

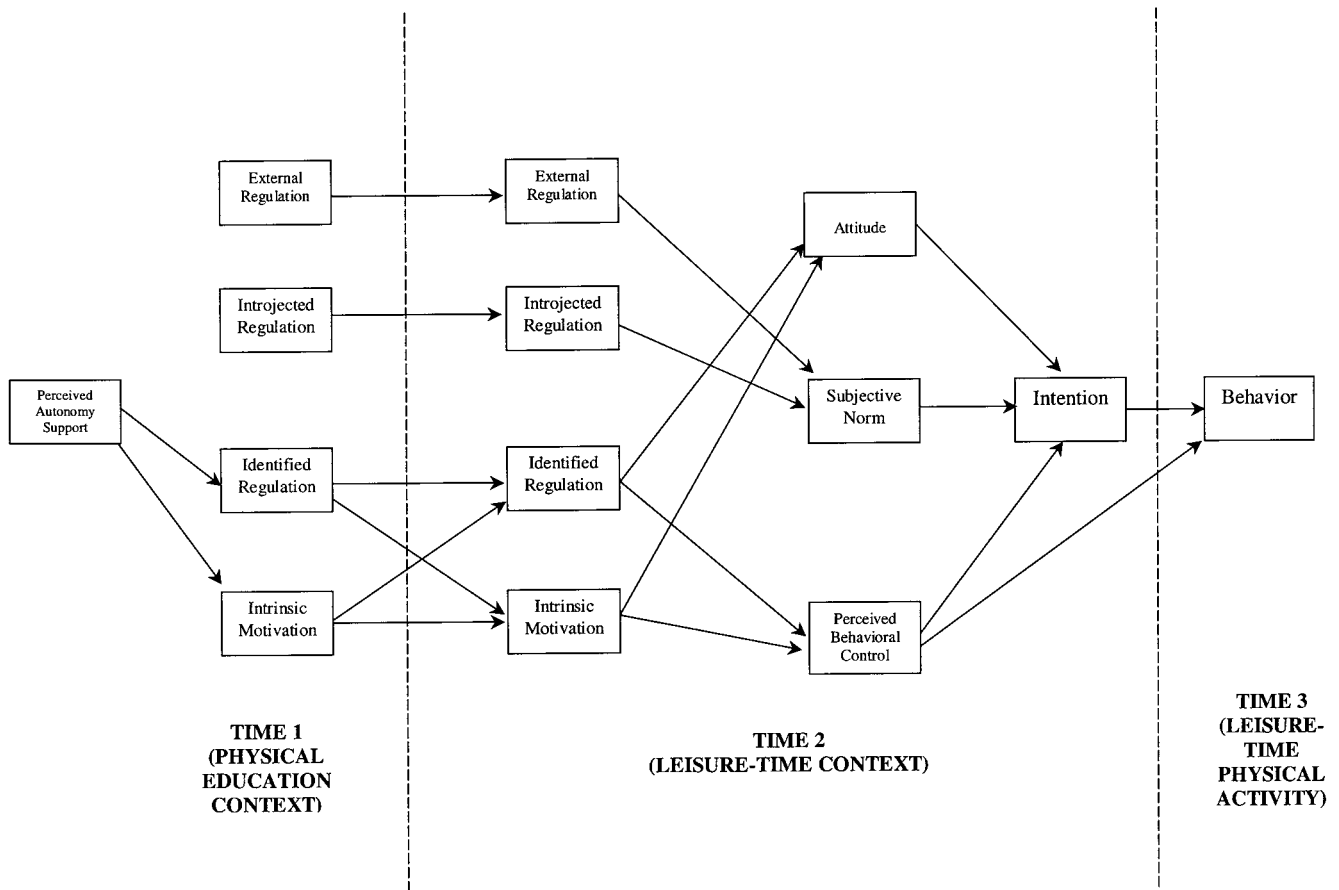


Figure 1. The hypothesized trans-contextual model.

that both internal and external perceived loci of causality in a physical education context will influence internal and external perceived loci of causality respectively in a leisure-time context (see Figure 1). Specifically, it is expected that the perceived locus of causality constructs will exhibit significant within-construct, trans-contextual regressions from the physical education context to the leisure-time context. In addition, the proximity of intrinsic motivation and identified regulation to the perceived locus of causality usually gives rise to strong correlations between these constructs (Ryan & Connell, 1989). Indeed, intrinsic motives in one context may give rise to identified motives in another context or the relationship may be reciprocal, thus cross-lagged relationships between intrinsic motivation and identified regulation were hypothesized ( $H_3$ ). Because the perceived locus of causality is reported to translate social factors into contextual motivation, it is also expected that the perceived locus of causality in a physical education context will completely mediate the effect of perceived autonomy support in a physical education context on the perceived locus of causality in a leisure-time context ( $H_4$ ).

In congruence with Vallerand's (1997) predictions and with the findings of recent studies examining the impact of the perceived locus of causality on intentions and behavior within the theory of planned behavior (e.g., Chatzisarantis et al., 2002; Hagger et al., 2002b), it is hypothesized that the perceived locus of causality in

a leisure-time context will influence physical activity intentions and behavior only via the mediation of the belief-based constructs of attitude, subjective norms, and perceived behavioral control. Specifically, it is anticipated that intrinsic motivation and identified regulation will significantly and positively influence attitudes and perceived behavioral control, and attitudes and perceived behavioral control will completely mediate the relationships between intrinsic motivation and identified regulation on intentions to participate in leisure-time physical activity ( $H_5$ ). This is because an intrinsic perceived locus of causality is presumed to act as a source of information in the formation of attitudes and perceived behavioral control (Chatzisarantis et al., 2002).

Further, because subjective norms typically reflect social pressure from significant others to engage in the target behavior, a significant and positive effect of external and introjected regulations on subjective norms was expected and for subjective norms to mediate the impact of external and introjected regulations on intentions ( $H_6$ ). Again, information derived from the external motives on the perceived locus of causality serve as precursors to the formation of situation-specific, social-cognitive constructs like subjective norms. The final link in this proposed sequence is the hypothesis ( $H_7$ ) that intentions mediate the impact of attitudes, subjective norms, and perceived behavioral control on physical activity behavior, as originally proposed in the theory of planned

behavior (Ajzen, 1985). The one exception is the proposed direct effect of perceived behavioral control on physical activity behavior in addition to the indirect effect mediated by intentions (Ajzen & Madden, 1986). Overall, therefore, the effects of the perceived locus of causality in a leisure-time context on behavior is expected to be indirect mediated by the set of belief-based constructs of attitudes, subjective norms, perceived behavioral control, and intentions. The one exception is the effect of an internal perceived locus of causality in a leisure-time context on behavior that is mediated by perceived behavioral control alone ( $H_8$ ). These hypotheses are summarized in Figure 1.

Given that the impact of perceived autonomy support in physical education on participation in leisure-time physical activity is proposed to be completely mediated by the motivational sequence specified by the trans-contextual model, the direct effect of perceived autonomy support on physical activity behavior is proposed to be zero ( $H_9$ ). An alternative hypothesis is that the effects of perceived autonomy support in physical education may have both direct and indirect effects on physical activity behavior in a leisure-time context. In such cases, perceived autonomy support is unlikely to act as an impetus for the spontaneous engagement in leisure-time physical activity behavior; rather, unmeasured constructs related to motivation are likely to be responsible for such a relationship.

Finally, recent reviews of the impact of past behavior in the theory of planned behavior have emphasized that past behavior–future behavior links reflect the covariance stability of the behavior (Ajzen, 2002). However, to the extent that the past behavior–future behavior relationship is attenuated by the introduction of explanatory social–cognitive variables, one can be confident that these variables account for such stability (Ajzen, 2002; Bagozzi, 1981; Bagozzi & Kimmel, 1995; Bentler & Speckart, 1981). Although past leisure-time physical activity behavior may have an impact on future leisure-time physical activity behavior, variables from the trans-contextual model might partially explain the stability of the past behavior–future behavior relationship ( $H_{10}$ ).

## Method

### Research Participants and Design

Participants were 295 students (boys = 132, girls = 163, range = 13–16 years, mean age = 14.5 years,  $SD = 1.35$ ) studying in three state high schools. The school principals granted initial consent for data to be collected in their schools. The students were recruited at the schools' convenience from lessons where there was no specific syllabus content to be fulfilled, namely, the period before classes when students spend a few minutes with their homeroom teacher and study periods. Three classes in either the 8th, 9th, or 10th grades, numbering approximately 100 students from each school, were visited. Consent from the parents was also obtained from a letter sent home, with students outlining the study prior to data collection. A preprinted form was provided for parents to complete, sign, and return to the students' home-room teacher if they did not want their child to participate in the study. No forms were returned. Students were informed that they would be asked to complete a series of short questionnaires over the coming weeks as part of a survey on young people.

A prospective design was used, with psychological variables being assessed at three points in time. In the first wave of data collection, perceived autonomy support in physical education and the perceived locus of causality in a physical education context were assessed using self-report questionnaires. In the second wave of data collection, which took place

after 1 week, components of the theory of planned behavior (Ajzen & Madden, 1986), perceived locus of causality in a leisure-time physical activity context (Mullan, Markland, & Ingledeu, 1997), and frequency of physical activity in the past 6 months (Bagozzi & Kimmel, 1995) were measured. A 1-week delay was used to avoid presenting similar measures in succession and to prevent contamination of the data by the introduction of common method variance. After 5 weeks, participation in physical activities was assessed (Godin & Shephard, 1985). A 5-week interest period was used to correspond with previous meta-analytic studies of the theory of planned behavior that have classified proximal measurement of intentions and behavior as 4 weeks or less and distal measures as greater than 4 weeks (Hagger et al., 2002a). The greater the time period, the more confident the researcher can be of the robustness of the long-range effects under scrutiny. Two researchers conducted the data collection in quiet classroom conditions. Children were separated such that they could not copy or discuss responses. All of the questionnaires were completed anonymously to preserve confidentiality. Prospective responses were matched with baseline responses by using birth date and gender.

### Measure

*The theory of planned behavior.* Development of a theory of planned behavior questionnaire followed the procedures recommended by Ajzen and Madden (1986) and Courneya and McAuley (1994). Three items drawn from Courneya and McAuley (1994) and Ajzen and Madden (1986) were used to measure behavioral intentions. One item was rated on a 7-point dichotomous-graded scale (e.g., "I intend to do active sports and/or vigorous physical activities"), anchored by 7 (*strongly agree*) to 1 (*strongly disagree*). One item was measured on a 7-point continuous-closed scale (e.g., "I intend to do active sports and/or vigorous physical activities with the following regularity"), ranging from 1 (*not at all*) to 7 (*every day*). One item was rated on a continuous-open scale (e.g., "I intend to do active sports and/or vigorous physical activities for at least 30 minutes, \_\_\_ times per week over the next 5 weeks"). The internal reliability (Cronbach's  $\alpha$ ) for this scale was .90.

Attitudes were assessed in response to the following question: "Participating in active sports and/or vigorous physical activities during my leisure-time in the next 5 weeks is . . ." Responses were measured on four bipolar adjectives. One adjective reflected moral evaluations (*bad–good*), two adjectives reflected instrumental evaluations (*useful–useless, harmful–beneficial*), and another adjective reflected affective evaluation (*unenjoyable–enjoyable*). All adjectives were rated on 7-point semantic differential scales and achieved satisfactory internal reliability ( $\alpha = .87$ ). Subjective norms (injunctive norms) were measured through two items and on a 7-point scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). An example was "People important to me encourage me to do active sports and/or vigorous physical activities during my leisure time." The alpha reliability of this scale was less than satisfactory ( $\alpha = .41$ ). Such measures of subjective norms have typically been criticized in meta-analytic reviews for their poor reliability and lack of prediction (Conner & Armitage, 1998) and must be recognized as a limitation of research using these standard measures.

Perceived behavioral control was assessed through three items and on 7-point scales. One example of an item statement is "I feel in complete control over whether I do active sports and/or vigorous physical activities in my leisure-time," which was measured on a 7-point scale ranging from 1 (*no control*) to 7 (*complete control*). Another example was "If I wanted to I could do active sports and/or vigorous physical activities in my leisure-time in the next 5 weeks," which was measured on 7-point scale ranging from 1 (*definitely true*) to 7 (*definitely false*). The internal consistency (Cronbach's  $\alpha$ ) for this scale was .79.

*Perceived locus of causality in physical education and leisure-time contexts.* The perceived locus of causality assesses domain-specific individual differences in the types of motivation or regulation. The perceived locus of causality in a physical education context (Ryan & Connell, 1989)

is slightly different from the perceived locus of causality in a leisure-time physical activity context (Mullan et al., 1997). The perceived locus of causality measures initially presented participants with a common stem. The common stem for the perceived locus of causality in a physical education context was "Why do you participate in physical education?" and the stem for the perceived locus of causality in a leisure-time physical activity context was "Why do you participate in active sports and/or vigorous physical activities in your spare time?" The respondents were then required to rate several possible reasons selected to represent the different styles of regulation or motivation. The perceived locus of causality in a physical education context measured each motivational style through eight items; two items for each of the four perceived loci of causality constructs. The motivational styles were external regulation (e.g., "Because I want the teacher to think that I am a good student"), introjected regulation (e.g., "Because I will feel bad about myself if I do not"), identified regulation (e.g., "Because physical education is important to me"), and intrinsic motivation (e.g., "Because I enjoy physical education") and were measured on 4-point scales, ranging from 1 (*very true*) to 4 (*not true at all*). The internal reliabilities (Cronbach's  $\alpha$ ) for these scales were .72, .66, .68, and .87, respectively. The perceived locus of causality in a leisure-time physical activity context contains multiple items for each of the four perceived loci of causality constructs. External regulation (e.g., "I exercise because others say I should") was assessed using four items ( $\alpha = .80$ ), introjected regulation (e.g., "I exercise because I will feel guilty if I do not") was assessed through three items ( $\alpha = .75$ ), and identified regulation (e.g., "I exercise because it is important to make the effort") and intrinsic motivation (e.g., "I exercise because it is fun") were assessed using four items each ( $\alpha = .78$  and  $.85$ , respectively). Responses to each item were measured on 7-point scales, ranging from 1 (*not true at all*) to 7 (*very true*).

*Perceived autonomy support in physical education.* According to Deci and Ryan (1987), perceived autonomy support is the degree to which people perceive others in positions of authority to be autonomy supportive. In the present study, the authoritative others were the students' physical education teachers. A modified version of the Sport Climate Questionnaire was used to measure perceived autonomy support during physical education (Baard, Deci, & Ryan, 2000). The wording of the Sport Climate Questionnaire was changed slightly to specify physical education. Perceived autonomy support was measured through six items, for example, "I feel that my physical education teacher provides me with choices and options" and "I feel that my physical education teacher accepts me." Responses to the items were recorded on 7-point scales, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The internal reliability (Cronbach's  $\alpha$ ) for this scale was .93.

*Self-reported physical activity behavior and past behavior.* Past behavior was assessed at the second wave of data collection through one item and on a 6-point scale, ranging from 1 (*not at all*) to 6 (*most of the days per week*; Bagozzi & Kimmel, 1995). Research participants were asked to report how often they had been doing active sports and/or vigorous physical activities during the last 6 months.

Physical activity behavior was assessed at the third wave of data collection through an adaptation of Godin and Shepherd's (1985) Leisure-Time Exercise Questionnaire. This asked how many times the individual engaged in vigorous exercise for at least 30 min per occasion in the past 5 weeks. In keeping with definitions of leisure-time activities (Godin, Jobin, & Bouillon, 1986), the questionnaire did not include physical activity that was performed during normal school time because physical education is compulsory.

Specifically, participants were requested to consider an average week (7 days) and to report how many times per week they engaged in vigorous physical activity the last 5 weeks. Participants reported how often they participated in physical activity after they had been presented with the definition of vigorous physical activity. Vigorous physical activity included all active sports training, practices, and competition, but not pool,

darts, or similar sedentary sports. It also included physical activities that were active, like continuous swimming, cycling, aerobics, and running, but not casual street play or walking to school. Participants' responses were recorded on one item using a 9-point scale ranging from 0 to 8. Independent evaluations of the Leisure-Time Exercise Questionnaire have found it to be valid, reliable, easy to administer, and that it displayed concurrent validity with objective activity and fitness indexes (Jacobs, Ainsworth, Hartman, & Leon, 1993). Further, previous research using the theory of planned behavior has predicted physical activity behavior as measured by the Leisure-Time Exercise Questionnaire (e.g., Courneya & Hellsten, 1998).

### Data Analyses

First, a maximum likelihood confirmatory factor analysis was used to ascertain discriminant validity between measures of the perceived locus of causality in a physical education context and perceived locus of causality in a leisure-time physical activity context, and between attitudes and intrinsic motivation (Bentler, 1995). Second, responses to items measuring the same construct were averaged for use in the correlation and path analyses. A robust maximum likelihood method was used to estimate parameters of path models (Satorra & Bentler, 1988). The EQS (Version 5.7; Bentler, 1995) statistical software was used to conduct the confirmatory factor analyses and path analyses.

## Results

### Preliminary Analysis

Measures of the perceived locus of causality in physical education and leisure-time physical activity contexts may lack discriminant validity given that the content of the indicators of these constructs is similar. Likewise, intrinsic motivation and attitudes may lack discriminant validity because of similarities in the content of items used to measure these constructs. Therefore, it was important to examine the discriminant validity of the measures of the perceived locus of causality in both contexts and attitudes before proceeding with the main analyses. The present study used confirmatory factor analyses to examine the discriminant validity between measures (Mulaik & Millsap, 2000). In confirmatory factor analysis, models are specified and evaluated on the basis of differences between empirical and model-implied covariance matrices. Adequacy of models was assessed using fit indexes that examine the extent to which the model-implied covariance matrix can reproduce the empirical covariance matrix satisfactorily. The comparative fit index (CFI) and the standardized root-mean-square residual (SRMSR) were used to evaluate the adequacy of models, because in simulation studies, these fit indexes are least influenced by sample size (Fan, Thompson, & Wang, 1999). A cut-off value close to .95 for CFI and a cut-off value close to .08 for the SRMSR were set as criteria of acceptable fit (Hu & Bentler, 1999). In addition, the present study ascertained discriminant validity by comparing models that assumed discriminant validity with congeneric models that assumed lack of discriminant validity. Akaike's Information Criterion (AIC) was used in facilitating model comparisons (Rigdon, 1999). AIC is generally used in many model selection contexts including confirmatory factor analysis and time series analysis (Marcoulides & Hershberger, 1997). AIC favors parsimonious models that best fit the observed data. There are no criterion values on the basis of which one can infer whether a model fits the data. Its function therefore is purely descriptive and

not inferential (Rigdon, 1999). Researchers compute this index for all models and choose the model that obtains the lowest value. Although AIC is influenced by sample size, it is attractive because it takes into account parsimony. Friedman's tests of ranked residuals was not utilized in facilitating model comparisons because this test does not take into account parsimony (Rigdon, 1999).

Discriminant validity was first examined through specification of a congeneric model (Model 1) in which indicators of the perceived locus of causality in a physical education context and in a leisure-time physical activity context loaded on the same factors. Thus, for example, Model 1 hypothesized that indicators of external regulation in a physical education context and indicators of external regulation in a leisure-time physical activity context loaded on the same factor. Overall, the congeneric model hypothesized that a four-factor model would explain relationships between indicators of the two measures of the perceived locus of causality (Mulaik & Millsap, 2000). In addition, Model 1 specified correlations between the latent factors but did not specify cross-loadings and correlations at the residual space of indicators. As shown in Table 1, the fit indexes indicated that parameters of Model 1 did not reproduce the observed covariance matrix adequately. In direct contrast, Model 2, which assumed that indicators of the perceived locus of causality scales in physical education and leisure-time contexts loaded on eight distinct factors, explained observations satisfactorily (see Table 1). Loadings of the indicators of both measures of the perceived locus of causality were significant and positive ( $p < .01$ ). In addition, the average magnitude of the standardized loadings for the factors was .63, which is well in excess of the widely accepted minimum of .40 (Ford, MacCallum, & Tait, 1986). The correlations corrected for attenuation between measures of the perceived locus of causality in physical education and leisure-time contexts were significantly positive (see Table 2), but the factors were unique from a statistical standpoint because the correlations plus twice each standard error summed to a value of less than 1 (Bagozzi & Kimmel, 1995).

Discriminant validity between the perceived locus of causality in a physical education context and attitudes was examined through the specification of a model (Model 3) in which indicators of the perceived locus of causality and attitudes loaded on five latent factors (Mulaik & Millsap, 2000). A four latent-factor model was specified in order to account for the unidimensional attitudes and for the four dimensions of the perceived locus of causality in

a physical education context. In addition, Model 3 specified correlations between the latent factors but did not specify cross-loadings and correlations at the residual space of indicators. As shown in Table 1, the fit indexes indicated that parameters of Model 3 reproduced the observed covariance matrix adequately. In contrast, a congeneric model (Model 4), which assumed intrinsic motivation and attitudes to load on the same factor, did not explain observations satisfactorily. The factor correlations between identified regulation and intrinsic motivation in a physical education context with attitudes were significantly positive, but the factors were unique from a statistical standpoint because the correlations plus twice each standard error summed to a value of less than 1 (Bagozzi & Kimmel, 1995).

Similarly, discriminant validity between the perceived locus of causality in a leisure-time physical activity context and attitudes was tested by specifying a model (Model 5) in which indicators of the perceived locus of causality and attitudes loaded on five latent factors (Mulaik & Millsap, 2000). A four latent-factor model was specified to account for the unidimensional structure of attitudes and for the four dimensions of perceived locus of causality in a leisure-time physical activity context. In Model 5, correlations between the latent factors were freely estimated, but cross-loadings and correlations among indicators were not. Fit indexes indicated that parameters of Model 4 reproduced the observed covariance matrix adequately. The congeneric model (Model 6), which assumed intrinsic motivation and attitudes to load on the same factor, did not account for the observations satisfactorily. The factor correlations between identified regulation and intrinsic motivation in a leisure-time context with attitudes were significantly positive, but the factors were unique insofar as the correlations were significantly different from unity (Bagozzi & Kimmel, 1995).

Table 2 presents correlation coefficients among all psychological measures. Correlations supported relationships between intrinsic motivation and identified regulation in a physical education context, with identified regulation and intrinsic motivation in a leisure-time context. In addition, external regulation and introjected regulation in a physical education context were significantly and positively correlated with external regulation and introjected regulation in a leisure-time context. Further, physical activity behavior was significantly and positively correlated with intentions, and intentions were significantly and positively correlated with attitudes and perceptions of control. Subjective norms

Table 1  
*Fit Indexes of Confirmatory Factor Analysis (CFI) and Path Analysis Models*

Model	$\chi^2$	<i>df</i>	CFI	SRMSR	AIC
1: PLOC in PE and LT are assumed to be congeneric	669.75	182	.683	.132	305.75
2: PLOC in PE and LT are assumed to be different	208.14	161	.984	.062	-111.85
3: PLOC in PE and attitudes load on different factors	125.56	55	.932	.083	19.56
4: PLOC in PE and attitudes assumed to be congeneric	390.40	59	.654	.149	274.40
5: PLOC in LT and attitudes load on different factors	204.85	125	.950	.055	-45.14
6: PLOC in LT and attitudes are assumed to be congeneric	347.69	129	.854	.069	89.69
7: A path model of the TCM	87.69	57	.978	.046	-26.30
8: A path model of the TCM without subjective norms	118.28	51	.949	.063	20.28

*Note.*  $N = 295$ . Model 7 assumes that the direct path from autonomy support to leisure-time physical activity behavior is zero. PLOC = perceived locus of causality; PE = physical education context; LT = leisure-time context; TCM = trans-contextual model; SRMSR = standardized root-mean-square residual; AIC = Akaike's Information Criterion.

Table 2  
Descriptive Statistics and Correlations Among Study Variables

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Intentions	4.66	1.67	—														
2. Attitudes	5.58	1.28	.538**	—													
3. Subjective norms	4.55	1.51	-.027	-.003	—												
4. Perceived control	5.32	1.17	.391**	.306**	-.093	—											
5. External regulation in PE	2.32	0.74	-.083	-.016	.043	-.086	—										
6. Introjected regulation in PE	2.36	0.73	-.006	.102	.014	-.108	.436**	—									
7. Identified regulation in PE	3.17	0.75	.240**	.243**	.004	.116*	.008	.161**	—								
8. Intrinsic motivation in PE	3.31	0.78	.263**	.281**	-.004	.058	-.042	.029	.647**	—							
9. External regulation in LT	2.43	1.34	.085	-.002	-.386**	-.025	.216**	.235**	.160**	.170**	—						
10. Introjected regulation in LT	3.27	1.36	.216**	.131*	-.295**	.015	.157**	.240**	.150**	.675**	.351**	—					
11. Identified regulation in LT	4.51	1.30	.475**	.519**	-.003	.254**	-.004	.099	.398**	.374**	.150**	.106	—				
12. Intrinsic motivation in LT	5.37	1.52	.393**	.489**	.006	.214**	.062	.062	.389**	.439**	-.040	.615**	.375**	—			
13. Perceived autonomy support in PE	4.58	1.02	.231**	.262**	.243**	.076	.022	.089	.384**	.334**	-.089	.010	.285**	.340**	—		
14. LT physical activity	3.84	1.27	.480**	.299**	.039	.194**	.053	.014	.222**	.222**	.035	.131*	.221**	.280**	.235**	—	
15. Past LT physical activity	3.68	1.36	.485**	.724**	.407**	.013	.263**	.011	.054	.251**	.277**	.139*	.221**	.367**	.334**	.229**	—

Note. Correlations in bold typeface have been corrected for attenuation. PE = physical education context; LT = leisure-time context.

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

were not significantly associated with intentions. The correlations between perceived autonomy support and the internal perceived locus of causality in a physical education context and in a leisure-time physical activity context were significant and positive. Finally, measures displayed satisfactory levels of internal consistency, with all Cronbach's  $\alpha$  coefficients greater than .65. An exception was subjective norms, which displayed low levels of reliability. For this reason, in the main analysis, two path models were estimated: one that included the construct of subjective norms and another model with this construct excluded.

Main Analysis

Path analysis using the averaged manifest scales for each construct was used to examine the processes by which perceived autonomy support and the perceived locus of causality in a physical education context influences physical activity participation. A hypothesized path model (Model 7) was specified in which perceived autonomy support in physical education predicted internal perceived locus of causality in a leisure-time physical activity context indirectly via internal perceived locus of causality in a physical education context (see Figure 1). In addition, the hypothesized model predicted that intrinsic motivation in a physical education context would predict attitudes and perceived control mediated by identified regulation and intrinsic motivation in a leisure-time context. Further, Model 7 hypothesized that identified regulation in a physical education context would predict attitudes and perceived control mediated by identified regulation and intrinsic motivation in a leisure-time context. What is more, consistent with the model tested by Hagger et al. (2002b), paths from intrinsic motivation and identified regulation to physical activity behavior mediated by attitudes and perceptions of control in a leisure-time context were specified. Model 7 also specified indirect paths from external regulation and introjected regulation in a leisure-time context to physical activity behavior mediated by subjective norms. Finally, we controlled for the effects that past behavior may have exerted on the relationships postulated by the trans-contextual model by specifying paths from past behavior to all variables. Thus, in the hypothesized model, past behavior was the exogenous variable, and variables specified by the trans-contextual model were treated as endogenous variables. The path coefficients between variables of the trans-contextual model were independent of the effects that past behavior exerted on the same variables. Examination of the fit indexes revealed that Model 7 reproduced the observed covariance matrix satisfactorily.

Model 7 revealed that perceived autonomy support in physical education predicted the internal perceived locus of causality (intrinsic motivation and identified regulation) in a physical education context, supporting the first hypothesis ( $H_1$ ). In accordance with the second hypothesis of the present study ( $H_2$ ), parameters of Model 7 indicate that the four types of regulation from the perceived locus of causality in a physical education context predicted the perceived locus of causality in a leisure-time physical activity context. Specifically, intrinsic motivation, identified regulation, introjected regulation, and external regulation all exhibited within-construct, trans-contextual regressions. In addition, intrinsic motivation in physical education predicted identified regulation in a leisure-time physical activity context. On the hypothesized cross-contextual reciprocal relationships between identified regulation

and intrinsic motivation, a significant impact of intrinsic motivation in physical education on identified regulation in a leisure-time context was found, but there was no reciprocity so  $H_3$  was partially supported. This indicates that intrinsic motivation in physical education can lead to motives to perform the behavior due to a personal value in another context. The anticipated mediation of the impact of perceived autonomy support in physical education on the perceived locus of causality in a leisure-time context by the perceived locus of causality in a physical education context was also confirmed ( $H_4$ ).

With respect to the perceived locus of causality in a leisure-time physical activity context, parameters of Model 7 indicated that intrinsic motivation exerted an indirect influence on intentions mediated by attitudes and perceived behavioral control, whereas identified regulation only predicted intentions indirectly, mediated by the mediation of attitudes and not perceived behavioral control, partially supporting the fifth hypothesis ( $H_5$ ). These findings support Chatzisarantis et al.'s (2002) and Hagger et al.'s (2002b) hypotheses, which state that intention-linked constructs representing more deliberative modes of information processing mediate the effects of an internal perceived locus of causality on leisure-time physical activity behavior. Further, although external regulation predicted subjective norms in accordance with the sixth hypothesis ( $H_6$ ), the indirect relationship between external regulation in a leisure-time context and intentions was not significant, thus  $H_6$  was only partially supported.

The original premise of the theory of planned behavior that intentions mediate the impact of attitudes, subjective norms, and perceived behavioral control on behavior was corroborated by the present findings ( $H_7$ ). The only exception was that the subjective norm construct did not predict behavior, directly or indirectly. The expected perceived behavioral control-mediated effect of the internal perceived locus of causality on physical activity intentions and behavior in a leisure-time context was not supported because perceived behavioral control did not directly affect physical activity behavior ( $H_8$ ). Overall, these results corroborate the view that the internal perceived locus of causality in a physical education context promotes motivation and physical activity behavior during leisure time.

Further, perceived autonomy support in physical education exhibited two types of effects with regard to leisure-time physical activity behavior. There was an indirect effect of perceived autonomy support on physical activity behavior mediated by a mediation model comprising the internal perceived locus of causality in a physical education context, the internal perceived locus of causality in a leisure-time context, attitudes-perceived behavioral control, and intentions. A direct effect also described the relationship between perceived autonomy support in physical education and physical activity behavior in a leisure-time context. A Lagrange Multiplier Test (Bentler 1995) identified this nonhypothesized path and showed that the fit of Model 7 would be significantly improved if the direct path from autonomy support to leisure physical activity was estimated,  $\chi^2(1, N = 295) = 23.987, p < .05$ . Considering this indirect effect, the ninth hypothesis ( $H_9$ ) must be rejected in favor of the alternative hypothesis in which both direct and indirect effects of perceived autonomy support on behavior are specified. Importantly, the total effect of perceived autonomy support in physical education on leisure-time physical activity intentions and behavior was significantly different from

zero (Table 3). In addition, the stability of the past behavior–future behavior relationships was significantly attenuated from  $r = .49$  (see Table 2) to  $\beta = .27$  (see Figure 2) by the motivational sequence offered by the trans-contextual model ( $H_{10}$ ). Finally, examination of a path model (Model 8) in which the construct of subjective norms was excluded revealed results similar to results from Model 7. Specifically, Model 8 displayed satisfactory levels of fit and path coefficients virtually identical to those exhibited by Model 7.

Discussion

The trans-contextual model presented in this study adopted hypotheses from self-determination theory and the theory of planned behavior to explain how young people's perceptions of an autonomy-supportive environment affected their motives in a physical education context and their physical activity motives, intentions, and behavior in a leisure-time physical activity context. This model aimed to make a unique contribution to the literature by specifying the mechanisms by which perceived autonomy support in one context is translated into motivation and behavior in another. Not surprisingly, perceived autonomy support in physical education directly influenced intrinsic and identified motives in a physical education context. In accordance with the hypotheses, the four types of regulation from the perceived locus of causality in a physical education context positively influenced the same regulatory types in the perceived locus of causality in a leisure-time physical activity context, with the strongest cross-contextual regression for intrinsic motivation. Intrinsic motivation in a physical education context also had an impact on identified regulation in a leisure-time context. Importantly, intrinsic motivation in a leisure-time physical activity context also positively influenced attitudes and perceived behavioral control, and identified regulation influenced attitudes. External regulation positively predicted subjective norms. In keeping with findings from previous research, attitudes and perceived behavioral control completely mediated the effect of intrinsic motivation and identified regulation on intention. There was a small direct impact of perceived autonomy support on leisure-time physical activity behavior and a significant total ef-

Table 3  
Total Effects of Behavioral Regulations, Past Behavior, and Autonomy Support on Intentions and Physical Activity

Independent variable	Intentions	Physical activity behavior
External regulation in PE	.00	.00
Introjected regulation in PE	.00	.00
Identified regulation in PE	.05	.01
Intrinsic motivation in PE	.12*	.02
External regulation in LT	.00	.00
Introjected regulation in LT	.00	.00
Identified regulation in LT	.24**	.05
Intrinsic motivation in LT	.08	.02
Perceived autonomy support	.08	.16**
Past behavior	.26**	.45**

Note. Coefficients reflect standardized parameter estimates for the total effect specified. Decomposition of effects into direct and indirect effects are given in Figure 2. PE = physical education context; LT = leisure-time context.  
\*  $p < .05$ . \*\*  $p < .01$ .



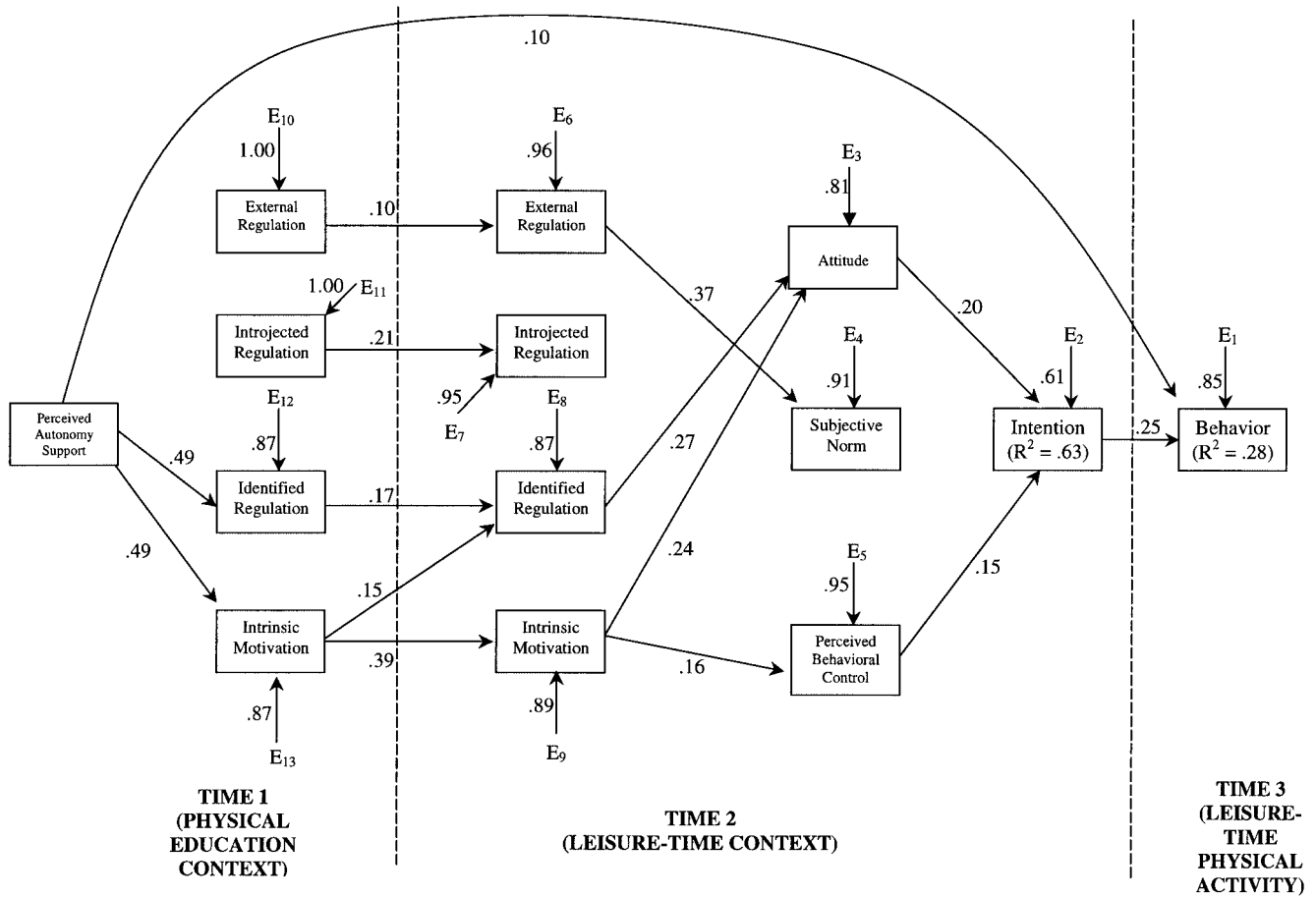


Figure 2. The trans-contextual model (including subjective norms). For clarity, only significant paths are presented, and the effects of past behavior on endogenous variables are not depicted. Past behavior exerted significant direct relationships with intentions (.56), attitudes (.23), perceived behavioral control (.21), identified regulation in a physical education context (.18), intrinsic motivation in a physical education context (.22), perceived autonomy support in a physical education context (.23), external regulation in a leisure-time physical activity context (.13), introjected regulation in a leisure-time context (.21), identified regulation in a leisure-time context (.26), intrinsic motivation in a leisure-time context (.21), and physical activity behavior (.27). In addition, the paths from identified regulation in a physical education context to intrinsic motivation in a leisure-time context, from introjected regulation in a leisure-time context to subjective norms, and from identified regulation in a leisure-time context to perceived behavioral control are zero and are not presented for simplicity. E<sub>1</sub>–E<sub>13</sub> = residual errors associated with each manifest variable.

fect. However, the majority of this influence was accounted for by the trans-contextual model. Finally, the strong relationship between past behavior and future behavior was completely explained by the trans-contextual model, and the only influences of past behavior in the model were additive.

The motivational sequence modeled by the trans-contextual model is responsible for the translation of autonomy support in physical education into motives, intentions, and action in a leisure-time physical activity context and supports the multitheory approach adopted by the present study. The approach corroborates and extends hypotheses relating to self-determination theory (Deci & Ryan, 1985), research on perceived autonomy support (Williams, Rodin, Ryan, Grolnick, & Deci, 1998), the hierarchical model suggested by Vallerand (1997, 2000, 2002), the theory of

planned behavior (Ajzen, 1985, 1991), and meta-theoretical approaches augmenting the theory of planned behavior with self-determination theory (Chatzisarantis & Biddle, 1998; Chatzisarantis et al., 1997, 2002; Hagger et al., 2002b). The first step in the proposed sequence begins with the significant relations between perceived autonomy support and an internal perceived locus of causality in a physical education context. This within-context influence of the environment fostered by educationalists is congruent with the results from other studies on autonomy support and intrinsic motives (Deci & Ryan, 1987).

In the next step in the sequence, the motivational styles from the perceived locus of causality in a physical education context affect the perceived locus of causality in a leisure-time context, as implied by Vallerand's (1997, 2000; Vallerand & Ratelle, 2002)

proposal in his hierarchical model of intrinsic and extrinsic motivation that cross-contextual interplay can occur between regulation types. Vallerand's (1997, 2000; Vallerand & Ratelle, 2002) focus, however, was to provide an explanation for the search for compensatory behaviors in alternative contexts. He proposed that the thwarting of needs in one context can, in turn, compel a person to satisfy his or her psychological needs elsewhere, such that intrinsic motivation in one context may negatively predict intrinsic motivation in another context. However, the opposite process has not been studied or developed. In the trans-contextual model presented here, it was hypothesized that the perceived locus of causality in one context has a pervasive effect on the perceived locus of causality in another, particularly for a context such as physical education that is closely related in terms of the set of behaviors and selected skills involved in the context of leisure-time physical activity. The within-construct cross-contextual relations found in the present study corroborate these hypotheses: An internal perceived locus of causality in a physical education context positively affects an internal perceived locus of causality in a context that has similar behavioral and motivational outcomes, namely, leisure-time physical activity. In fact, the internal perceived locus of causality in a physical education context completely mediated the impact of perceived autonomy support in physical education on the internal perceived locus of causality in a leisure-time context. Taken together, these two findings suggest that in the trans-contextual model, context-specific perceived locus of causality is a necessary process by which autonomy support is transferred to another related context. Therefore, the current process is not a compensatory one in which young people are compelled to make up their intrinsic motivation deficiencies in physical education in their leisure-time; rather, it is a positive transfer effect of the internal perceived locus of causality across contexts.

The perceived locus of causality in a leisure-time context then influences the social cognitions from the theory of planned behavior and form the next sequential step in the trans-contextual model. Specifically, it is the internal perceived locus of causality, intrinsic motivation, and identified regulation that have motivational significance in this step. These constructs predict the two constructs that have motivational and competence-related orientations, namely, attitudes and perceived behavioral control supporting the theory of Deci and Ryan (1985). Attitudes and perceived behavioral control have a strong influence on behavior, but only through the mediation of intentions, as originally proposed by Ajzen (1985). Finally, the mediation of the influence of the intrinsic perceived locus of causality in a leisure-time context on intentions by attitudes and perceived behavioral control support the findings of researchers that have used self-determination theory to explain the structural integrity of the enactment of intentions in the theory of planned behavior (Chatzisarantis & Biddle, 1998; Chatzisarantis et al., 1997; Hagger et al., 2002a). Thus, the significant total effect of intrinsic motivation in a physical education context on physical activity intentions can only be explained by the trans-contextual processes through the perceived locus of causality in a leisure-time context and the theory of planned behavior.

Although present findings did not find direct effects of the internal perceived locus of causality in the physical education or leisure-time contexts on leisure-time physical activity behavior, there was a direct effect from autonomy support in physical education to leisure-time physical activity. This effect was atten-

uated substantially by the motivational sequence stipulated by the trans-contextual model. However, the existence of a significant direct effect suggests that other unmeasured constructs may be responsible for explaining direct effects. Further, the inclusion of past behavior in the model did not account for this effect, suggesting that this influence is not due to behavioral consistency. To speculate, such processes may be due to effects on beliefs untapped by the trans-contextual model that affect behavior or may be due to aspects of trans-contextual regulation not tapped by the perceived locus of causality. Such regulation may be those linked with other psychological needs such as competence and relatedness (Deci & Ryan, 2000; Ryan, Stiller, & Lynch, 1994) or self-esteem (Sheldon, Elliot, Kim, & Kasser, 2001). These motivational processes were not tapped by the perceived locus of causality and constitute an inherent limitation of the trans-contextual model, which future research may wish to address. However, it is important to stress that processes related to competence may be accounted for by the theory of planned behavior in the perceived behavioral control construct (Chatzisarantis & Biddle, 1998). Therefore, it is also important to highlight the need for discriminant validity of measures of attitudes, perceived behavioral control, and competence before any modification of the trans-contextual model is attempted.

Finally, the inclusion of past leisure-time physical activity behavior in the trans-contextual model confirms that the trans-contextual model can account for the covariance stability of leisure-time physical activity behavior. Many researchers have included past behavior as a predictor of future behavior in models of social cognition (e.g., Bagozzi, 1981; Bagozzi & Kimmel, 1995; Bentler & Speckart, 1981). Ajzen (2002) points out that past behavior–future behavior relations in models of social cognition like the theory of planned behavior represent nothing more or less than the degree of stability that the behavior exhibits. Thus the extent to which a given social cognitive model can mediate this relationship indicates the predictive utility of the model to account for behavioral stability and address the why questions surrounding human behavior over time. The trans-contextual model exhibits utility as it mediates the past behavior–future behavior relationships for leisure-time physical activity. The remaining unique prediction of behavior from past behavior represents those aspects of behavioral stability for which the present model cannot account. More advanced models that include constructs untapped by the perceived locus of causality, such as relatedness, may provide an analog to the explanation of behavioral stability.

In conclusion, the present study provides support for a model specifying the trans-contextual effects of perceived autonomy support in physical education and perceived locus of causality in both physical education and leisure-time contexts on leisure-time physical activity intentions and behavior. The main findings indicate that perceived autonomy support predicts an internal perceived locus of causality in a physical education context, which affects leisure-time physical activity intentions and behavior by the mediation of the perceived locus of causality in a leisure-time context. This motivational sequence explains behavioral stability in leisure-time physical activity and contributes to the understanding of the translation of needs-related motives into motivated action. These results suggest that an important step in facilitating intrinsic motivation to participate in extramural physical activity may begin in schools. The onus is therefore on teachers to adopt an appropriate

motivational discourse (Lepper, Drake, & O'Donnell-Johnson, 1997) and provide appropriate task-related feedback (Ames, 1992) that may enhance intrinsic motives for learning (Meece, Blumenfeld, & Hoyle, 1988).

Future research could adopt this model to examine the proposed cross-contextual compensatory effects proposed by Vallerand (2000) in physical education. It could be argued that the lack of presentation of choice in a physical education context may compel the seeking of compensatory activities or substitute fulfillments in order to achieve "collateral satisfaction." Thus, if needs for self-determination are thwarted in physical education, perhaps because students are not able to choose activities that instill feelings of competence and enjoyment during physical education, then an adolescent may focus on deriving competence and pleasure from participating in alternative extramural physical activities that he or she has chosen. In this respect, an external perceived locus of causality in a physical education context and low autonomy support could predict an internal perceived locus of causality in a leisure-time context, but only in those whose needs are thwarted. Chatzisarantis et al. (1997) provided some empirical support to this hypothesis because their study showed that an external perceived locus of causality in schools was positively associated with physical activity intentions. This could be a useful avenue for further research and may provide an explanation for trans-contextual transference in the case of thwarted needs.

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Received October 8, 2002

Revision received March 12, 2003

Accepted March 14, 2003 ■