

METHODOLOGY**Manipulation of the
Self-Determined Learning
Environment on Student
Motivation and Affect Within
Secondary Physical Education**

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Abstract

Secondary physical education (PE) has become a popular area of inquiry because students are not meeting overarching goals of PE programs, are less motivated, and demonstrate negative affect while in class. As such, teachers and researchers are starting to examine pedagogical approaches that support student motivation as a means to alleviate some of the aforementioned issues. The purpose of this study was to examine the influence of two different learning contexts based within self-determination theory on the motivation and affect of secondary PE students. Seventy-nine secondary PE students were randomly assigned to a unit of basketball taught in either a highly autonomy-supportive or highly controlling learning environment. Data were collected using a pre–post test design measuring psychosocial needs, motivation, and enjoyment. Analysis of data used repeated measures ANOVAs on all dependent variables with follow-up pairwise comparisons on all significant ANOVAs. Analysis of data indicated that engagement in a highly autonomy-supportive learning context significantly changes secondary PE students overall motivation, need for competence, and enjoyment.

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Secondary school physical education (PE) has become a commonly identified area of inquiry within the pedagogical research and literature. The focus on secondary PE can be attributed to a number of factors, including students (a) not meeting the goals of PE and engaging in low levels of physical activity outside of the class (Centers for Disease Control and Prevention, 2006), (b) being less motivated (Bycura & Darst, 2001), and (c) demonstrating negative affect when in class (Ntoumanis, Pensgaard, Martin, & Pipe, 2004). The National Association for Sport and Physical Education (NASPE, 2004) indicated that secondary PE can potentially offer a learning environment that provides students the opportunities to overcome many of the aforementioned issues (i.e., low motivation and negative affect). Standage, Duda, and Ntoumanis (2003) suggested that a cornerstone to understanding and improving PE is the concept of student motivation. As such, gaining insight into pedagogical approaches that facilitate support for student motivation and the applied benefits (e.g., affect) is imperative.

Motivation, Physical Education, and Self-Determination Theory

The concept of student motivation within this study was grounded within self-determination theory (SDT) as espoused by Deci and Ryan (1985, 2000, 2004). SDT is based on the notion that individual motivation and the applied student benefits (e.g., participation, engagement) are influenced by a linear progression: (a) social or learning context, (b) support for psychosocial needs, (c) motivational level, and (d) associated benefits/experiences or outcomes (Vallerand & Losier, 1999). Figure 1 illustrates the linear process.

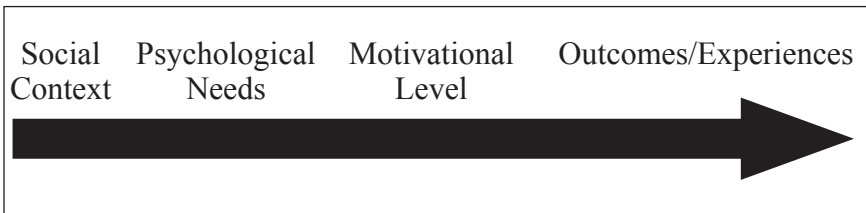


Figure 1. Linear Progression of Motivation (Modified from Vallerand & Losier, 1999)

Based on self-determination, the social or learning context can be categorized as either autonomy-supportive or controlling (Deci & Ryan, 1985, 2004). Reeve, Jang, Carrell, Jeon, and Barch

(2004) identified instructional behaviors of an autonomy-supportive learning context as facilitating support of students' internal desires (e.g., fun), implementing flexible forms of communication, and demonstrating a sense of caring for students in need by being patient during times of challenging tasks. On the contrary, a controlling environment uses instructional aspects that focus on external factors (e.g., guilt or rewards), are strict within their communication (e.g., deadlines and guilt), ignore students who struggle and attempt to demonstrate power, and pressure students to complete tasks (Reeve, et al., 2004). Depending on the level of autonomy-support perceived within the learning context, a student could be supported in terms of their psychological needs of autonomy (perception of control/choice), competence (sense of success or optimal challenge), and relatedness (perception of caring/empathy and inclusion; Deci & Ryan, 2004; Deci et al., 2001). Each psychosocial need works both individually and synergistically to influence the degree or level of self-determined motivation (Ryan & Deci, 2000). As such, a student who is well supported within their psychological needs will tend to be more motivated within the specific setting (Deci & Ryan, 2000; Vallerand, 2001). Finally, levels of self-determined motivation are strongly associated with applied student benefits such as engagement, in-class participation, and affective learning (Ntoumanis, 2001, 2005; Standage et al., 2003).

The SDT-based literature supports that engagement within a highly autonomy-supportive context is most beneficial for students (Deci & Ryan, 2004). For instance, Ntoumanis (2001) and Standage et al. (2003) have illustrated a strong connection between autonomous context and psychomotor learning. Furthermore, students have reported higher levels of cognitive (Boggiano, Flink, Shields, Seelbach, & Barrett, 1993) and affective learning (Ryan & Connell, 1989) when taught in a highly autonomy-supportive context. In terms of pedagogical influence, the social context tends to be the only aspect of the motivational process that the teacher influences (Perlman & Webster, 2011). As such, focusing on scholarly inquiry within the social context aspect of the motivational linear process is imperative.

To date, much of the research has examined the influence of diverse learning contexts (i.e., autonomy-supportive and controlling) on psychosocial needs support, individual motivation, and student outcomes within a variety of non-PE related settings (Black & Deci, 2000; Deci et al., 2001; Vallerand, Fortier, & Guay, 1997). In

PE, three studies have examined elements of the learning context on diverse student outcomes using SDT as a framework (Ward, Wilkinson, Graser, & Prusak, 2008; Mandigo, Holt, Anderson, & Sheppard, 2008; Murcia, Lacarcel, & Alvarez, 2010). Each study provided students with a context that was autonomy-supportive by allowing students more choice (Mandigo et al., 2008; Ward et al., 2008) or through the teacher's use of supportive instruction (Murcia et al., 2010). This study attempted to further understand the influence of diverse social contexts and their influence on students' psychological and affective measures within PE. In addition, this study attempted to address limitations of previous studies whereby controlling learning contexts was not examined. Therefore, the purpose of this study was to examine the psychosocial, motivational, and affective responses of secondary PE students within two different learning contexts. Specifically, this study was guided by the following research question: What influence does the learning context (highly autonomy-supportive and highly controlling) have on psychosocial needs support, motivation, and affect?

Method

Participants and Setting

Seventy-nine (male = 39, female = 40) Year 9 and 10 students who were enrolled in one of two required PE classes were used within this study. Each class was engaged in a 4-week (16-lesson) unit of basketball following the skill-drill-game approach. Each lesson lasted 72 min with 62 min of activity time due to the allocation of dressing time. One secondary PE teacher was recruited to teach both PE courses. Use of one teacher was intentional to provide students with a level of consistency in terms of behaviors such as teaching style and personality. Due to the use of intact classes, randomization was conducted at the class level. Thus classes were randomly assigned to a treatment by a research student who was blind to the study purpose. As a result of class randomization, distribution of students was 41 (male = 20, female = 21) in the highly autonomy-supportive (HAS) class and 38 (male = 18, female = 20) in the highly controlling (HC) class.

Social Context Intervention

Before implementing the intervention, the PE teacher engaged in a 5-day intensive workshop. The workshop focused on the

development and implementation of a basketball unit that was HAS and HC. Initially, the teacher was taught the underlying principles of SDT (Deci & Ryan, 1985) and the teacher behaviors that align with each learning context. Specifically, diverse teacher behaviors were based on the work of Reeve, Bolt, and Cai (1999), Reeve et al. (2004), Reeve and Yang (2006), Reeve (2009), Sarrazin, Tessier, Pelletier, Trouilloud, and Chanal (2006), and Perlman and Webster (2011). Building upon the theoretical grounding, the teacher and researcher collaboratively developed both basketball units (i.e., HAS and HC). The first step required the teacher to design a standard 16-lesson basketball unit based within the skill–drill–game approach. Use of the skill–drill–game approach was requested by the school to align with the district curriculum. The purpose of this initial 16-lesson unit was to ensure that all classes were provided similar content and learning opportunities (see Table 1).

Table 1

16 Lesson Basketball Unit

Lesson	Content
1	Introduction to Basketball Needs Assessment
2	Dribbling Skill Practice Game Play (5 vs. 5)
3	Passing Skill Practice Game Play (5 vs. 5)
4	Shooting Skill Practice Game Play (5 vs. 5)
5	Offense/Defense Skill Practice Game Play (5 vs. 5)
6–9	Class Warm-Up/Practice Game Play (5 vs. 5)
10–15	Class Warm-Up Tournament
16	Class Warm-Up Tournament Championships Awards Ceremony

During the third phase, the teacher focused on developing specific teaching behaviors that would align with high levels of autonomy support and control. These teaching behaviors were piloted with two unaffiliated classes a semester before the actual study. The pilot-tested classes were assessed on their level of social context using the same measures outlined in the fidelity section. The researcher felt comfortable that the teacher was able to implement appropriate instruction with social contexts that both (a) aligned with the criteria outlined within the fidelity section and (b) provided all the students the same opportunity to learn basketball-related content.

Fidelity of Implementation

To ensure that each social context was implemented in a manner espoused by the premise of this study, (a) all lessons were videotaped and analyzed using a systematic observation tool designed by Sarrazin et al. (2006) and (b) students completed the Learning Climate Questionnaire (LCQ; Williams & Deci, 1996) at the beginning and end of the 16-lesson unit. The systematic observation tool codes specific teacher–student interactions into 15 categories. These categories are condensed into an overall score (e.g., frequency of statements) for autonomy support, control, and neutral. For the purpose of this study, the researcher identified a 90% threshold for both the HAS setting and the HC setting. In essence, each lesson should contain a minimum of 90% of teacher–student interactions that align with the identified context. Upon completion of the study, two researchers familiar with and trained to use the observational tool independently coded each videotaped lesson. Reliability of coding was conducted, as both researchers met and conducted interrater agreements for both learning contexts (HAS = 90%, HC = 93%). Further fidelity measures used data from the LCQ that provided an overall student score for their perceived level of autonomy support. Student data from the LCQ were analyzed using a (2 x 2) (Group x Time) repeated measures ANOVA. The RM ANOVA revealed a significant interaction effect, $F(1, 77) = 8.321$, $p = .005$, $\eta^2 = .088$. A follow-up Bonferroni pairwise comparison illustrated a significant difference between groups on their posttest scores whereby the HAS class was significantly higher compared to the HC class.

Measures of Dependent Variables

Psychosocial needs support. The Basic Psychological Needs Scale in Physical Education (BPNS-PE; Ntoumanis, 2005) was used to assess the students' perceived level of support for autonomy, competence, and relatedness. Students responded to 21 items using a 7-point Likert scale (1 = *not true at all* to 7 = *very true*). Responses were averaged and provided an overall score for autonomy, competence, and relatedness (e.g., seven items per psychological need). The BPNS-PE has been identified as a valid and reliable tool for use with PE students (Ntoumanis, 2005).

Self-determined motivation. Student motivation was assessed using the 16-item Sport Motivation Scale (SMS; Pelletier et al., 1995). The SMS requires students to rate their level of agreement for each item (1 = *strongly disagree* and 7 = *strongly agree*), providing each student with four motivational scores (i.e., intrinsic motivation, identified regulation, external regulation, and amotivation). The four motivational scores are further used within an equation that provides an overall score or self-determination index (SDI): $((2 \times \text{intrinsic motivation}) + \text{identified regulation}) - (\text{external regulation} + (2 \times \text{amotivation}))$. Ward et al. (2008) has established adequate validity and reliability for use of the SMS with secondary PE students.

Affect. Assessment of student affect was measured with the enjoyment subscale of the Intrinsic Motivation Inventory (IMI-E; McAuley, Duncan, & Tammen, 1989). Each student rated their level of agreement (7 = *very strongly agree* and 1 = *very strongly disagree*) on seven items. An overall enjoyment score is calculated by averaging scores for all items. Mitchell (1996) identified adequate validity and reliability for use of the enjoyment subscale within high school PE.

Data Collection

Before beginning the study, the university ethics committee approved the study and each participant and guardian provided informed consent. The study followed a pretest–posttest design. During the first day of class, students were asked to complete the battery of questionnaires (e.g. LCQ, SMS, BPNS-PE, IMI-E) in a classroom setting that took around 35 min to complete. This process was completed again during the final day of the study. Each of the 16 lessons were videotaped and audiotaped from a noninvasive part of the gymnasium for later analysis for fidelity of implementation.

Data Analysis

Analysis of data began with descriptive statistics (mean and standard deviation) and reliability (alpha) calculations for all dependent variables. To examine the influence of the independent variables, five separate repeated measures ANOVAs were calculated for SDI, autonomy, competence, relatedness, and enjoyment with an adjusted p value of .01. The goal of the ANOVA calculation was a significant interaction effect. Any significant ANOVA calculation was (a) plotted to illustrate the differences between groups and (b) further analyzed using a Bonferroni pairwise comparison that was entered into SPSS syntax during the original ANOVA analysis.

Results

Table 2 displays descriptive statistics (mean and standard deviation) and reliabilities for all pretest and posttest scores. Findings from the repeated measures ANOVA revealed significant interaction effects for SDI, $F(1, 77) = 14.356, p = .000, \eta^2 = .157$; competence, $F(1, 77) = 11.657, p = .001, \eta^2 = .131$; and enjoyment, $F(1, 77) = 10.744, p = .002, \eta^2 = .122$. Scores associated with autonomy, $F(1, 77) = 0.196, p = .659, \eta^2 = .003$, and relatedness $F(1, 77) = 0.552, p = .460, \eta^2 = .007$, were deemed insignificant. Follow-up pairwise comparisons for SDI, competence, and enjoyment indicated significant differences among posttest scores, which are displayed in Table 3. In addition, Figures 2 to 4 illustrate pretest and posttest differences of mean scores for all significant ANOVA calculations (SDI, competence, and enjoyment).

Table 2

Descriptive Statistics (Mean and Standard Deviation) and Reliability (Alpha)

Dependent Variables	Autonomy-Supportive		Controlling		α
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
SDI – Pretest	4.89	3.40	3.98	3.50	.89
SDI – Posttest	6.37	4.12	3.30	3.59	.88
Autonomy – Pretest	4.16	0.67	4.26	0.71	.82
Autonomy – Posttest	4.04	0.84	4.08	0.78	.85
Competence – Pretest	3.07	0.91	3.17	0.72	.90
Competence – Posttest	3.21	0.92	2.84	0.86	.92
Relatedness – Pretest	3.65	1.09	3.98	0.84	.89
Relatedness – Posttest	3.84	1.02	4.04	0.87	.81
Enjoyment – Pretest	3.30	1.00	3.32	1.14	.85
Enjoyment – Posttest	4.10	0.96	3.62	1.10	.88

Table 3*Pairwise Comparisons of Significant ANOVA Calculations*

	Phase	(I)	(J)	Mean Diff. (I-J)	Standard Error	Sig.	Confidence Interval Lower	Upper
Self-Determination Index	Pretest	HAS	HC	-.090	.777	.908	-1.637	1.457
	Posttest	HAS	HC	3.063*	.976	.001*	1.318	4.808
Competence	Pretest	HAS	HC	-.098	.186	.602	-.468	.273
	Posttest	HAS	HC	.554	.179	.003*	.198	.910
Enjoyment	Pretest	HAS	HC	-.013	.241	.957	-.493	.467
	Posttest	HAS	HC	.483	.232	.041*	.021	.946

* $p \leq .05$

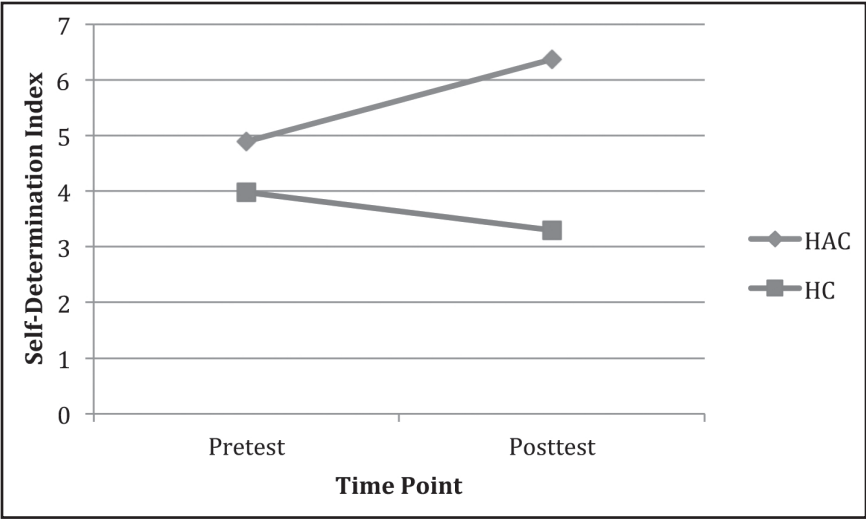


Figure 2. Significance Plot for SDI

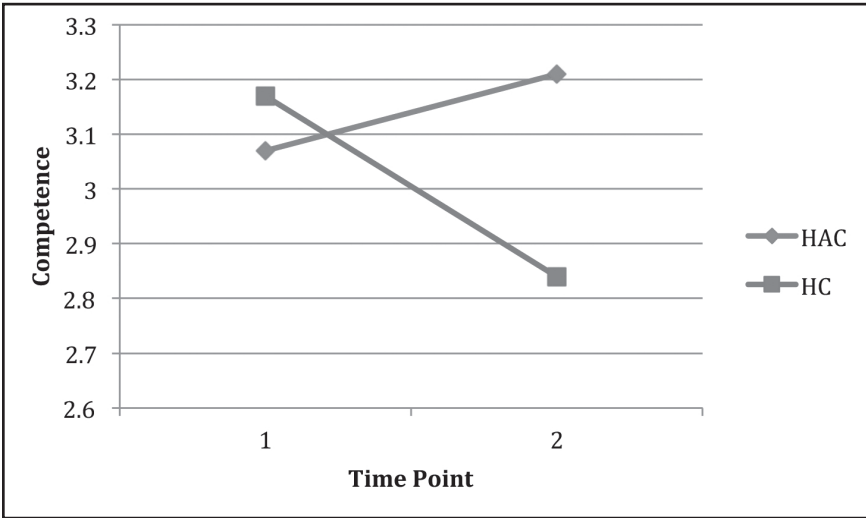


Figure 3. Significance Plot for Competence

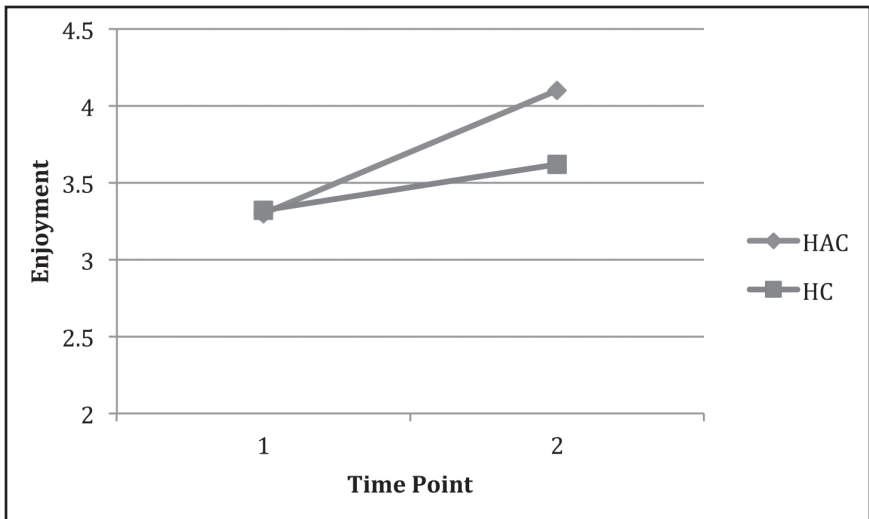


Figure 4. Significance Plot for Enjoyment

Discussion

The overarching focus of this study was to investigate the influence of different social contexts based within SDT (i.e., HAS and HC) on psychosocial needs support, motivation, and affect. Results from this study indicated that secondary PE students who engage in a highly autonomy-supportive learning context experience significantly greater competence support, self-determined motivation, and enjoyment. In addition, results from this study indicated that students' level of support for relatedness and autonomy are insignificant.

Influence of the autonomy-supportive learning context brought about significantly higher changes associated with student enjoyment, motivation, and support for the competence need. These results support the PE-based literature of the positive benefits of engaging students within an autonomy-supportive context (Ntoumanis, 2001; Standage et al., 2003). Specifically, findings support the notion that engaging students in a highly autonomy-supportive context can facilitate change in the need for competence, motivation, and affect (Ntoumanis, 2001; Standage et al., 2003).

Results associated with a significant change to the need for competence and the lack of change associated with autonomy and relatedness were most interesting. Ryan and Deci (2000) suggested that effective pedagogy should allow for support of every

psychosocial need. A plausible reason for the result associated with competence could have been the nature of the sport-based unit. With a skill–drill–game approach, students may not have been provided many opportunities to take on higher levels of control (autonomy support) and/or develop peer relationships (relatedness support). For example, each student was taught in a direct style of what and how to complete tasks. In addition, team members were rotated daily for most of the 16-lesson unit. As such, the focus on performance, through effective game play or skill execution, may have been the underlying lesson focus and provided an avenue for supporting student competence. This result may illustrate a need to examine the learning context from a dual perspective that includes (a) what and how instruction is provided and (b) the premise of the underlying unit/lesson content.

Results associated with self-determined motivation and enjoyment support the positive student benefits of engaging in an autonomy-supportive climate within PE (Ntoumanis, 2001; Standage et al., 2003). It seems plausible that the significant change in competence, as well as the small increase in both autonomy and relatedness (i.e., small increase in mean scores between pretest scores and posttest scores), may have influenced the change in overall motivation. These results are similar to the work of Standage et al. (2003) whereby engagement in an autonomy-supportive climate elicited a moderate association with one psychosocial need. Change to student enjoyment can be viewed as critical because PE students have reported a feeling of dislike as a primary cause for a lack of engagement or motivation (Ntoumanis et al., 2004). This result further illustrates the strong association with higher levels of motivation and positive affect (Ntoumanis, 2001).

Overall, the present findings reinforce (a) the relevance of self-determination within PE and (b) the applied benefits associated with teaching PE using a highly autonomy-supportive learning context. To build upon this research, future research should examine additional applied benefits of engaging in an autonomy-supportive context. Furthermore, results from this study may call for a greater understanding and use of autonomy-supportive teaching behaviors within a PE class as teachers attempt to infuse autonomous teaching with high educative lessons.

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