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PHYSICAL ACTIVITY

Testing an Integrated Model of Interest Theory and Self-Determination Theory in University Physical Activity Classes

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Abstract

Despite close links between the tenets of self-determination theory (SDT) and the concept of interest, few studies have closely investigated their integration in the area of physical Activity (PA). This study explored the nature of situational interest and need support. Surveys were administered at two data points (4-week window) to college students (n = 347) enrolled in PA classes. Confirmatory factor analysis results point to needs support as a separate factor associated with situational interest. Structural equation model analysis presented an acceptable fit, $\chi^2 = 195.825$ df = 83, $p < 0.05$, CFI = .953, TLI = .932, RMSEA = .063, SRMR = .049. Situational interest and need support are separate factors. Situational interest and optimal challenge have an inconsistent relationship with situational interest. Overall findings support the integration of interest theory and SDT, with clearer integration of personal interest into SDT compared to situational interest.

The importance in the relationship between motivational and physical activity (PA) outcomes has been widely documented in previous research (Gunnell et al., 2014; Standage et al., 2003). Self-determination theory (SDT; Deci, 1992; Deci & Ryan, 1985; Ryan &

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Deci, 2000) and interest theory (Krapp, 1999) represent important motivational theories that help explain and predict PA outcomes. Although Deci (1992) reported close links between the tenets of SDT and the concept of interest, few studies have closely investigated theoretical integration in the area of PA. In this study, we explore relationships between SDT and interest theory constructs advocated by Deci (1992) and Krapp (1999). Specifically, we explore the nature of situational interest and need support.

SDT proponents have posited that self-determined motivation is fostered by a social environment that supports a person's basic psychological needs of autonomy, competence, and relatedness (Jang et al., 2016). Autonomy focuses on behavioral engagement that is self-endorsed. Competence is defined as engaging effectively in one's environment. Relatedness focuses on securing meaningful and fulfilling relationships. The social environment plays a significant role in satisfying basic psychological needs. For example, in PA settings, teachers who can support students' autonomy (e.g., provide choices), competence (e.g., provide skill-related feedback), and relatedness (e.g., provide personal support) will likely satisfy students' basic psychological needs. In SDT, this is called needs support (Jang et al., 2016). There is minimal evidence at this point, however, about the relation between a needs-supportive environment in PA and interest-related constructs. Therefore, this study investigated an integrated model of interest theory and SDT in university PA classes.

Self-Determination Theory

According to SDT, there are different types of motivational orientations that operate on a continuum ranging from amotivation to autonomous motivation (Deci & Ryan, 1985; Ryan & Deci, 2000; Reeve et al., 2004). Amotivation is expressed through feelings of incompetence, lack value for a task, and negative experiences (Reeve et al., 2004). Students at this stage of motivation do not see any reason for engagement in PA (Standage et al., 2007). Amotivation represents a complete lack of motivation to act. Controlled motivations occur when students feel coerced or when they do not fully endorse engaging in tasks (Ryan & Deci, 2000). Amotivation is characterized with continued presence of external monitoring and rewards (Reeve et al., 2004). Students' motivation and subsequent engagement in PA is influenced by external rewards and/or avoidance of

external punishment (Standage et al., 2007). Students may also rely on internal contingencies of reward or punishment to control their behaviors (Reeve et al., 2004).

With autonomous motivation, behavioral engagement is coordinated and assimilated as part of a person's lifestyle and self-system (Ryan & Deci, 2000). The values attached to behavior are stable aspects of life and are part of a person's personal identity (Reeve et al., 2004). Similarly, autonomous motivation represents engagement in an activity for its own sake (Ryan & Deci, 2000). A major goal of SDT is to explain how students develop autonomous motivation (Ryan & Deci, 2002). In PA settings, students who are autonomously motivated are moved to act because of the fun or challenges encountered in the activity rather than external pressures or rewards (Ryan & Deci, 2000). Scientists agree that human beings are endowed with autonomous motivation tendencies, but maintenance and enhancement of autonomous motivation requires supportive social environments (Deci, 1992). Finally, autonomous motivation is considered a healthy and adaptive form of motivation, whereas controlled motivation is an unhealthy and maladaptive form of motivation (Ryan & Deci, 2002).

One important precept of SDT is that autonomous motivation does not directly emerge from social factors (needs support), but instead is influenced by perceived needs satisfaction of autonomy, competence, and relatedness (Deci, 1992). Research has shown that social factors are directly related to needs satisfaction and indirectly related to motivation (Deci & Ryan, 1987; Gagne, 2003). In his research findings, Deci (1992) revealed how situational interest may be related to SDT constructs, especially needs support and satisfaction. Notwithstanding, Krapp (1999) explored the relationship between personal interest with needs satisfaction and motivational orientations. Even though there appear to be links between needs support, needs satisfaction, motivation, and interest constructs, little research has been completed to clarify these relations.

Interest Theory

Interest is categorized into situational interest and personal interest. Situational is the appealing effect of the characteristics of an activity, whereas personal interest is a psychological disposition toward a specific activity (Chen et al., 1999; Chen & Zhu, 2005).

Researchers have posited that personal and situational interests perform distinct functions toward student motivation (Chen et al., 1999; Sun et al., 2008). Specifically, situational interest typically attracts novice learners to be engaged in tasks, whereas personal interest is built on prior experience and guides long-term preferences for certain tasks or activities (Ryan & Deci, 2002). Due to the long-lasting nature of personal interest, scientists have concentrated on investigating situational interest. In other words, the rigid nature of personal interest makes it hard to alter. Situational interest not only is malleable but can also be manipulated and can be triggered by teaching strategies (Linnenbrink-Garcia et al., 2013). Deci (1992) also theorized a connection between person–task interactions and situational interest. Researchers have hypothesized six indicators of situational interest associated with person–task interactions: attention demand, challenge, instant enjoyment, exploration intention, novelty, and total situational interest (Chen et al., 1999).

Attention demand is the mental energy and concentrated cognition required for learning PA (Sun et al., 2008). Challenge is the level of difficulty in relation to a student's ability (Sun et al., 2008). Sun et al. (2008) defined instant enjoyment as the pleasure derived from engaging in PA. Exploration intention describes psychological aspects that require cognitive stimulation (Mitchell, 1993), and it is triggered by PA tasks that encompass concentrated cognition (Chen et al., 1999). Novelty is the gap between known information and information deficiency (Chen & Darst, 2001). Finally, total situational interest is the overall evaluation of student's situational interest in PA (Zhu et al., 2009).

Situational interest is part of the social environment in learning contexts (Linnenbrink-Garcia et al., 2013). Learning environments that support students' needs are likely to also trigger situational interest (Deci, 1992). According to Deci (1992), situational interest is a framework that explains how the social environment stimulates needs support and, in turn, influences needs satisfaction and motivational orientations. Deci (1992) has proposed that situational interest encompasses the person, activity, and the social environment. Students develop and maintain situational interest whenever their engagement in activities is completed in a social environment that upholds needs support. Nonetheless, a social environment that

fails to support students' needs satisfaction is associated with controlled motivation and interest disruptions (Linnenbrink-Garcia et al., 2013).

Self-Determination Theory and Interest Theory

There appear to be relations between personal interest and SDT motivation constructs (Krapp, 1999). Development of personal interest is often related to changes in the motivational structure of an individual. Students often develop personal interest based on experiences and exposure to ideas or activities over time. Thus, it seems plausible that students maintain personal interest in a task when they assess and feel that they experience autonomous motivation (Krapp, 2005). Based on literature, it appears that autonomous motivation can promote personal interest but that controlling motivation is likely to undermine personal interest.

A recent study established that athletes' personal interest in sports was significantly predicted by autonomous motivation (Gillet et al., 2012). Examining the relationship between motivation and interest, Goudas et al. (1994) established that students who reported autonomous motivation also revealed higher levels of personal interest, whereas controlled motivation was associated with boredom and disruption of the learning process. A study with university students found association between autonomous learning motivation and high personal interest (Müller & Louw, 2004). Accordingly, this general pattern of relationships appears to be present across many contexts. Examination of PA among breast cancer survivors showed that SDT constructs explained 20% of the variance in PA (Milne et al., 2008). Competence was found to be major predictor of PA. A randomized controlled trial with women found that application of autonomous forms of motivation led to higher levels of PA (Silva et al., 2010). A study examining the role of social support reported an increase in PA interest among students who received social support from their groups (Jago et al., 2009).

Although the studies discussed demonstrate links between SDT and interest theory, little empirical evidence is available for empirical connections to be made between the two theories in PA settings. Further, research that examines associations between SDT constructs and situational and personal interest is sparse. Therefore, this study investigated associations between situational interest, needs

support, needs satisfaction, autonomous and controlled motivations, and personal interest for students enrolled in university PA classes. The following hypotheses were made:

- **H_1:** Student reports of situational interest and needs support will have direct associations with needs satisfaction and indirect associations with motivation.
- **H_2:** Student reports of needs satisfaction will have direct relations with motivation and personal interest.
- **H_3:** Student reports of autonomous motivation (positive) and controlled motivation (negative) will have direct relations with personal interest.
- **H_4:** Student reports of situational interest will have a direct association with personal interest.

Method

Participants

Participants were 347 students (20.5% males, 79.5% females; M_{age} = 20.42 years, SD = 1.78) enrolled in general kinesiology activity classes in a large research university in the Southeastern United States. Of the students in the sample, 40.1% were seniors, 25.1% were juniors, 25.6% were sophomores, and 8.9% were freshmen. A majority (73.8%) of the participants reported a Caucasian ethnicity, whereas 17.6% reported African American, 4.9% Asian/Asian American, 2.6% Hispanic, 0.9% Native American, and 3% others.

Instrumentation

Situational Interest

Indicators of person–task interactions were measured via the 24-item situational interest scale (Chen et al., 1999). The target activity was the warm-up. Immediately after the warm-up tasks, participants responded to this questionnaire. Example items include (1) "This activity is new to me" (novelty); (2) "This activity is complicated" (challenge); (3) "It is fun for me to try this activity" (enjoyment); (4) "I was very attentive all the time" (attention demand); and (5) "I want to discover all the tricks of this activity" (exploration intention). Each item was answered on a 5-point scale ranging from 1 (*very untrue*) to 5 (*very true*). This scale has been used widely in PA contexts.

Needs Support

Measures of autonomy, competence, and relatedness support were measured with a 15-item scale (6 autonomy support, 4 competence support, and 5 relatedness support) used by Standage et al. (2006). Items measuring social indicators started with the phrase "During this activity..." and sample items include (1) "the teacher listened to how I would like to do things" (autonomy support); (2) "the teacher made me feel like I was good at this activity" (competence support); and (3) "the teacher encouraged me to work with others in practice" (relatedness support). Each item was answered on a 5-point scale ranging from 1 (*very untrue*) to 5 (*very true*). Standage et al. (2006) reported reliability in these scales.

Needs Satisfaction

Needs satisfaction was measured on the Basic Needs Satisfaction in Sport Scale (Ng et al., 2011). Three subscales in the Basic Needs Satisfaction in Sport Scale measure students' autonomy, competence, and relatedness satisfaction. Students were asked to respond to the items regarding their feelings and experiences in the activity class instead of in sport. Each scale comprised five items. Autonomy satisfaction has five items (e.g., "In my class, I get opportunities to make choices"). Competence satisfaction was measured with five items (e.g., "I can overcome challenges in my class"). The relatedness satisfaction questionnaire has five items (e.g., "In my class, I feel close to other people"). Each item was measured on a 5-point scale ranging from 1 (*not true at all*) to 5 (*very true*).

Motivation

Autonomous motivation and controlled motivation were measured with the 20-item Perceived Locus of Causality Scale developed by Goudas et al. (1994). The scale was modified to replace "PE" with "activity class." Items begin with common stem "I take part in this activity class..." and a sample response is "because it is fun." Each item was answered on a 5-point scale ranging from 1 (*not at all true*) to 5 (*very true*).

Personal Interest

Personal interest toward PA was measured with Trautwein et al.'s (2006) personal interest scale. The personal interest questionnaire contains three items assessing each student's personal interest in PA.

Students were asked to think about the PA course they are enrolled in and answer questions about their interest in it (e.g., "Because this class is fun, I wouldn't want to give it up"). Each item was answered on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Procedures

In accordance with the institutional review board, this research was approved. We then liaised with the university PA course instructors to schedule date and time for data collection. During the data collection sessions, we first distributed consent forms, and participants who accepted to participate in the research were issued questionnaires. We then distributed surveys, outlined the instructions for filling the survey, explained the procedure, and answered questions from the participants. The instructors stepped outside when questionnaires were administered.

Data were collected during a 4-week window. At the first data point, the participants filled out a questionnaire focusing on basic demographic information (activity class, age, gender, classification, and race), indicators of situational interest, and needs support. The second data point was conducted after 4 weeks. At the second data point, the questionnaires assessed needs satisfaction, motivation, and personal interest. Data were collected from eight PA classes: tennis, tai chi, jogging, yoga, boot camp, weight training, aerobic dance, and golf. In both phases, participants took approximately 10 to 15 min to fill out the questionnaires. These lifetime physical activities were selected because they are likely to elicit personal interest and demonstrate the importance of maintaining health and wellness throughout the course of a lifetime.

Data Analysis

Prior to data analysis, screening was done for input accuracy, missing data, normality, and outliers. We used a series of confirmatory factor analyses (CFA) to disentangle relationships between situational interest and needs support. Specifically, we used CFAs to determine if situational interest and needs support represented a single factor of the social environment or two related but separate factors of the social environment. We used structural equation modeling (SEM) to simultaneously test the four hypotheses.

SEM is an approach that combines a measurement model and a structural model (Kline, 2015). The measurement model consists of using CFA procedures to determine how well the theorized covariance matrix matches the sample covariance matrix (i.e., overall model fit and parameter estimates). The structural model consists of a series of regression equations that provide information on relationships among latent variables in the structural model. In other words, SEM tests theoretical relationships between latent constructs, apart from testing direct and indirect effects, and mediating relationships among variables (Byrne, 2013). SEM assumes that all variables measured have some unique variance and error that must be accounted for in the explanatory model (Byrne, 2013). A major strength of SEM, therefore, is that it parcels reliable variance from unique variance and measurement error in the same fashion as CFA. Notwithstanding, in a cross-sectional study, SEM cannot determine causal relationships.

H_1, H_2, H_3, and H_4 were tested via SEM in IBM AMOS version 22. Model fit is based on generally accepted thresholds for the chi-square goodness-of-fit test (χ^2), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and the root-mean-square error of approximation (RMSEA). CFI and TLI values ≥ 0.90 reveal an adequate fit and values $\geq .95$ reflect a good fit of the model (Kline, 2015). Generally, the cut-off value for RMSEA is .06, even though values ≤ 0.08 indicate realistic errors of approximation in the population.

Results

Descriptive Statistics

Table 1 shows descriptive statistics, internal reliability coefficient (Cronbach's alpha), and correlation estimates for the indicators of situational interest. Significant correlations were noted among the variables in the two subscales in situational interest and needs support subscales. The highest correlation was between instant enjoyment and total situational interest. Novelty and challenge had weak correlations with the each of the situational interest indicator variables. All the observed variables had means above the midpoint of a 5-point Likert scale. Overall, there were positive correlations between autonomy support (AS), competence support (CS), and relatedness support (RS). On a 5-point scale, AS, CS, and CS had means above the midpoint.

Table 1
Internal Reliability, Means, and Correlations for Measured Variables

Variable	1	2	3	4	5	6	7	8	9
Ad	1								
Ch	.122*	1							
Enj	.585**	.183**	1						
Ex	.440**	.202**	.587**	1					
Nov	.271**	.236**	.311**	.405**	1				
Tot	.496**	.145**	.847**	.558**	.359**	1			
AS	.375**	−.047	.353**	.240**	.088	.294**	1		
CS	.360**	−.051	.318**	.185**	.127*	.266**	.767**	1	
RS	.274**	−.030	.287**	.180**	.117*	.223**	.718**	.831**	1
M	3.819	2.935	3.866	3.585	3.227	3.916	4.096	4.416	4.438
SD	.724	.768	.644	.767	.851	.711	.605	.541	.553
α	.862	.696	.844	.833	.711	.899	.876	.889	.899

Note. Ad = attention demand; Ch = challenge; Enj = enjoyment; Ex = exploration intention; Nov = novelty; Tot = total situational interest; AS = autonomy support; CS = competence support; RS = relatedness support.

*$p \geq 0.05$ (2-tailed). **$p \geq 0.01$ (2-tailed).

Confirmatory Factor Analysis

A series of CFA tests examined the factor structure of situational interest. Specifically, four models were tested. Model 1 was a single-factor model that included six indicators of situational interest and three needs support indicators. Model 2 was a two-factor model that included a situational interest factor with six indicators and a needs support factor with three indicators. Model 3 was a modified two-factor model that excluded challenge and novelty, which had low factor loadings. Model 4 consisted of a three-factor model that added a third factor that represented secondary situational interest that encompassed challenge and novelty. Table 2 shows fit indices. Results show that Model 3 presented a good fit, $\chi^2 = 42.058$, $df = 13$, $p < 0.05$, CFI = .980, TLI = .968, RMSEA = .071, SRMR = .050.

Table 2
Tested CFA Models

Model	χ^2	SB-χ^2	*df*	CFI	TLI	RMSEA	SRMR
1	745.171	643.170	27	0.531	0.375	0.256	0.159
2	99.422	88.257	26	0.953	0.934	0.083	0.059
3	42.058	35.443	13	0.980	0.968	0.071	0.050
4	87.081	77.156	24	0.960	0.939	0.080	0.054

Factor	UFL	*SE*	SFL	h^2	u^2
Situational interest					
Attention demand	1.000		0.606	0.368	0.632
Instant enjoyment	1.413	0.141	0.964	0.929	0.071
Exploration intention	1.094	0.117	0.618	0.382	0.618
Total interest	1.425	0.136	0.877	0.769	0.231
Needs support					
Autonomy support	1.000		0.818	0.669	0.331
Competence support	1.028	0.046	0.941	0.885	0.115
Relatedness support	0.985	0.052	0.881	0.777	0.223

Note. UFL = unstandardized factor loadings; SE = standard error of UFL; SFL = standardized factor loading; h^2 = explained variance of indicator by factor; u^2 = unexplained variance of indicator.

The CFA results did not support a single situational interest–needs support factor. Specifically, needs support was a different factor and not part of situational interest. Challenge and novelty were also dropped from the final model because of low common variance with other situational interest factors, which has been a problem in previous research (Garn, 2017; Roure & Pasco, 2018). Based on this outcome, Model 3 was selected and entered in the SEM analysis. Table 2 shows the factor loadings, explained variance, and unexplained variance for the indicators of situational interest and needs support. Situational interest explained the greatest percentage of variance in instant enjoyment (93%) and the least percentage in attention demand (37%). Besides, needs support explained prominent level of variance in autonomy, competence, and relatedness support.

Structural Equation Modeling

SEM analysis tested the measurement model and structural relationship between interest theory and SDT constructs. Based on the goodness of fit tests, the sample covariance matrix from the model presented an acceptable fit, $\chi^2 = 195.825$ $df = 83$, $p < 0.05$, CFI = .953, TLI = .932, RMSEA = .063, SRMR = .049. Table 3 shows regression coefficients and explained variances among latent variables (needs satisfaction, autonomous motivation, controlled motivation, and personal interest).

Table 3
Regression Coefficients and R-*Square Values of SEM Analysis*

Structural relationships	B	*SE*	*p*	β	R^2
Needs satisfaction					0.332
Situational interest	0.302	0.048	0.001	0.418	
Needs support	0.248	0.058	0.001	0.272	
Autonomous motivation					0.602
Needs satisfaction	1.060	0.104	0.001	0.776	
Controlled motivation					0.003
Needs satisfaction	−0.075	0.088	0.395	−0.052	
Personal interest					0.573
Situational interest	0.039	0.045	0.382	0.053	
Needs satisfaction	0.360	0.144	0.012	0.351	
Autonomous motivation	0.294	0.83	0.001	0.446	
Controlled motivation	−0.129	0.035	0.001	−0.180	

H_1 Findings

SEM results partially supported H_1. There was a direct relationship between situational interest and needs satisfaction and between needs support and needs satisfaction. Situational interest had a positive indirect association with autonomous motivation (β = .325, $p < .05$) through needs satisfaction. There was not an indirect relationship between situational interest and controlled motivation (β = −.022, $p > .05$). Similarly, needs support had a positive indirect association with autonomous motivation (β = .211, $p < .05$) through

needs satisfaction, but no indirect relation was present with controlled motivation ($\beta = -.014$, $p > .05$).

H_2 Findings

Hypothesis H_2 was partially supported. Results revealed a strong relationship between needs satisfaction and autonomous motivation. However, the relation between needs satisfaction and controlled motivation was not significant. Finally, results revealed a significant direct relationship between needs satisfaction and personal interest.

H_3 Findings

Results fully supported H_3. There was a direct positive association between needs satisfaction and personal interest and between autonomous motivation and personal interest. Personal interest was directly predicted by needs satisfaction ($b = .28$) and autonomous motivation ($b = .45$). The relationship between controlled motivation and personal interest was negative with a weak magnitude. Personal interest was negatively predicted by controlled motivation ($b = -.18$).

H_4 Findings

Contrary to hypothesis H_4, the relationship between situational interest and personal interest was not significant. This outcome contradicts previous findings that have supported this association (Chen & Darst, 2001). Finally, results revealed indirect effects as follows: situational interest on autonomous motivation via needs satisfaction (.328), needs satisfaction on personal interest via autonomous motivation (.304) and controlled motivation (–.230), and needs support on autonomous motivation via needs satisfaction (.211).

Discussion

This study explored the structural relationships between interest theory and SDT. Specifically, it investigated the relationships between situational interest, needs support, needs satisfaction, autonomous motivation, and personal interest among college students enrolled in PA classes. Prior to testing major study hypotheses, CFA tests examined needs support constructs, autonomy support, competence support, and relatedness support as potential indicators of situational interest. This section discusses the explanation of initial CFA findings, followed by the results of the four study hypotheses.

Nature of Situational Interest and Needs Support

Although a nine-indicator model of situational interest that integrates dimensions of needs support was hypothesized, findings are not supportive. Specifically, results clearly show that situational interest and needs support are separate factors. The correlation between needs support and situational interest is positive, but small-to-moderate, which also points to less overlap between these two aspects of the social environment. The role of social indicators in situational interest from an SDT perspective remains uncertain despite clear theoretical links (Deci, 1992). It is possible that needs support is a source of situational interest rather than part of its internal dynamics. It is also possible that situational interest and needs support are two distinct aspects of the social environment in PA settings. Because this is a cross-sectional study without a random sample, the design cannot establish causation. Future research should investigate the relationship between needs support and situational interest to ascertain if it is a reciprocal relationship or if needs support may be a necessary source to facilitate situational interest.

In this study, challenge and novelty were poor indicators of situational interest. In the past literature, the relationship between challenge and other situational interest indicators produced conflicting results. For instance, some studies found moderate correlation between challenge and total situational interest (Chen & Darst, 2001; Chen et al., 1999; Zhu et al., 2009). Notwithstanding, at least one study reported an insignificant relationship between challenge and total interest (Ding et al., 2013). In these findings, the insignificant association between challenge and other situational interest indicators supports the notion that challenge has an inconsistent association with situational interest (Chen et al., 2001).

Integration of Interest and Self-Determination Theories

Overall, findings generally support the integration of interest theory and SDT. Results partially support hypothesis H_1 by identifying the direct relationship between situational interest and needs satisfaction and between needs support and needs satisfaction. Central to both SDT and interest theory is the assumption that elements of the social environment influence needs satisfaction (Deci, 1992; Krapp, 2005; Standage et al., 2006). Research has not

investigated the joint contributions of situational interest and needs support on needs satisfaction. Situational interest was a stronger predictor of needs satisfaction than of needs support, which was surprising. This is a unique finding with important implications. Specifically, person–task interactions associated with situational interest (e.g., attention demand and instant enjoyment) appear to be a meaningful source for needs satisfaction above and beyond needs support. Therefore, situational interest appears to be closely intertwined with students' needs satisfaction in university PA classes.

As hypothesized (H_2), perceived needs satisfaction was directly associated with autonomous motivation. This outcome is consistent with principles of SDT, which holds that autonomous motivation is influenced by the extent of satisfaction of the three needs (Standage et al., 2006). On account of this, students' autonomous motivation is anchored to the extent to which students have opportunities to exercise their own volition, are competent to participate in class activities, and receive positive feedback, among other means of relatedness. Nonetheless, results from this sample indicate a lack of relationship between needs satisfaction and controlled motivation, contradicting the hypothesis and theoretical undertones of SDT. For example, a study with college athletes found a negative association between needs satisfaction and controlled motivation (Gagne, 2003). Athletes whose coaches applied controlled motivation reported lower levels of needs satisfaction. For this reason, future studies might explore the relationship between needs satisfaction and controlled motivation. Last, results support H_2 by revealing a direct relationship between needs satisfaction and personal interest. Hence, these outcomes support theoretical approach (Krapp, 1999) suggesting that students' personal interest is directly associated with needs satisfaction.

In support of H_3, perceived autonomous motivation had a direct relationship with personal interest. These findings are consistent with literature that links autonomous motivation with students' personal interest (Krapp, 1999, 2005). In other words, students' personal interest is predisposed in a learning environment that is autonomously motivating. Although weak, there is a significant negative association between controlled motivation and personal interest. This finding supports Krapp (1999), who postulated that personal interest is negatively predisposed by controlled motivation. Students

who are exposed to a controlling learning environment might report low levels of personal interest.

Contrary to H_4, results from this study do not show a direct association between students' personal interest and situational interest in PA. This contrasts with the theoretical undertone of interest theory and research findings that have suggested a direct relationship between these two variables (Chen et al., 1999). It is possible that students' amount of personal interest toward the class content was already well established, reducing the effect of situational interest. University students may be beyond this point in their learning of the physical activities. Similarly, the timing of situational measurement may also have been an issue. Situational interest was measured toward the end of an 18-week semester during which the class met three times per week. This may have minimized the relationship between situational interest and personal interest.

In summary, findings support researchers who have suggested a connection between interest theory and SDT (Deci, 1992; Krapp, 1999). However, this research has limitations. First, results from CFA did not support the hypothesized model, which resulted in testing alternative models. Second, this was a cross-sectional study and therefore the results do not portray causal effect. Future longitudinal studies can be conducted with specific interventional strategies. Also, future studies can focus on one task to determine if there is a difference in the outcome. Finally, it is recommended that a future longitudinal study investigate if there is any causal relationship between needs support and situational interest.

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