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Examination of Self-Determination within the Sport Education Model

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The purpose of this study was to examine the influence of the Sport Education Model (SEM) on students' self-determined motivation and underlying psychological need(s) in physical education. A total of 182 Year-9 students were engaged in 20 lesson units of volleyball, using either the SEM or a traditional approach. Data was collected using a pretest/posttest design measuring self-determined motivation and perceptions of the psycho-social climate. Analysis of data utilized four separate repeated measures ANOVAs for self-determination and basic psychological needs. Results indicated significant change in self-determination and relatedness for students engaged in the SEM. As such, implementation of the SEM may be utilized as a means for supporting students' social connectedness and motivation to engage in sport-based activities.

Introduction

The concept of student motivation is an important construct to understand within physical education due to the connection with higher levels of engagement (Ntoumanis, 2001) and student learning (Tjeerdsma-Blankenship, 2008; Chen, 2001). Based in a social cognitive perspective, motivation is the extent to which students endorse their behavior(s) and engage in activity with a holistic sense of control and a feeling of choice (Deci & Ryan, 1985). In physical education, motivational research is focused on social contexts that facilitate student engagement toward the development of a lifelong mover (NSW Board of Studies, 2003; NASPE, 2004). Whether students are motivated within or outside the physical education setting is dependent upon their perceptions of a psychologically supportive environment (Ntoumanis, 2001). A type of motivation that has been linked with determining students' level of engagement inside and outside school is self-determination (Ntoumanis, 2001, 2005).

Physical education research has demonstrated that self-determined motivation is positively correlated with active participation/engagement (Ntoumanis, 2001, 2005), learning (Chen, 2001), and mental, psychomotor and social experiences (Vallerand, 2001). Accordingly, self-

determination theory (SDT) posits that providing students with a social context that supports the innate and critical psychological needs of autonomy, competence, and relatedness can influence self-determination and numerous positive responses (Deci & Ryan, 1985; Vallerand, 2001). To understand SDT further, the following provides more detail about each psychological need, as well as individual motivation.

Deci and Ryan (1985) suggest that autonomy is a students' feeling of choice and/or control over their behaviour. In physical education, supporting autonomy is achieved when a student is provided and perceives a level of control over a learning task (Deci & Ryan, 1985). Furthermore, while the traditionally prescriptive nature of education can be controlling (Ryan, & Grolnick, 1986), a student who perceives an activity as informational or meaningful will be supported in their need for autonomy (Deci & Ryan, 2002). The need for competence is defined as perceiving and executing effectiveness, specifically when exposed to an appropriate level of challenge, within the social setting (Deci, 1975; Harter, 1983; Ryan & Deci, 2000). Baumeister and Leary (1995) define relatedness as a student feeling a sense of caring, empathy and/or inclusion within their class from both peers and teachers. Students can possess a feeling of relatedness support through the development of friendships, or hearing encouraging statements from classmates (Baumeister & Leary, 1995).

Providing a psycho-social supportive environment is crucial for influencing or mediating students' level of self-determination (Vallerand, 2001). Each need is an independent construct, yet the interplay and synergy between all three needs can and will influence individual motivation (Deci & Ryan, 1985). For instance, students may engage in an activity to play with their friends (i.e. relatedness), while another student may engage in the same activity to play with friends and win the game (i.e. relatedness and competence). Of importance in physical education is the implementation of experiences which support all three needs and in turn influence a student's self-determination (Ntoumanis, Pensgaard, Martin, & Pipe, 2004; Deci & Ryan, 2000).

Deci and Ryan (2000) posit that self-determination lies on a continuum classifying motivation into three overarching categories: amotivation, extrinsic and intrinsic motivation (Table 1).

Table 1
Relationship between Type of Motivation, Regulation and Level of Self-determined Motivation

Type of Motivation	Amotivation	Extrinsic Motivation				Intrinsic Motivation
Type of Regulation	Non-Regulation	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Quality of Behavior	Non Self-Determined					Self-Determined

(Modified from Ryan & Deci, 2000)

From an applied viewpoint, the closer motivation aligns with the intrinsic end of the continuum, the more self-determined or internally regulated the individual (Deci & Ryan, 2000). On the contrary, amotivation is at the opposite end of the spectrum and are students who possess a limited if any desire to engage or participate in a learning task (Deci & Ryan, 2000). Students who are amotivated perceive a lack of ability to achieve, thus rarely engage in activity (Ryan, 1995).

Extrinsic motivation focuses on the attainment of external factors and possesses four distinct levels, also called regulations (i.e. external, introjected, identified and integrated) (Vallerand, 1997, 2001). External regulation has been deemed the least autonomous or self-determined of all extrinsic motivation (Vallerand, 1997). Externally regulated motivation has been associated with fulfillment of external rewards and/or avoidance of punishment (Ryan & Deci, 2000). For instance, a student will only participate in a physical education class if they perceive the ability to obtain a reward or avoid being the center of a joke.

Introjected regulation is the next tier closer to more autonomous motivation and is different from external regulation as there is a slight level of internalization (Nicholls, 1984). Ryan (1982) suggests that students who align their motivation with introjected regulation are more likely to engage in behaviour for socially comparative reasons (e.g., guilt, shame).

Identified regulation is a higher level of extrinsic motivation, which is internalized to a higher degree than introjected regulation (Deci & Ryan, 1985). An individual will value and endorse the underlying behaviour, and perceive an internal perception or locus of control (Ryan, 1995). For example, a student may desire to enhance their game play ability within basketball (e.g., shooting 10 free throws in a row) but will not continue to practice when his or her goal is met. Loevinger and Blasi (1991) suggested that identified regulation can be viewed as an autonomous behaviour for a limited time (only during engagement in the activity directed toward achievement of the personal goal).

Integrated regulation lies at the top tier for extrinsic motivation and considered the most self-determined form of extrinsic motivation (Vallerand, 1997, 2001). Ryan (1995) stated that integrated regulation is behaviours that are endorsed by the individual and become internalized or a part of the self, as the student finds a level of internal meaning. For example, a student may engage in the same basketball program to be able to shoot 10 free throws in a row and eventually he or she will feel that basketball is beneficial to the self after the initial goal has been met. Integrated regulation is similar to intrinsic motivation, but differs since the behavior was engaged by external factors and was not done freely and for the enjoyment of the activity (Deci & Ryan, 2002).

Deci & Ryan (2000) suggests that intrinsic motivation is behaviours influenced by internal factors such as enjoyment and pleasure. Intrinsic motivation is seen as the optimal stage, since individuals participate in activity or behaviour for the psychological feeling of personal enjoyment and/or reward (Ntoumanis, 2001; Vallerand, 1997, 2001). Intrinsically motivated individuals are more apt to participate and continue in activity then extrinsically motivated individuals (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). Deci and Ryan (1985, 2000) suggests that the rank order of motivational styles (e.g., intrinsic, extrinsic and amotivation) form a simplex pattern where adjacent motivational styles are closer then distant ones.

Providing students with an educational setting that aligns with aspects of self-determination theory is crucial in assisting students in becoming active inside and outside physical education (Ntoumanis, 2001, 2005). A model of instruction which aligns with aspects of self-determination (e.g., supporting psycho-social needs) is the Sport Education Model [SEM] (Wallhead & Ntoumanis, 2004; Sinelnikov, Hastie, & Prusak, 2007; Perlman & Goc Karp, 2010; Perlman, 2010).

Sport Education and Motivation

Kinchin (2006) and Hastie (1998) has identified and documented the goals, features and applied student benefits of the SEM. Relevant research to this study on the SEM demonstrates how the model possesses features that support students' psycho-social needs (Perlman & Goc Karp, 2010; Perlman, 2010) and individual motivation (Wallhead & Ntoumanis, 2004; Sinelnikov et al., 2007; Spittle & Byrne, 2009).

Achieving relatedness support occurs through features, such as team affiliation and fair play structures, within the SEM (MacPhail, Kirk, & Kinchin, 2004; Perlman & Goc Karp, 2010). Students exposed to the SEM have indicated a social connection with classmates in terms of perceiving a sense of inclusion of students who are traditionally marginalized (Carlson, 1995; Clarke & Quill, 2003; Kinchin, 2001; Perlman, 2010). As a result of the supportive context developed within the SEM, students are provided opportunities to communicate more with both their classmates and teachers (Kinchin & O'Sullivan, 2003; O'Donovan, 2003; Hastie & Sharpe, 1999).

Supporting competence is one of central tenets of the SEM, as with many instructional models. However, different from other instructional models, Siedentop (1994) designed the SEM to develop a student's ability to be successful (i.e., competent) within all facets of game play (psychomotor, cognitive and affective). As a result of exposing an all male class to the SEM, Wallhead and Ntoumanis (2004) indicated a significant difference in students' perceived competence compared with a traditionally taught class. In addition, Spittle and Byrne (2009) reported similar results about perceived competence with a heterogeneous group of Year-8 physical education students.

Providing autonomy support within physical education can be a difficult task, as much of the structure surrounding an educational setting is inherently controlling and prescriptive (Ryan & Grolnick, 1986). While supporting autonomy can be daunting for teachers (Reeve, 2009), students exposed to the SEM are provided and perceive more opportunities to experience control and choice over their learning (Siedentop, 1994; Siedentop, Hastie, & van der Mars, 2011; Wallhead & Ntoumanis, 2004). For example, Perlman and Goc Karp (2010) found that providing students with an increased level of control over certain learning aspects within the SEM (e.g., affiliation), facilitated motivational change over multiple sport-based units.

As such, it seems plausible that student engagement within the SEM can provide adequate support for the psychological needs of relatedness, competence, and autonomy, yet there is a need for further investigation. Review of literature has demonstrated an inference between the SEM and facilitation of self-determined motivation through support of each psychological need, although currently limited empirical evidence is available.

To date, a few studies have investigated students' motivational responses within the SEM (Wallhead & Ntoumanis, 2004; Sinelnikov, et al., 2007; Spittle & Byrne, 2009; Perlman & Goc Karp, 2010; Sinelnikov & Hastie, 2010; Wallhead, Hagger, & Smith, 2010). Most of these studies have adopted a quantitative approach and been grounded in either an achievement goal theory (Wallhead & Ntoumanis, 2004; Spittle & Byrne, 2009; Sinelnikov & Hastie, 2010) or situational motivational framework (Sinelnikov, et al., 2007). Those studies housed within achievement goal theory indicated that the SEM facilitated motivational change (i.e. enjoyment and perceived competence), due to a change in student's perception of a social context that supported student's perceptions of personal growth (Wallhead & Ntoumanis, 2004; Spittle & Byrne, 2009). Sinelnikov, et al. (2007) utilized a comparative study focused on motivational differences at the situational level during phases (e.g. skill practice, game play and officiating) and found consistently higher levels of motivation when engaged in the SEM. Finally, Perlman and Goc Karp (2010) utilized a qualitative approach to examine student experiences and perceptions within multiple seasons of the SEM. Results of their study indicated that students began to adopt higher levels of self-determination and perceived relatedness support as the primary driver. From these and other SEM studies, a call to further investigate the motivational responses was suggested (Wallhead, & Ntoumanis, 2004; Sinelnikov, et al., 2007; Hastie & Sinelnikov, 2006; Perlman & Goc Karp, 2010). Specifically, understanding the motivational influence of the SEM from a holistic self-determined perspective is critical as SDT is deemed a robust theory for understanding human behavior (Hastie & Sinelnikov, 2006; Perlman & Goc Karp, 2010). Therefore, the purpose of this study was to examine the influence of the SEM on students' self-determined motivation and underlying psycho-social needs.

Method

Participants & Setting

Students within the study were from eight intact heterogeneous Year-9 physical education classes in the United States randomly assigned to one of two instructional groups (N=8; SEM=4 or Traditional=4). Classes consisted of 94 (Male=43, Female=51) for the SEM groups and 88 (Male=48, Female=40) students for the Traditional group. Classes met four times per week for a total of 60 minutes each day. Each class participated in a 20 lesson units of volleyball. Units of study typically lasted one month, thus implementation of 20 lesson units was a common practice within this school.

One physical education teacher was assigned to instruct all classes. This teacher had ten years of teaching experience within the same school. Selection of this teacher was due to his desire and abilities to implement both models of instruction. In addition, this teacher possessed adequate educational background (master's degree) and was routinely involved in professional development. Use of the same physical education specialist was conducted to alleviate concerns surrounding diverse teaching styles and personality.

Instructional Models

Examination of sport-based teaching approaches utilized the work of Browne, Carlson, and Hastie (2004) as a framework for the development and implementation of both approaches. As with

previous studies, representation of the SEM should include the six key features of affiliation, record keeping, seasons, formal competition, festivity and culminating event (Siedentop, 1994). Within this study, lessons 1-7 provided students with primarily teacher-led activities that focused on the development of effective game play (i.e., skill and tactical focus). During the initial lessons (i.e., lesson 2) students were placed into season long teams and provided sport-specific roles (e.g., coach, official). It should be noted that evaluations of games (i.e. who won) were assessed using a holistic game play rubric focused on the aspects of (a) winning of game, (b) fair play / sportspersonship and (c) completion of assigned roles. Lessons 8-16 engaged students in inter-team game play and team led practices. Lessons 17-20 consisted of a post-season tournament, championship game and award ceremony.

The traditional approach implemented structured lessons focusing on teaching game related skills and tactics (e.g., forearm pass, setting up the attack) during the first 7 lessons. During these lessons, the teacher developed and led team warm-ups; skill-related practices and finished with modified game play. Lessons 8-16, engaged students in game play designed around "real volleyball" using six players per side and did not provide any rule modifications. Team members changed on a daily basis and allowed students to work with different peers. Lessons 17-20 placed students on teams for a final round-robin tournament. Only wins were recorded during the final tournament to establish an overall winner. It is important to note that although students received different approaches toward the delivery of a sport-based unit, the primary unit goals for all students were (a) development of game-related skills, (b) understanding and application of net/wall tactics and (c) understanding and development of aspects to facilitate game play (e.g., rules). Table 2 provides daily outlines for both approaches.

Table 2
Comparison of Daily Lesson Focus for the SEM and Traditional Approach

Day	SEM	Traditional
1	Introduction to VB Game Play (Needs Assessment) Selection of Team Coaches	Introduction to VB Game Play (Needs Assessment)
2	Announcement of Teams/Coaches Forearm Pass Team Practice on Home Court Introduce Game Play (3v3) Introduce Duty Team Choose team name	Forearm Pass Skill Practice Game Play (6v6) "Forearm Pass only"
3	Team Warm-up/Practice Overhead Pass Intra-team Game Play (3v3) Student Roles and Responsibilities	Overhead Pass Skill Practice Game Play (6v6) "Forearm and Overhead"
4	Team warm-up/practice Serve (Underhand) Intra-team Game Play (3v3)	Serve (Underhand) Skill Practice Game Play (6v6) "No Attacking"
5	Team warm-up/practice Serve (Overhand) Pre-Season Games (3v3) Fair play/Sportspersonship	Serve (Overhand) Skill Practice Game Play (6v6) "No Attacking"
6	Team warm-up/practice Spike and Dunk Pre-Season Games (3v3)	Spike and Dunk Skill Practice Game Play (6v6)
7	Team warm-up/Practice Pre-Season Games (3v3)	Skill Review Stations Game Play (6v6)
8	Team warm-up/Practice Regular Season (3v3)	Review of Skills Game Play (6v6)
9	Team warm-up/Practice Regular Season (3v3)	How to Self-Officiate Games Game Play (6v6)
10	Team warm-up/Practice Regular Season (3v3)	Class Warm-up Game Play (6v6)

Model Fidelity

This study utilized previous guidelines to establish fidelity of the SEM and Traditional approaches through teacher preparation, reflective practice and comparison between planned materials and observation of implementation (Hastie & Sinelnikov, 2006; Parker & Curtner-Smith, 2005).

Teacher Preparation & Reflective Practice between Teacher and Researcher

Collaboration between teacher and researcher were conducted via three pre-study meetings to develop block plans, daily lessons and instructional materials for both approaches. Upon development of all materials, written plans were examined by an independent expert in Curriculum and Instruction to ensure both approaches were appropriately represented. To ensure the teacher felt comfortable in implementing the SEM, two separate pilot studies of 20-lesson volleyball seasons were implemented the semester before the research study with unaffiliated students. Lessons observations supported proper implementation of the SEM and Traditional approach. Daily post-lesson reflections provided the teacher with opportunities to discuss features of the SEM and address any study-related concerns.

Comparison of Materials and Observation

Comparative examination of each approach utilized a combined benchmark table derived from previous SEM studies [See Table 2] (Browne et al., 2004; Ko, Wallhead, & Ward, 2006). The first step began with analysis of developed materials (e.g., unit and lesson plans) by an expert (i.e., possessed a Ph.D. and 15 years experience in Physical Education Teacher Education) unaffiliated with the study to support and verify that planned materials were representative of each approach. Upon approval of all documents the next step examined fidelity of implementation. All lessons were videotaped and coded (i.e. identification by model feature) by both researcher and graduate student unaffiliated with this study using the benchmark table (Table 3). Both observers reviewed all 20 lessons to establish the SEM and Traditional approaches were implemented and delivered in a manner representative of each approach. As such, inter-rater reliability of 98% was reached for both groups.

Table 3
Sample Benchmarks used to examine the Sport Education Model and Traditional Approach

SEM	Traditional
Season phases	Majority of lesson time spent on skill
Students involved in the process of team selection	Team members change on a regular basis
Persisting teams for duration of unit	Skills practiced by the individual and not team
Incorporates student duty roles within lessons	Entire class warm-up
A formal schedule of competition is established	Lesson followed skill-drill-game format
Fair play and sportspersonship awards utilized	Teacher-led activities
Teams were mixed ability	Teams were randomly selected
Game rules were modified	Games represented "real" competitive game

(Adapted from Ko et al. 2006)

Measures

Self-Determined Motivation

Perception of self-determined motivation was assessed using the abridged Sport Motivation Scale [SMS] (Pelletier, Fortier, Vallerand, Tuson, Brière, & Blais, 1995). Due to the study focus on self-determined motivation the abridged version was used in line with previous literature (Grolnick, & Ryan, 1987). In addition, Ward, Wilkinson, Graser and Prusak (2008) have indicated adequate validity and reliability for use within physical education.

The SMS requires students to respond to a 16-item questionnaire, which provides four motivational scores derived from SDT for each participant; Intrinsic Motivation – to Know (IMK), Identified Regulation (IR), External Regulation (ER) and Amotivation (AM). Answers are scored using a 7-point Likert scale ranging from 1= "strongly disagree" to 7= "strongly agree". Individual scores for each sub-scale are calculated through mean score of responses. The SMS also provides students with a self-determination index (SDI), which represents a students overall level of self-determination. SDI is calculated using the following formula ((2*IMK) + IR)-(ER + (2*AM)). For the purpose of this study, SDI was used as the primary measure of self-determination. Collection and analysis of IMK, IR, ER and AM were not used within the analysis, yet illustrate and support the simplex-pattern of motivation espoused by SDT.

Perceptions of Psychological Needs Support

Assessment of perceived autonomy, competence and relatedness support utilized the Basic Psychological Needs Scale – Physical Education [BPNS-PE] (Deci & Ryan, 2000; Ntoumanis, 2005). BPNS-PE requires students to respond to a 21-item questionnaire, which provides three scores for autonomy, competence and relatedness. Answers are scored using a 7-point Likert scale ranging from 1= "not true at all" to 7= "very true". Individual scores for each sub-scale are calculated through mean score of responses. Ntoumanis (2005) reported acceptable reliability and validity for use in physical education.

Procedure & Data Collection

Before beginning this study, both the University Institutional Review Board and participants provided appropriate consent. Student information was kept confidential through the use of random identification numbers. Assignment of treatments to distinct classes was randomly conducted by a school official unaffiliated with the study during the summer months.

Dependent variables were SDI, autonomy, competence and relatedness and assessed using a pretest/posttest design. Data was collected with the administration of the BPNS-PE and SMS on the first day of class. Students completed all surveys in a classroom setting which required twenty minutes for completion. During the next four weeks, students were exposed to 20 lessons of volleyball using one instructional approach. Upon completion of the four week volleyball unit,

students completed the BPNS-PE and SMS a second time. During the administration of the surveys, students were instructed that the information provided would be used to help develop the physical education experiences and survey responses would have no impact on their course evaluation.

Data Analysis

Initial Analysis

Raw score data was entered using a third party and double-checked for accuracy before completing all calculations. Data was analyzed using SPSS 15.0 (SPSS Chicago, IL). Reliability analysis on all pretest and posttest dependent variable measures utilized Cronbach alpha calculation and were deemed acceptable ≥.70 level (Nunnally, 1978). Next, descriptive statistics (Mean and Standard Deviation) were calculated for both groups (Traditional and SEM) and measures (SDI, IMK, IR, ER, AM, Autonomy, Competence and Relatedness) on pretest and posttest scores.

Change in and Facilitation of Self-Determination

The primary research question examined whether the students overall perception of self-determination and support for their basic psychological needs in the SEM would be greater than students in the Traditional class. To examine this question, analysis utilized four separate repeated measures ANOVAs for each dependent variable. Due to the use of multiple calculations, a Bonferroni level adjustment was conducted ($p \leq .0125$). In addition, Levene's test for homogeneity was calculated to identify both groups were not statistically different.

Results

Table 4 provides results of alpha analyses and descriptive statistics for the SEM and traditional approach on pretest and posttest data. Mean scores for IMK, IR, ER and AM on pretest and posttest data were used to illustrate and support the simplex-pattern of self-determined motivation. Levene test for homogeneity revealed a lack of significant difference, thus providing support of similar groups.

Repeated measure ANOVA calculations revealed significant main (Time) and interaction (Time X Treatment) effects for SDI (Time) $F(1,180) = 19.68$, $p \leq .0125$, $\eta^2 = .099$; (Time X Treatment) $F(1,180) = 10.63$, $p \leq .0125$, $\eta^2 = .056$ and Relatedness (Time) $F(1,180) = 6.73$, $p \leq .0125$, $\eta^2 = .029$; (Time X Treatment) $F(1,180) = 13.34$, $p \leq .0125$, $\eta^2 = .069$ with students involved in the SEM demonstrating higher posttest scores when compared with students in the traditional group. Furthermore, data analysis revealed a lack of significance for Autonomy (Time) $F(1,180) = .345$, $p \geq .0125$, $\eta^2 = .002$; (Time X Treatment) $F(1,180) = 1.55$, $p \geq .0125$, $\eta^2 = .009$; and Competence (Time) $F(1,180) = 3.44$, $p \geq .0125$, $\eta^2 = .019$; (Time X Treatment) $F(1,180) = .68$, $p \geq .0125$, $\eta^2 = .004$.

Table 4
Descriptive Statistics (Mean and Standard Deviation) and Reliability (Alpha)

Measure	SEM M	SEM SD	Traditional M	Traditional SD	α
IMK-Pre	3.40	0.96	3.43	0.97	.88
IMK-Post	4.59	0.79	3.78	1.14	.80
IR-Pre	3.84	0.93	3.41	0.87	.75
IR-Post	4.39	1.04	3.69	1.30	.70
ER-Pre	3.44	1.18	3.55	1.24	.81
ER-Post	3.39	0.93	3.64	1.20	.80
AM-Pre	1.99	0.99	1.88	1.35	.85
AM-Post	1.83	1.01	2.07	1.16	.79
SDI-Pre	3.20	3.98	2.98	4.16	.85
SDI-Post	6.53	3.89	3.49	4.48	.80
Autonomy-Pre	4.39	0.76	4.52	0.51	.90
Autonomy-Post	4.43	0.64	4.44	0.63	.89
Competence-Pre	3.65	0.87	3.73	0.66	.73
Competence-Post	3.72	0.69	3.90	0.74	.80
Relatedness-Pre	4.22	0.58	4.47	0.35	.83
Relatedness-Post	4.52	0.53	4.40	0.68	.82

Discussion

The purpose of this study was to examine the influence of the SEM on student's self-determined motivation and psychological need(s) in physical education. Results showed students engaged in the SEM reported significantly higher levels of self-determination and perceptions of relatedness than students in the traditional approach.

The SEM brought about positive change in students self-determination within a sport-based physical education class. Change in self-determined motivation is consistent with findings of Sinelnikov et al. (2007), who reported consistently higher levels of situational motivation within different features of a SEM season when compared with a traditionally taught class. Findings from this study also lend support to Wallhead and Ntoumanis (2004) who found that students reported significantly higher levels of the intrinsic motivation measure of enjoyment when engaged in the SEM. Sinelnikov et al. (2007), Wallhead and Ntoumanis (2004) and Sinelnikov and Hastie (2010) suggest that features of the SEM, such as longer seasons and being in cohesive teams, facilitate higher levels of motivation through development of a positive social context in supporting student competence and autonomy. I share this resolve as the SEM does provide a positive and supportive social context for facilitating student motivation, yet results from this study illustrate relatedness (discussed later in this section) as the primary driver of self-determined motivation.

This study proposed that the SEM possessed features which, implemented appropriately, provided adequate support for all three psychological needs. To examine this question, the present study assessed whether students significantly changed their perceptions of autonomy, competence and relatedness. The results associated with changes in psycho-social needs support indicate students perceived a significant change for their need of relatedness and not competence nor autonomy. Results suggest that the SEM implemented within this study facilitated perceptions of a supportive psycho-social environment, which fostered higher levels of self-determination. In

addition, findings support Vallerand (2001) who suggested that changes in self-determination are influenced through support of all or a combination of needs. Within this study, self-determination was positively influenced by the need for relatedness. As such, these findings lend support for the SEM providing an environment which allows for positive social connections between peers and teacher (Clarke & Quill, 2003; Kinchin, 2001; Perlman & Goc Karp, 2010) and comfort speaking with classmates and teachers (Kinchin & O'Sullivan, 2003; O'Donovan, 2003). A plausible reason for students support for relatedness can be attributed to aspect such as the use of consistent teams and fair play guidelines. These pedagogical strategies could provide students with opportunities to get to know each other, create a sense of belonging and enhanced inclusionary feelings.

Results of this study indicated that students did not significantly change in their perception of support for autonomy and competence. These findings are not consistent with claims that the SEM is motivational through autonomy supportive, such as peer coaching (Wallhead & Ntoumanis, 2004; Sinelnikov et al., 2007) or enhance student competence (Siedentop, 1994). The lack of autonomy support may have been influenced by what Ryan and Grolnick (1986) suggest is the prescriptive nature of instruction. The act of prescribing learning experiences (i.e., decreased autonomy-support) takes control away from the student. For instance, students gain control through engagement in various roles, yet controlled through (a) how each role is completed and (b) evaluated on their degree of completion. Furthermore, the lack of change associated with student competence could be attributed to the lack of time (e.g., 20 lessons) and increased focus and learning on additional aspects imbedded within the SEM (e.g., roles).

Conclusion

These findings contribute to both the SEM and SDT literature and suggest that it is possible to influence students' self-determination within the SEM. Engagement within the SEM facilitated students' self-determined change through support for relatedness. Although the SEM assisted in facilitating motivational change for students' engaged in this physical education class, this study illustrates the need for further examination of the SEM using SDT, in particular autonomy-support. SDT provides a robust model of motivation, due to the inter- and intra-relationship between motivation and psychological needs, providing a complex matrix by which to examine models-based research to explain how key features within the SEM influence student perceptions of autonomy-support. This research provides inquiry into the examination of motivation within the SEM due to the sometimes conflicting balance between motivation (autonomy-support and control) and the pedagogical variables which influence learning.

Sport-based physical education experiences using the SEM may facilitate self-determined change. Physical educators could use features of the SEM as a structural template in providing support for each psychological need. Providing support for autonomy can be a difficult task, as the student/teacher control level may fluctuate through each SEM season. Accordingly, future studies may benefit from mixed method designs which examine features of the SEM and their influence on each psychological need and type of motivation.

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