

**TRANSFORMATIONAL TEACHING AND RELATIONAL EFFICACY
BELIEFS AMONG ADOLESCENTS: A PROSPECTIVE OBSERVATIONAL
STUDY**

by

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Abstract

It has recently been reported that 93% of Canadian youth are not meeting daily physical activity guidelines (Colley et al., 2011) and as a result are potentially at increased risk of current and future physical and mental health problems. School-based physical education has been highlighted as a particularly salient setting in which life-long physical activity behaviour can be positively promoted (Cavill, Biddle, & Sallis, 2001). The overall purpose of this thesis was to apply the tenets of transformational leadership theory (Bass & Riggio, 2006) with a view to understanding the prospective relationships between students perceptions of transformational teaching and students' (a) *personal* efficacy beliefs (task self-efficacy, self-regulatory efficacy), (b) *relational* efficacy beliefs (other-efficacy, relation-inferred self-efficacy), as well as (c) physical activity behaviours (within-class time and also during leisure time). Seven hundred and fifty three grade 10 adolescents (Mean age = 15.43) from 38 classes participated in this research. Students completed a 20-minute questionnaire at two time points, eight weeks apart. In addition, a sub-sample of 53 students wore accelerometers for 5 consecutive days at each of the two time points. Analyses were conducted separately for males and females based on mean differences at baseline. However, it should also be noted that the *pattern of results* between the independent and criterion measures in this study were largely the same for males and females. Results indicated that student perceptions of transformational teaching were able to explain significant variance in student self-efficacy, RISE and other-efficacy beliefs in the context of performing physical education tasks. Furthermore, a positive relationship between transformational teaching and within-class physical activity behaviour was found. No association was found between transformational

teaching perceptions and leisure time physical activity behaviour. Self-regulatory efficacy (the belief a person has in his/her ability to self-regulate behaviour in the face of challenges and set-backs) and physical education self-efficacy (the belief one has in his/her ability to perform tasks in the context of physical education classes) were found to be positively associated with leisure time physical activity. Collectively, this research demonstrates the utility of transformational teaching in predicting adolescents' health-enhancing cognitions and physical activity behaviour, specifically within physical education class settings.

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Chapter One: Introduction

Physical activity tends to decrease during adolescence (Colley et al., 2011). There is now general consensus that physical inactivity during adolescence can lead to both immediate and future physical and mental health problems. These include an increased risk of cardiovascular disease (Anderson et al., 2006), cancer (Okasha, McCarron, Gunnell, & Smith, 2003), obesity (Hills, King, & Armstrong, 2007) and an increased occurrence of depressed mood (Teychenne, Ball, & Salmon, 2008). Specifically, in Canada it is estimated that chronic diseases related to inactivity cost in excess of \$5.1 billion dollars annually (Katzmarzyk & Janssen, 2004).

While the majority of research on adolescent health has primarily focused on health-compromising behaviours there has been a recent rise in research examining the potential for health-enhancing behaviours. Specifically, adolescence presents an opportunity for the development of positive lifestyle habits (Call et al., 2002) with levels of physical activity behaviour during adolescence significantly predicting physical activity behaviour in adulthood (Telama et al., 2005). In light of the numerous benefits associated with adolescent physical activity for both physiological and psychological functioning (Tolfrey, Jones, & Campbell, 2000; Zahner et al., 2006) Morris (1994) remarked that increasing individuals' physical activity behaviour is "today's best buy in public health" (p. 807). In 2004 the World Health Organization (WHO) identified the promotion of physical activity behaviour as an essential public health strategy to improve the health of individuals and populations.

Despite this recommendation, recent research suggests that as few as 7% of Canadian children (5-11) and youth (12-17) are sufficiently active to meet the new daily

physical activity guidelines of 60-minutes of moderate-to-vigorous physical activity per day (Colley et al., 2011). While these guidelines represent the target threshold required to derive health benefits it should be noted that the number of youth attaining this threshold decreases during adolescence (Colley et al., 2011). In light of the high costs attached to physical inactivity, interventions designed to increase physical activity among adolescents to a level that is beneficial for maintaining a healthy lifestyle are imperative.

The WHO (2004) has specifically identified the school setting as an ideal environment for the promotion of physical activity amongst adolescents. Children spend more time in schools than any other environment outside of the home, with no other institution having such continuous or intense contact with children during this period (Frumkin, 2006). Therefore, schools have an unparalleled opportunity to create an environment in which physical activity behaviour can be promoted. Specifically, physical education classes have been highlighted as a setting in which both within-class and leisure time physical activity behaviour can be positively promoted to ensure immediate and lifelong participation (Cavill, Biddle, & Sallis, 2001).

From an *evidence-based* perspective school-based physical education has been found to be an effective means of increasing physical activity behaviours both within and outside of school hours (Kahn et al., 2002). Similarly, Dale, Corbin, and Dale (2000) reported that children were more physically active after school (3.30-7.00pm) on days in which they had scheduled physical education class, which suggests that physical education *may* stimulate children to engage in more active behaviours outside of the classroom environment.

Furthermore, it has been suggested that through physical education young people develop the appropriate knowledge, understanding and behavioural skills needed to ensure lifelong physical activity participation (Fairclough & Stratton, 2005). Okely and colleagues (2001) reported that the level of basic movement skills present in adolescents significantly predicts the time they are involved in organized physical activity outside of school. Well-planned physical education programs can improve these fundamental motor skills allowing children to successfully participate in activities across the lifespan (van Beurden et al., 2003).

In addition to the physical development benefits associated with purposeful engagement in physical education, recent research suggests that physical education benefits may extend to social, affective and cognitive domains (Bailey et al., 2009). Within the *social* domain, physical education represents a potential vehicle for the promotion of pro-social skills (Parker & Steihl, 2005) including empathy, cooperation, and a sense of personal responsibility (Bailey et al., 2009). Furthermore, participation in physical education has been suggested to have a positive impact on school attendance and attitude within school (Bailey et al., 2009) as well as a reduction in anti-social behaviour (Andrews & Andrews, 2003). With regard to *affective development*, physical education and physical activity participation have been positively associated with improved self-esteem (Trudeau & Shephard, 2008), psychological well being (Gilman, 2001) and pupils' broad attitudes towards schooling (Marsh & Kleitman, 2003). Studies examining the *cognitive benefits* associated with physical education report that classroom academic performance is commonly maintained and occasionally increased following increases in the provision of physical education, despite a decrease in the amount of time spent in academic study (Coe,

Pivarnik, Womack, Reeves, & Malina, 2006; Sallis et al., 1999). This finding reiterates the claims that a “healthy body leads to a healthy mind” (Bailey et al., 2009, p. 14). While the accumulated evidence to date highlights the wealth of potential benefits associated with physical education interventions, Bailey and colleagues (2009) stress that the role of the physical education teacher is central in order to observe these beneficial outcomes and that the *relationship* established between the teacher and student is essential. For example, Parker and Stiehl (2005) reported that teachers who are respectful, fair and honest provide positive role models to the students with whom they work. Furthermore, in qualitative research Thompson, Humbert and Mirwald (2003) reported that experiences with a physical education teacher influenced students’ physical activity behaviours. As such, researchers have increasingly examined the teacher-student relationship and its potential to foster health-enhancing behaviours amongst adolescents.

A framework that has recently been applied to the educational domain (cf. Beauchamp & Morton, 2011) to examine the teacher-student relationship is transformational leadership theory (Bass & Riggio, 2006). Studied extensively within organizational settings (see Barling, Christie, & Hopton, 2010, for a review), transformational leadership has been associated with a range of adaptive outcomes in followers including enhanced motivation (Dvir, Eden, Avolio, & Shamir, 2002), commitment to the organization (Avolio, Zhu, Koh & Bhatia, 2004) and performance (Lim & Ployhart, 2004). Specifically, within the educational setting Morton, Keith and Beauchamp (2010) demonstrated that when physical education teachers were perceived as transformational, students reported improved cognitive (motivation and attitudes towards physical education), affective (satisfaction with teacher and enjoyment with physical

education) and behavioural (in-class physical activity and leisure time physical activity) outcomes.

The aim of the proposed research is to extend the current knowledge of the relationship between physical education teacher behaviour (as conceptualized from the perspective of transformational leadership theory), student cognition (efficacy beliefs) and within-class and leisure time physical activity behaviour.

Transformational Leadership

Over the past two decades transformational leadership theory (Bass & Riggio, 2006) has become the most extensively studied framework for understanding leader behaviours (Barling et al., 2010; Piccolo & Coquitt, 2006). With its origins in the political writing of Pulitzer prize-winning author James McGregor Burns (1978), Bernard Bass (1985) later conceptualized a *Full Range Leadership* model that differentiated between transformational and transactional behaviours. The model proposes that these leadership behaviours be considered on a continuum from passive to active and ineffective to effective (Figure 1), and includes laissez faire, transactional and transformational dimensions (Avolio & Bass, 1991).

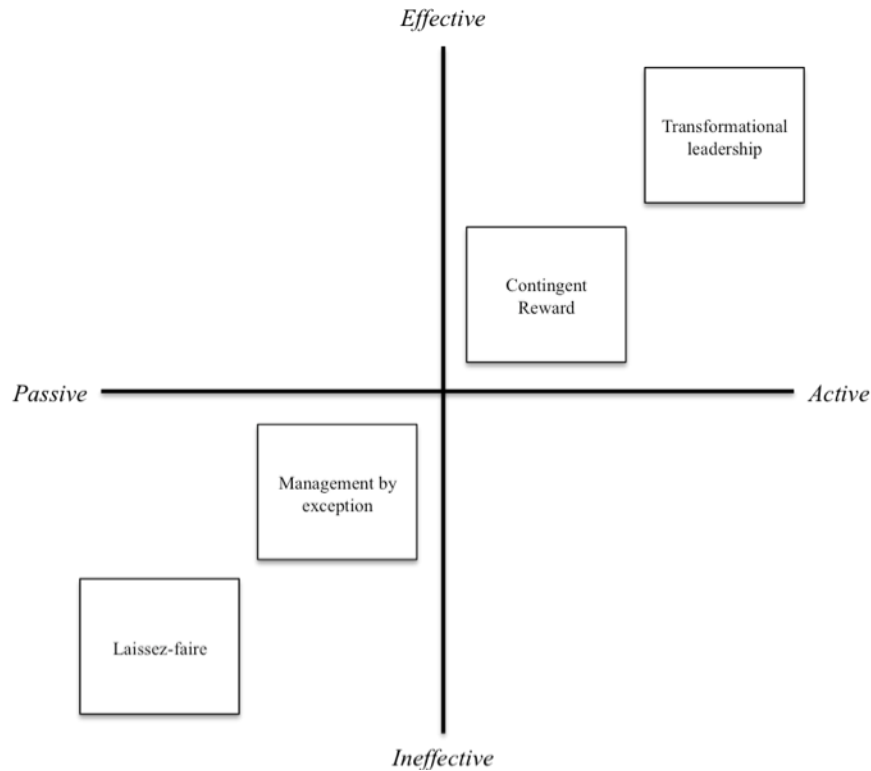


Figure 1. The full range model of leadership (Bass & Riggio, 2006)

Laissez-faire leadership represents the most inactive and ineffective form of leadership characterized by an avoidance of responsibility and a reluctance to intervene even in the most pressing situations. Furthermore, laissez-faire leaders appear indifferent to what is happening around them (Avolio & Bass, 1991). Interestingly, this behaviour has also been referred to as *non-leadership* (Bass, 1985). *Transactional* leadership is characterized by leaders' use of reinforcement to gain compliance from followers and comprises two dimensions namely: management-by-exception and contingent reward (Bass & Riggio, 2006). *Management-by-exception* is characterized by leaders monitoring followers' behaviour and the degree to which corrective action is taken when standards are not met. *Passive* management-by-exception occurs when leaders wait until the

consequences of subordinate mistakes are of such magnitude they can no longer be ignored, and only then do they intervene and often with criticism. In their meta-analytic review, Judge and Piccolo (2004) reported that both laissez-faire and passive management-by-exception leader behaviours were associated with negative follower satisfaction and motivation. *Active* management-by-exception on the other hand, occurs when leaders set out clear standards for subordinates and actively monitor their progress, often focusing on mistakes at the expense of successes. *Contingent reward* involves setting goals and providing rewards and recognition depending on whether specified standards are met. This form of transactional leadership represents ‘good’ leadership (Bass, 1985) and is positively associated with follower satisfaction and leader effectiveness (Judge & Piccolo, 2004). Bass (1998) proposed that the more active forms of transactional leadership namely: active management-by-exception and contingent reward, provide necessary, yet insufficient conditions for elevated follower satisfaction and performance. According to Bass (1998), in order to maximize follower outcomes transformational leadership is required, and when it is provided it supersedes the effects provided by transactional forms of leadership.

So what is transformational leadership? *Transformational* leadership involves the demonstration of behaviours that empower, inspire and intellectually challenge others to achieve higher levels of functioning (Bass & Riggio, 2006), and includes four distinct behavioural dimensions. These include idealized influence, inspirational motivation, intellectual stimulation and individualized consideration (Bass & Riggio, 2006). *Idealized influence* involves the display of behaviours that reflect leaders’ values and beliefs. Leaders’ who display idealized influence act as role models and engender trust and respect from their followers. They act with integrity and possess a strong ethical commitment to

their followers. *Inspirational motivation* involves articulating the expectation of high standards through positive encouragement, energy, and enthusiasm. Such behaviours help followers achieve their goals and accomplish beyond what they thought was previously possible. Through inspirational motivation, leaders make use of stories and anecdotes in order to motivate others. Leaders who engage in *intellectual stimulation* encourage followers to question current standards and beliefs, and to address issues from new perspectives. Through intellectual stimulation, leaders emphasize creativity and independent thought, enabling followers to develop personally effective ways of dealing with problems. Finally, when using *individualized consideration*, leaders recognize and respond in relation to the needs and abilities of individuals and celebrate personal successes. In such instances, these leaders act with genuine care and concern toward their followers (Bass & Riggio, 2006).

Through the use of both observational and experimental research designs transformational leadership has been studied extensively within a vast number of settings (military, hospitals, business and sport) and has been consistently associated with various adaptive outcomes among those being led. Specifically, transformational leadership has been positively associated with job satisfaction (Judge & Bono, 2000; Morrison, Jones & Fuller, 1997) and perceived leader effectiveness (Judge & Piccolo, 2004). Furthermore, various psychosocial outcomes have been positively associated with transformational leadership including follower empowerment (Dvir et al., 2002), commitment to the organization (Barling, Weber, & Kelloway, 1996) and well-being (Arnold, Turner, Barling, Kelloway, & McKee, 2007).

Of particular relevance to the current thesis, research has demonstrated that transformational leadership is significantly associated with the elevation of self-efficacy beliefs among followers (Kark, Shamir & Chen, 2003; Kirkpatrick & Locke, 1996; Pillai & Williams, 2004). In addition, transformational leadership has been consistently associated with behavioural outcomes such as achievement behaviour across a variety of settings including business organizations (Barling et al., 1996), sport (Charbonneau, Barling, & Kelloway, 2001), and the military (Dvir et al., 2002).

Within the educational domain, transformational leadership research has demonstrated a positive association between university instructor's use of transformational leadership behaviours and students' ratings of instructor performance and student in-class involvement (Harvey, Royal, & Stout, 2003). Within the school system, displays of transformational leadership behaviours by principals' has been shown to be positively associated with teacher job satisfaction (Nguni, Slegers, & Denessen, 2006), organizational commitment (Leithwood & Jantzi, 2000), and citizenship behaviours (Koh, Steers, and Terborg, 1995). As one example, Leithwood and Jantzi (2006) reported that principals' transformational leadership behaviours were positively related to teachers' willingness to change their classroom practices. However, a meta-analysis conducted by Robinson, Lloyd, and Rowe (2008) reported that principals have a small and indirect effect on student outcomes. Student outcomes are suggested to be largely mediated by the influence of the class teacher. Leithwood and Jantzi (2000) suggest that leadership within schools is not the sole responsibility of the principal; rather, leadership should be shared with teachers. Despite this, limited research has examined the influence of teachers in relation to student development and behaviour.

Acknowledging that teachers are potentially powerful agents in students' lives (Gilligan, 1998), transformational leadership theory may provide a conceptual framework through which to gain a deeper understanding of the effects of teachers' behaviours in relation to adaptive adolescent development within the school setting (cf. Beauchamp & Morton, 2011). The extension of this framework to the educational context (specifically the teacher-student relationship) is proposed on the notion that leadership is a process of social influence in which one person influences and supports others to accomplish a specified goal (Chemers, 2002); as such, it has been proposed that effective leadership is synonymous with effective teaching, and vice versa (cf. Beauchamp et al., 2010). Interestingly, a growing body of evidence suggests that transformational leadership can be developed through intervention (Barling et al., 1996), and as such this framework represents a potentially applicable model for teacher development.

Transformational Teaching

Recent research has utilized transformational leadership theory to understand the relationship between teacher behaviour and student outcome, in particular within the physical education context. In preliminary qualitative work involving focus groups and follow-up interviews with adolescents, Morton and colleagues (2010) examined the extent to which students' reported that their physical education teachers made use of the behavioural components represented by transformational leadership. The results suggested that students described a range of different behaviours that directly aligned with leadership behaviours that have been widely reported within workplace settings (cf. Bass & Riggio, 2006). In addition, when teachers were perceived as displaying transformational behaviours

their students' reported more adaptive responses, including improved cognitive (beliefs and attitudes towards physical education, motivation towards physical activity), affective (enjoyment of physical education, satisfaction with the teacher) and behavioural (within-class and leisure time physical activity) responses. Building upon this preliminary study, a three-stage investigation by Beauchamp and colleagues (2010) sought to develop a psychometrically robust and conceptually sound measure of transformational teaching for use within the educational settings. In this work, focus groups and interviews were conducted with teachers and adolescents, as well as experts on transformational leadership theory to help develop a measure of transformational teaching (i.e., the Transformational Teaching Questionnaire, TTQ). Subsequently, multilevel confirmatory factor analytic procedures, with 2761 grade 8-10 adolescents, found support for the reliability and factorial validity of measures derived from the TTQ. Finally, Beauchamp and colleagues (2010) examined the predictive utility of measures derived from the TTQ, and found that when teachers demonstrated transformational behaviours, students reported greater self-determined motivation and positive affect towards physical education classes.

In addition to this qualitative and observational evidence, Beauchamp, Barling and Morton (2011) conducted a pilot intervention study in which physical education teachers were provided a 1-day workshop to improve their transformational teaching behaviours. In this study, perceptions of transformational teaching assessed at baseline were able to predict significant variance in student motivation ($r = .47$), self-efficacy ($r = .37$) and intentions ($r = .25$) five months later. In addition, the results revealed that teachers involved in the intervention condition demonstrated higher levels of transformational teaching than those in the control condition (after controlling for baseline levels). Furthermore, students

of teachers in the intervention condition displayed higher levels of self-determined motivation, self-efficacy, and intentions to be physically active in their leisure time than those in the control group (again, after controlling for baseline levels). Taken together, the findings of that study suggest that the transformational teaching behaviours displayed by school physical education teachers might be able to bring about improvements in motivational and confidence-related cognitions among students.

It should be noted, however, that research has yet to examine the predictive effects of transformational teaching in relation to behavioural responses among students. Although Morton and colleagues (2010) found some evidence to suggest that when teachers make use of these transformational behaviours this may translate into improved within-class and leisure time actions amongst students, this was a qualitative study, and as such precluded any inferences regarding directionality or the size of potential effects. Nonetheless, in light of the accumulated evidence from workplace settings linking transformational leadership to behavioural responses and achievement among employees (Barling et al., 1996), along with qualitative research findings within physical education settings (Morton et al., 2010), it would seem worthwhile to examine the relationships between transformational teaching by physical education teachers and student physical activity behaviors. Such a relationship is consistent with theory (cf. Bass & Riggio, 2006). Thus, it was hypothesized that adolescents' perceptions of teachers' transformational behaviours will predict both (a) physical activity behaviours among students within physical education classes, and also (b) the physical activity behaviours by adolescents during their leisure time (although it was expected that the effects for leisure time physical activity would be less pronounced than for within-class physical activity behaviours).

Hypothesis 1: *There will be a positive relationship between students' perceptions of transformational teaching and the amount of time that students spend in class time pursuing moderate-to-vigorous physical activity behaviours.*

Hypothesis 2: *There will be a positive relationship between students' perceptions of transformational teaching and the frequency and duration of students' moderate-to-vigorous leisure time physical activity behaviours.*

Transformational Teaching and Student Self-Efficacy

The construct of self-efficacy is embedded within Social Cognitive Theory (SCT), which was conceptualized by Bandura (1977) in an attempt to understand and explain human behaviour. This framework contrasted with those provided by behavioural theorists such as Skinner (1953) who asserted that behaviour is driven exclusively through responses to environmental stimuli. Alternatively, Bandura (1986) postulated that individuals are active agents in determining their behaviour rather than simply passive products of the environment. Specifically, Bandura suggested that individuals have the power to initiate actions for a particular purpose and thus assert their *personal agency* (Bandura, 1997). For example, rather than simply reacting to external stimuli, intermediary cognitive processes can determine which external factors are observed and how they are perceived, allowing an individual to exercise control over their own behaviour. Furthermore, a person's cognitive processes (e.g., beliefs and self-perceptions) will affect the social milieu in which they choose to engage and the way they behave in this setting. As such, social cognitive theory is built on the notion of *triadic reciprocal determinism*, specifically the interaction between

environmental events (e.g., presence of others, task difficulty), personal factors (e.g., cognitive and affective states), and behavioural (e.g., effort, performance) aspects (see Figure 2). While these factors are theorized to affect each other bidirectionally the strength of their influence will vary for different activities and under different circumstances.

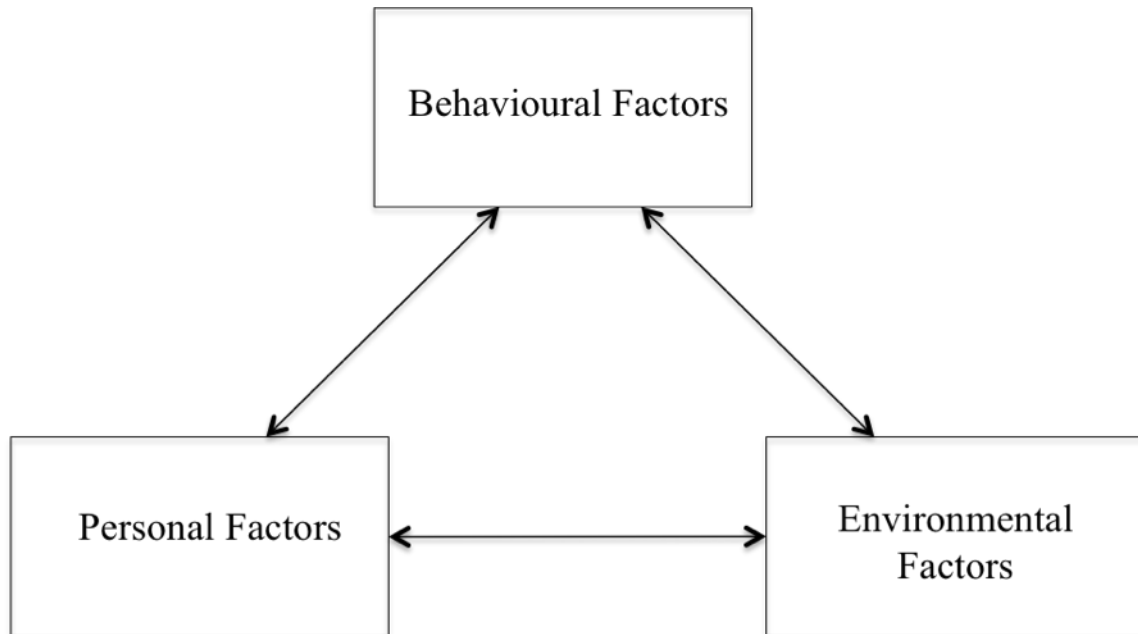


Figure 2. The relationship between the three major determinants in triadic reciprocal causation of personal agency (adapted from Bandura, 1997, p.6).

For example, within the context of physical education, a student may feel confident in his/her ability (a personal factor) to perform a lay-up in basketball during practice contexts (an environmental factor), and as such may increase his/her accomplishment of this task (a behavioural factor). Consequently, increased performance during practice may elevate the student's belief in his/her ability (a personal factor) to execute a lay-up in a game situation (an environmental factor). Two fundamental cognitive processes embedded

within social cognitive theory that are particularly implicated in the determination of behaviour are self-efficacy beliefs and outcome expectations.

Self-efficacy is conceptualized as “the belief in one’s capabilities to organize and execute the course of action required to produce given attainments” (Bandura, 1997, p.3). Emphasis is placed on individuals’ perceived capabilities of what they can do rather than their actual capability to achieve the outcome. As Bandura (1997) stated “people’s level of motivation, affective states, and actions are based more on what they believe than on what is objectively true” (p.2). Outcome expectancies, on the other hand, refer to an individual’s judgment that a specific behaviour will lead to a certain outcome (Bandura, 1977). The two cognitive factors are distinct from one another as self-efficacy represents a belief in one’s ability to carry out a specific behaviour, while outcome expectancies are judgments about the likelihood of an outcome following the behaviour (Bandura, 1997; see Figure 3). Furthermore, Bandura posits that self-efficacy beliefs casually influence outcome expectancies, but not vice versa¹.

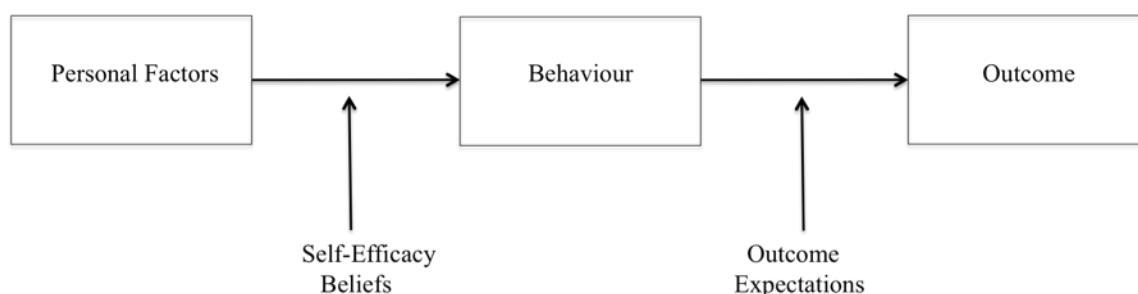


Figure 3. The relationship between self-efficacy beliefs and outcome expectancies

¹ The unidirectional causation model proposed by Bandura is somewhat contentious with some researchers suggesting that outcome expectations can causally influence self-efficacy beliefs (cf. Williams, 2010, for a review).

In relation to physical activity behaviour, Sallis, Prochaska, and Taylor (2000) highlight the increased importance of both self-efficacy beliefs and outcome expectancies as children grow up and physical activity behaviour becomes increasingly voluntary. However, while both outcome expectations and self-efficacy can affect motivation, Bandura suggests that self-efficacy plays a more substantial role because “the types of outcomes people anticipate depend largely on their judgments of how well they will be able to perform in given situations” (Bandura, 1997, p. 21). For example, in the physical education setting a student who believes he/she cannot play softball (low self-efficacy) will likely believe that she/he will not receive a good grade for that activity (low outcome expectancy). Conversely, an individual with an elevated sense of self-efficacy is likely to hold positive outcome expectancies about what can be accomplished.

Self-efficacy beliefs are conceptualized as being task specific and are influenced by six primary sources; past performances; vicarious experiences; imaginal experiences; social/verbal persuasion; and physiological and affective states (Bandura, 1997; Maddux, 2000). Past performances are theorized to be the most powerful source of self-efficacy information, whereby past successes increase a person’s self-efficacy for executing the action in the future; past failures will decrease self-efficacy. In situations where limited past experiences are available to draw from, individuals may observe others performing the specific behaviour. This observation, known as modeling (or vicarious experience), enables an individual to determine whether he or she will be capable of performing the same behaviour. Self-efficacy beliefs are also influenced by imagining oneself performing effectively or ineffectively in a situation. Images can be created from personal experiences,

from watching others perform the behaviour, or even through verbal persuasion (Williams, 1995).

Self-efficacy information is also gathered through the feedback individuals receive from significant others. This includes both verbal and non-verbal feedback that can either bolster or undermine self-efficacy beliefs. The strength of the persuasion depends on the trustworthiness and expertise of the source (Maddux, 2000). Physiological and affective states also provide an individual with information about an impending outcome that in turn can affect a person's self-efficacy beliefs. Physiological states refer to physical cues such as sweating, shaking, or fatigue that are associated with a certain situation, while affective states refer to the emotional cues associated with certain situations. Whether these states act to increase or decrease self-efficacy beliefs depend on how they are *appraised* by the individual. For example, a student experiencing an elevated physiological response (e.g., sweating) before entering a gym may perceive this as an indication of his/her inability to complete the impending task. Alternatively, the student may associate this physiological state with being ready and prepared, and so elevate the student's self-efficacy beliefs.

Of direct relevance to the current research, Hagger, Chatzisarantis, and Biddle (2001) reported that adolescent self-efficacy was positively related to intentions to be physically active. Furthermore, Motl and colleagues (2002) found that among adolescents self-efficacy was independently related to moderate and vigorous physical activity behaviour. Given the potential impact of self-efficacy beliefs on adolescent physical activity behaviour (Dishman et al., 2004) the current research focused on the relations between adolescent self-efficacy for completing tasks required in physical education classes and physical activity levels within class time. Of note, McAuley and Mihalko

(1998) distinguish between two broad categories of the self-efficacy construct, a *task* component and a *regulatory* component. The task component refers to beliefs an individual has regarding his or her ability to perform a specific behaviour (e.g., prescribed intensity), while the regulatory component refers to beliefs in one's ability to manage difficulties associated with performing the behaviour (e.g., fatigue). In the current research, and consistent with Bandura (1997), task self-efficacy was operationalized as a person's belief in his/her ability to perform tasks within the physical education setting and hereafter is referred to as *physical education self-efficacy*. Research among adults has found task self-efficacy to be positively associated with physical activity behaviour (McAuley, Courney, Rudolph, & Lox, 1994). In addition, recent research within the physical education setting found that student task self-efficacy was positively associated with physical activity behaviour both in and outside physical education classes (Jackson, Whipp, Pengelley, Chua, & Beauchamp, 2011b). In line with this finding, the current research sought to examine self-efficacy in the context of performing physical education activities as a predictor of adolescent physical activity behaviour in relation to within-class activities and indeed leisure-time activities.

Within the educational environment research suggests that self-efficacious students participate more readily, work harder and experience fewer negative emotions in the face of concerted difficulties than those who doubt their capabilities (Schunk & Pajares, 2002). Bandura (1997) stated “the stronger the perceived self-efficacy, the higher the goals individuals set for themselves and the firmer their commitment to them” (p. 116). Therefore, individuals who feel more efficacious in their abilities to perform tasks within class will be expected to display elevated levels of physical activity during class time.

In addition to physical activity behaviour displayed within class, one of the major aims of physical education classes is to provide adolescents with the necessary confidence and skills required to participate in physical activity during leisure time (Taylor, Ntoumanis, Standage, & Spray, 2010). It is therefore important to examine how motivational factors within physical education class may be translated to physical activity participation in leisure time, which represents a more distal outcome than within-class physical activity. Cox, Smith and Williams (2008) reported that motivation within physical education is positively related to students' leisure-time physical activity. Similarly, Taylor and colleagues (2010) found that when students' reported having greater competence in physical education they displayed greater effort within class and pursued more leisure time physical activity. However, the relationship between self-efficacy for physical education activities and leisure time physical activity behaviour has not yet been examined. Bandura (1997) suggests that efficacy beliefs may differ in their *generality*; that is, the extent to which individuals relate their self-efficacy beliefs from one situation to another. While some experiences generate self-efficacy beliefs that are specific to a situation, other experiences generate self-efficacy beliefs that extend beyond that specific context. This study will examine the extent to which self-efficacy beliefs for activities performed within physical education classes extend to physical activity behaviour outside of the classroom.

Of particular relevance to the current research, within the organizational literature it has been suggested that transformational leadership can have a positive effect on followers' self-efficacy beliefs (Bass & Riggio, 2006). In one study, employees who rated their managers as more transformational felt more empowered and displayed higher self-efficacy beliefs than those who rated their managers as less transformational (Kark et al., 2003). In

addition, Shamir, House and Arthur (1993) suggested that self-efficacy is the primary motivational mechanism through which transformational leaders influence their followers. From a conceptual perspective, the four dimensions of transformational leadership directly mirror the theoretical antecedents of self-efficacy beliefs (Pillai & Williams, 2004). First, individual consideration involves the display of genuine care and concern for an individual that is often displayed through *verbal persuasion* about what the other can accomplish. Second, through idealized influence followers perceive leaders as *role models* of appropriate behaviour with whom they can identify, and thus may act as a *vicarious source* of efficacy information (cf. Bandura, 1997). Third, inspirational motivation involves displays of enthusiasm, optimism about what others can accomplish, and the communication of high expectations (i.e., elevated outcome expectancies). Interestingly communication of higher expectations has been found to be related to heightened follower self-efficacy (cf. Williams, 2010) Finally, intellectual stimulation encourages individuals to think beyond what they thought possible and therefore has the potential to increase the opportunities for *mastery experiences*.

Within educational contexts elevated levels of self-efficacy are positively associated with improved achievement and effective learning strategies (Schunk and Pajares, 2002). Consistent with the tenets of transformational leadership theory it is theorized that displays of transformational behaviours by teachers will be related to increased self-efficacy beliefs among students. Research within the physical education setting has shown that displays of transformational teaching were prospectively related to students self-efficacy beliefs to complete the activities required of them in physical education classes over the course of a five month period (Beauchamp et al., 2011). The current study will further examine the

relationship between perceptions of transformational teaching and adolescent's self-efficacy for physical education class.

Hypothesis 3: *There will be a positive relationship between students' perceptions of transformational teaching and students' self-efficacy for physical education.*

Hypothesis 4: *There will be a positive relationship between students' physical education self-efficacy and the amount of time that students spend in class time pursuing moderate-to-vigorous physical activity behaviours.*

Hypothesis 5: *There will be a positive relationship between students' physical education self-efficacy and the frequency and duration of moderate-to-vigorous leisure-time physical activity.*

Extending Self-Efficacy Theory: Relational Efficacy Beliefs

Within social cognitive theory Bandura consistently emphasized the importance of social contexts in relation to personal enactment of salient behaviours, noting that, “whether [people's] endeavors are socially impeded or supported will depend, in part, on how efficacious others perceive them to be” (1986, p.437). In line with this perspective, Lent and Lopez (2002) sought to extend tenets outlined within self-efficacy theory in an attempt to understand the role of efficacy beliefs within relational, or *interpersonal*, contexts. Within close relationships, Lent and Lopez (2002) proposed that not only do we hold self-efficacy beliefs about our individual capabilities, but we also develop efficacy beliefs about those with whom we interact. Snyder and Stukas (1999) suggest that the

beliefs we hold about significant others can lead to a self-fulfilling prophecy, whereby significant others display a behaviour that mirrors what is expected of them. In educational settings, if students feel that their teacher has confidence in their abilities they may show increased effort in an attempt to live up to these expectations. This form of self-fulfilling prophecy has been extensively studied within the classroom in the well-known Pygmalion studies by Rosenthal and Jacobson (1968, 1992). Specifically, when teachers expected enhanced performance from their children, then the children often performed to these expectations.

In their model of relational efficacy, Lent and Lopez (2002) identified two focal constructs that together with self-efficacy form the basis of a tripartite model. These constructs involve *relation-inferred self-efficacy* (RISE) and *other-efficacy*. RISE refers to an individual's appraisal of how his/her capabilities are viewed by his/her partner. That is, RISE "involves person B's appraisal of how his or her capabilities are viewed by person A" (Lent & Lopez, 2002; p. 268). Other efficacy, on the other hand, refers to an individual's belief in his/her partner's capabilities to perform a given behaviour (Lent & Lopez, 2002).

Transformational Teaching and Student Relation-Inferred Self-Efficacy (RISE)

RISE beliefs develop as an individual reflects on "how my partner sees me" (Lent & Lopez, 2002, p. 268). RISE beliefs reflect an individual's *inference* about what his/her partner believes rather than what is objectively true. In this sense RISE is considered a metaperception (cf. Kenny & DePaulo, 1993). RISE beliefs are largely influenced by the behavioural responses of the partner (Lent & Lopez, 2002). Given the inferential nature of this efficacy information, these appraisals have the potential to be processed either

accurately or inaccurately. Lent and Lopez (2002) state that “RISE serves as a cognitive filter through which people interpret the supportive or discouraging feedback they receive from significant others” (p. 270). As such, RISE may provide a relationship-specific source of self-efficacy information. For example, if a student believes that the teacher does not believe in his/her ability (i.e., low RISE) then support from that teacher might be interpreted as meaningless and insincere, and thereby potentially decreasing the students’ self-efficacy beliefs. In contrast, if a student believes that the teacher has a strong belief in the student’s ability (i.e., high RISE) then a corrective comment may be interpreted as motivating and highlight a need for the student to expend extra effort, and thus potentially heightening the student’s self-efficacy beliefs.

Arbona (2000) examined the teacher-student relationship and found that whilst some students reported criticism from their teacher to be negative others believed it was a display of the teacher’s belief that they could perform to a higher standard. As such, it is suggested that RISE beliefs allow individuals to make sense of others’ messages regarding the self and so impact an individual’s self-efficacy beliefs. Within relational settings, RISE is theorized to augment the six primary sources of information from which individuals establish self-efficacy beliefs (Lent & Lopez, 2002).

Limited research has examined RISE appraisals within physical activity contexts. However, preliminary observational research within the sporting context by Jackson, Beauchamp and Knapp (2007) reported that individuals’ RISE beliefs were positively related to their self-efficacy beliefs. Furthermore, qualitative research on athlete-athlete dyads (Jackson, Knapp, & Beauchamp, 2008) and coach-athlete dyads (Jackson, Knapp, & Beauchamp, 2009) provide support for this suggestion. Recent quantitative research with

undergraduate students by Jackson and colleagues (2011a) suggested that when students believed that their teacher was highly confident in them (i.e., high RISE) they reported greater confidence in their own ability (i.e., high self-efficacy).

In research examining the antecedents of RISE Jackson and colleagues (2008) reported that RISE beliefs were constructed through the partner's verbal behavior; specifically, supportive communication was associated with more positive RISE appraisals. Supportive communication is characteristic of leaders who manifest *individualized consideration* through their acknowledgement of individuals' psychological and physical needs. In this sense, leaders who display individualized consideration would be expected to promote positive RISE appraisals. Furthermore, non-verbal behaviour conveyed from a partner, including body language, was also reported as an antecedent of RISE beliefs (Jackson et al., 2008). For example, one-athlete reported, "If you see his body language... you can see he's confident in you" (Jackson et al., 2008, p. 526). In a similar regard, when leaders exhibit *idealized influence* they act with honesty and integrity and it is likely that these attributes may be presented through non-verbal means. In qualitative research of coach-athlete dyads Jackson, Knapp and Beauchamp (2009) reported that the type of goals a coach sets for the athlete can affect athletes' RISE perceptions. Specifically, more challenging plans and goals set by coaches were associated with higher RISE appraisals by athletes. Leaders who manifest *inspirational motivation* display optimism about others' potential and accomplishments (Bass & Riggio, 2006). Thus, leaders who display inspirational motivation would be expected to elevate individuals RISE appraisals. Taken together, it seems likely that when leaders or teachers interact with others through displays

of transformational leadership, this is likely to result in elevated RISE beliefs among those being led or taught (i.e., students).

Given that RISE appraisals are open to personal interpretation, Lent and Lopez (2002) emphasized that caution must be taken to ensure that negative feedback is structured in a way that focuses on achievable goals and performance potential rather than implying incompetence and failure to reach unrealistic goals. This is particularly important within the educational setting where students must learn new skills and knowledge, upon which they are highly dependent upon the teacher. Therefore, if a student perceives that a teacher exhibits a strong belief in the student's ability (i.e., high RISE) then students will likely demonstrate high self-efficacy beliefs. In sum, drawing from theoretical tenets offered by Lent and Lopez, it is theorized that when a student believes that his/her teacher has confidence in the student's ability to complete the tasks at hand (i.e., high RISE) this will positively predict elevated levels of self-efficacy among students.

***Hypothesis 6:** There will be a positive relationship between students' perceptions of transformational teaching and students' RISE beliefs.*

***Hypothesis 7:** There will be a positive relationship between students' RISE beliefs and their self-efficacy beliefs to perform activities involved in physical education classes.*

Transformational Teaching and Other-Efficacy Beliefs

As stated previously, other-efficacy represents an individual's beliefs in his/her significant other's ability to perform a given behaviour (Lent & Lopez, 2002). Within the

teacher/student relationship, students will invariably develop beliefs regarding their teacher's ability to teach, while teachers will develop beliefs regarding their students' ability to learn. When a person has an elevated sense of the significant other's capabilities, this is theorized to affect the focal person's level of commitment and amount of effort expended in activities involving behavioural engagement (Lent & Lopez, 2002).

In a study of college students engaged in romantic relationships Lopez and Lent (1991) reported greater satisfaction with the relationship and intention to continue when an individual was confident in their partner's ability to manage the relationship (other-efficacy). Other-efficacy has also been studied within the sporting context. Within undergraduate physical activity classes, Jackson, Taylor, Myers, and Beauchamp (2011a) reported that favorable other-efficacy beliefs were able to predict student effort and enjoyment. Qualitative research by Jackson and colleagues (2009) examined the antecedents and consequences of other-efficacy within coach-athlete relationships. This study revealed that athletes reported having greater confidence in their coaches' ability (i.e., other-efficacy) when the coach displayed high levels of determination and effort, as well as a desire to succeed and improve as a coach. This coach behaviour mirrors the *inspirational motivation* component of transformational leadership, whereby leaders display energy and enthusiasm in order to help others reach their full potential. Furthermore, in this study, athletes reported feeling more confident in their coaches' abilities when coaches were able to communicate effectively and made their athletes feel at ease. This behaviour parallels that of *individualized consideration*, which involves the display of genuine care and concern for individuals and the recognition of specific needs and desires.

In many respects, the teacher-student relationship holds similarities with the coach-athlete relationship. Both coaches and teachers are in a position of power (superordinate-subordinate) and are employed in the pursuit of athlete/student learning and growth, where success in these pursuits is largely dependent on the expertise of the coach/teacher and commitment from the athlete/student.

Holding high other-efficacy beliefs for a significant other is also theorized to increase the amount of effort expended in joint tasks and potentially leads to an increase in performance (Lent & Lopez, 2002). In the sporting dyad of horse and rider within the sport of equestrian eventing, Beauchamp and Whinton (2005) reported that riders' confidence in their horses' capabilities (other-efficacy) explained significant variance in riding performance, above and beyond that explained by riders' self-efficacy beliefs alone. In another study, Jackson and colleagues (2009) found that when athletes' display high levels of other-efficacy for their coaches they reported greater motivation and responsiveness to the coach. As an example, one of the athletes in this qualitative study stated, "if you're confident that you're going to get the right training you're going to listen to them (i.e., your coach)" (p. 223). It is therefore likely that when students feel confident in their teachers' ability to effectively guide and teach them during physical education class they will engage in a greater amount of physical activity behaviour within class.

Hypothesis 8: *There will be a positive relationship between students' perceptions of transformational teaching and students' other-efficacy beliefs.*

Hypothesis 9: *There will be a positive relationship between students' other-efficacy beliefs and the amount of time that students spend in class time pursuing moderate-to-vigorous physical activity behaviours.*

Transformational Teaching and Self-Regulation

In recent years, in the field of health psychology, we have begun to see a shift from disease management to health promotion (Bandura, 2005). As such, attention has increasingly turned to how individuals effectively manage their lifestyle habits in order to stay healthy. In doing so, the construct of self-regulation has been highlighted as fundamental for health behaviour change (Bandura, 2005). Self-regulation is a psychosocial variable embedded within Social Cognitive Theory (SCT; Bandura, 1977) and is a process through which individuals personally regulate their behaviour towards specific goals. Self-regulation consists of three aspects; self-monitoring, judging and self-reacting (see Figure 4; Bandura, 1991).

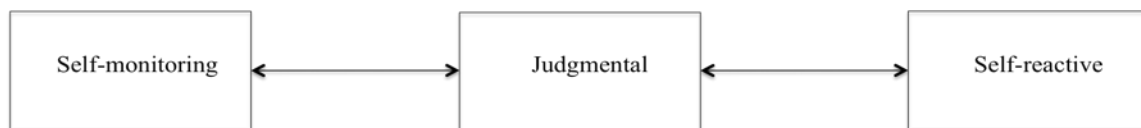


Figure 4. Structure of self-regulation of motivation (Bandura, 1991).

Before an individual can change his/her behaviour they must first observe it (see Figure 4). This involves monitoring when the specific behaviour occurs and both the immediate and distal consequences. The aspects of the behaviour that an individual considers important, based on personal values, will be attended to whilst those that are not

will be ignored (Bandura, 2005). Following this, an individual will 'judge' whether the action has positive or negative effects based on personally set standards against which the action is evaluated. Personal standards are influenced by three factors, (a) the degree to which an individual considers the activity valuable, (b) the comparison of one's own performance in relation to others, and (c) the extent of which performance is attributed to personal ability rather than external support.

Following these judgments, if a discrepancy is found between behaviour and personal standards then individuals will react in order to change behaviour. Through self-motivating incentives individuals are able to maintain these behaviour changes and exercise self-regulatory control (Bandura, 2005). Self-motivating incentives can involve specifying specific outcomes for the accomplishment of certain activities or the anticipation of affective reactions. These incentives provide the individual with sufficient motivation to complete the task (Bandura, 1991). Broadly defined, self-regulation involves setting personal goals and steering behaviour in a given direction in order to achieve them.

In the context of adolescent physical activity, it has been reported that adolescents who display better self-regulatory skills display higher levels of moderate and vigorous physical activity behaviour (Dishman et al., 2005; Petosa, Hartz, Cardina, & Suminski, 2005; Winters, Petosa, & Charlton, 2003). Adolescence is a time of transition whereby teens are more frequently afforded opportunities for autonomy. For example, in the early teenage years adolescents are faced with multiple external rules and regulations from teachers and parents, however, the level of control typically decreases as adolescents progress through school and are faced with increased choice over which activities they wish

to engage. At this time, the ability to self-regulate is crucial, especially if physical activity is to be maintained during leisure time pursuits.

A fundamental determinant of self-regulation corresponds to how much an individual believes they have the ability to exercise control over their behaviour in the face of challenges and setbacks; this is referred to as *self-regulatory efficacy* (Bandura, 1997) and is considered crucial for *maintaining* regular physical activity (Bandura, 1997).

Bandura (2004) notes that self-regulatory efficacy may be more salient than other cognitive factors when examining activities of daily living as the issue is not whether an individual believes they can do the task, but rather whether they can overcome potential setbacks to carry out the activity on a *regular basis*. Maddux and Gosselin (2003) suggest that individuals with a high level of self-regulatory efficacy set more challenging goals and show greater persistence to reach those goals even when faced with particular obstacles. Alternatively, failure and barriers will easily deter those who possess low self-regulatory efficacy. Within the exercise context, Ryan and Dzewaltowski (2002) found that self-regulatory efficacy is positively associated with physical activity behaviour in adolescents.

Of particular relevance to the current research, MacDougall, Schiller, and Darbyshire (2004) suggest that a major aim of physical education class is to enable students to develop the skills and confidence they need to be physically active outside the school environment, and to encourage physically active lifestyles. As such, physical education teachers are in a prime position to encourage students to develop the essential physical activity management skills and satisfaction needed to continue physical activity outside of the structured physical education setting.

Bandura (1997) proposed that the development of self-regulatory skills is enhanced through enlisting the help of individuals who are knowledgeable and influential; these people are often referred to as *proxy agents*. However, over-reliance on proxy agents can decrease self-regulatory efficacy by reducing the number of mastery experiences an individual encounters (Bandura, 1997). This suggestion was supported by Shields and Brawley (2007) who reported that individuals who preferred assistance from a proxy agent displayed less self-regulatory efficacy. To prevent this, independence from the proxy must be practiced and self-regulatory skills developed (Brawley, Rejeski, & King, 2003). Boekaerts (1997) suggested that self-regulation can be positively developed through *scaffolding*, whereby support is offered during the initial periods of skill learning, and subsequently, the level of support is reduced as the individual's own expertise increases. Scaffolding mirrors the concept of intellectual stimulation whereby the teacher encourages students to develop a sense of self-awareness, to think independently, and develop self-regulation (Avolio, 2003).

The ability to self-regulate is also developed through the modeling of desired behaviours from social agents (Bandura, 1969). Individuals who manifest idealized influence act as role models and focus on the long-term well-being of followers (Barling, et al., 2010). Therefore, it is possible that through role modeling, transformational teachers aid the development of self-regulatory skills among students. As such, transformational teachers may support students in the development of their self-regulatory efficacy beliefs, enabling them to manage their physical activity behaviour during leisure time.

The current thesis will examine the relationships between transformational teaching, self-regulatory efficacy and leisure time physical activity, which represents a more distal

and autonomous outcome to that of within-class physical activity. By examining the relations between transformational teaching and psychosocial variables that pertain to adolescent behaviour, both within and outside of the classroom, we will gain a better understanding of what motivates this population to be physically active.

Hypothesis 10: *There will be a positive relationship between students' perceptions of transformational teaching and students' self-regulatory efficacy beliefs*

Hypothesis 11: *There will be a positive relationship between students' self-regulatory efficacy beliefs and frequency and duration of moderate-to-vigorous leisure time physical activity.*

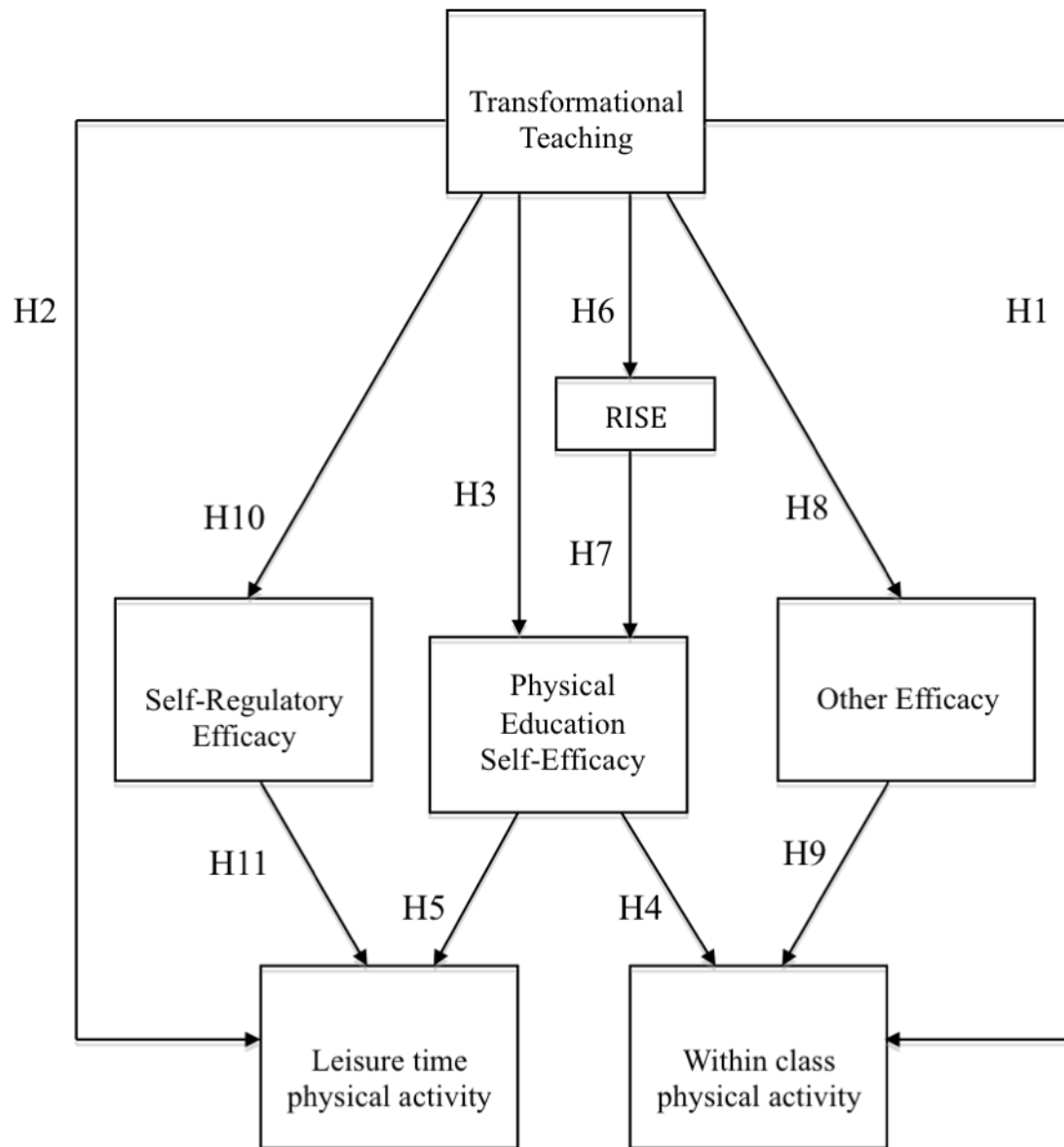


Figure 5. Proposed model linking transformational teaching to adolescent physical activity cognition and behaviour.

Testing a Mediation Model of Transformational Teaching

The current research will also examine whether transformational teaching directly predicts adolescent physical activity within and outside of the classroom setting, or whether (as hypothesized) these relationships are mediated by self-efficacy, other-efficacy, and self-regulatory efficacy (see Figure 5).

Hypothesis 12: *The relationship between transformational teaching and students' physical education self-efficacy beliefs will be mediated by students' RISE beliefs.*

Hypothesis 13: *The relationship between transformational teaching and within-class physical activity will be mediated by students' physical education self-efficacy.*

Hypothesis 14: *The relationship between transformational teaching and within-class physical activity will be mediated by students' other-efficacy.*

Hypothesis 15: *The relationship between transformational teaching and leisure-time physical activity will be mediated by students' physical education self-efficacy beliefs.*

Hypothesis 16: *The relationship between transformational teaching and leisure-time physical activity will be mediated by students' self-regulatory efficacy.*

Chapter Two: Methods

Participants

916 adolescents from grade 10 classes (Mean age = 15.43, SD = .62) participated in this study at Time 1 in April 2011. Of this group, 753 adolescents (384 boys, 369 girls) provided data two months later (17.8% attrition over time). Students were drawn from 38 classes, from eight schools in the Lower Mainland of British Columbia and represented a diverse range of ethnic and socioeconomic backgrounds. The demographic characteristics of the sample at Time 2 are shown in Appendix A. In addition to the questionnaires, a subsample of 67 adolescents were randomly selected and invited to wear an accelerometer at Time 1. Of this group, 53 adolescents wore the accelerometers again at Time 2.

Grade 10 represents the final year in which physical education is a mandatory school-subject in British Columbia (Canada), following which physical education becomes optional and enrolment tends to decrease significantly (Deacon, 2001). Furthermore, one study has shown that many students elect to take Grade 11 physical education based primarily on their Grade 10 experiences rather than based on what the course will entail (Gibbons, Wharf Higgings, Gaul, Van Gyn, 1999). Given that teacher behaviour emerges as the most influential factor when examining student attitudes toward physical education (Goudas & Biddle, 1994) examination of the teacher-student relationship among Grade 10 adolescents was deemed to be the focus of interest within the current research.

Procedure

Prior to conducting the study, ethical approval was obtained from the institutional review board at The University of British Columbia, as well as agency approval from the

corresponding school boards. Initial contact with the schools was made via school principals. Once principals had agreed to participate in the study contact was made with school physical education departments. After schools had elected to participate, an initial visit was conducted 3 weeks prior to data collection. At this time, potential participants were provided with a verbal announcement during student classes explaining the purpose of the study. Students were also given an information letter explaining the purpose of the study, that participation was voluntary and that they could withdraw from the study at any time without having to give a reason (see Appendix B). At the same time, parents were sent a letter outlining the purpose of the study and provided with the opportunity to opt their child out of the study (see Appendix C). Passive consent from parents was utilized for various reasons. First, there is strong evidence to suggest that active parental consent leads to a decrease in subject participation rates as many students fail to return the parental consent forms (Dent, Sussman, & Stacy, 1997). Second, it has been suggested that parental consent is more likely to be obtained from students of more advantaged educational and economic backgrounds (Dent et al., 1993). Potential losses from the original sample lead to underrepresentation of these populations and decreases confidence in the results. Third, the process of passive consent places less strain on the school system. Furthermore, it is reasonable to assume that teachers who are transformational will encourage students to return parental consent forms, whereas those who are less transformational may not be as enthusiastic. Therefore, the passive parental consent procedure derives a number of benefits over obtaining active parental consent and likely leads to the inclusion of a more representative sample. Informed consent from students was provided by election to

complete the questionnaire. This approach is consistent with recommendations provided by the Society of Adolescent Medicine (Santelli et al., 1995).

Questionnaire administration occurred in April and June, 2011. Data collection at the initial time point (April) ensured that students had sufficient time to establish stable perceptions of teachers' behaviours. This avoids the potential honeymoon-hangover period in which new situations are often rated as overly appealing, followed by a significant reduction in attractiveness (Boswell, Boudreau, & Tichy, 2005). Questionnaires took around 15-20 minutes to complete (see Appendix D) and were completed independently by students during a pre-arranged class under the supervision of a research assistant. On each occasion students were informed of the voluntary nature of the study and advised that they could withdraw at any point without incurring any negative consequences.

In addition to questionnaire completion, a subsample of students were randomly selected and invited to provide objective measures of physical activity through accelerometry. Sixty-eight adolescents elected to wear an accelerometer at Time 1; of this group 53 adolescents provided data two months later (20.9% attrition over time). Students who elected to participate were provided with verbal instructions from the researcher on how to correctly wear the accelerometer and wear it for 5-days (three weekdays and two weekend days). A reminder service was provided to the students either via email or text message. Those who chose to use this service were sent a reminder at 7am every morning on the appropriate days. In addition, monetary incentives (\$20) were provided for students who wore accelerometers in order to heighten compliance rates. The Previous Day Physical Activity Recall Diary (see Appendix E) was also used and students were instructed to complete the diary in addition to wearing the accelerometer for 5-days. At the end of the 5-

day period the researcher returned to the schools in order to collect the diary and accelerometers.

Measures

Demographics. Demographic information was collected from students and included information on: date of birth, place of birth, gender, school name, class name, grade, ethnicity, first three digits of postal code, and finally mother and fathers' occupation.

Perceptions of Transformational Teaching. Student perceptions of transformational teaching behaviour were assessed using the Transformational Teaching Questionnaire (TTQ; Beauchamp et al., 2010). This 16-item measure assesses each of the four transformational dimensions of idealized influence, inspirational motivation, intellectual stimulation and individualized consideration. Items are measured on a 5-point rating scale with anchors 'not at all' (0), 'once in a while' (1), 'sometimes' (2), 'fairly often' (3), and 'frequently' (4) and are prefixed by: *The physical education teacher I am rating....* Example items are 'motivates me to try my hardest' (Inspirational Motivation), 'provides me with tasks and challenges that get me to think in different ways' (Intellectual Stimulation), 'treats me in ways that build my respect' (Idealized Influence), and 'recognizes the needs and abilities of each student in the class' (Individualized Consideration). Results of multilevel confirmatory factor analysis found support for the reliability and factorial validity of measures derived from the TTQ (Beauchamp et al., 2010). In the present study, the higher order measure of Transformational Teaching was operationalized (potential range of scores 0-16), and demonstrated good internal consistency ($\alpha = .95$ at Time 1, $\alpha = .96$ at Time 2).

Tripartite Efficacy Beliefs.

Three 9-item measures were used to examine the tripartite efficacy beliefs of self-efficacy, other-efficacy and RISE specifically within the physical education setting (Jackson et al., 2011b). The three measures were found to demonstrate adequate reliability, factorial validity and measurement invariance by nationality (Australians and Singaporeans) and gender. In this study, Jackson et al. provided evidence for factorial validity, whereby the data demonstrated close model fit for a three-factor latent variable model, comprising measures of self-efficacy, other-efficacy, and RISE. These measures are described in turn below.

Student Physical Education Self-Efficacy. Student perceptions of their abilities to perform specific tasks within the physical education setting were assessed using the 9-item Physical Education Self-Efficacy Questionnaire (Jackson et al., 2011b).

Items are prefixed by: *Rate your confidence in your ability to.....*, and use a 5-point rating scale with anchors ‘No confidence at all’ (1), ‘low confidence’ (2), ‘moderate confidence’ (3), ‘high confidence’ (4), and ‘complete confidence’ (5). All items use the stem: *Honestly rate your confidence in your ability to....* Exemplar items include ‘Try your hardest in every PE class’, and ‘Always listen carefully to you PE teacher’s instructions’. Scoring involved taking the mean of all items. The self-efficacy measure demonstrated sound internal consistency ($\alpha = .90$ at Time 1 and Time 2).

Student Relation-Inferred Self-Efficacy (RISE). Student RISE beliefs were measured using the 9-item RISE Questionnaire (Jackson et al., 2011b). The questionnaire was

designed specifically for use within the physical education context. All items are prefixed by: *Estimate how confident your teacher is in your ability to....* followed by items such as ‘Perform all the skills you are taught in PE’, and ‘Try your hardest in every PE class’. Items were scored on a 5-point rating scale (1-5) using anchors ranging from ‘no confidence at all’ to ‘complete confidence’. Scoring involved taking the mean of all items. The RISE measure demonstrated sound internal consistency ($\alpha = .92$ at Time 1 and $\alpha = .93$ at Time 2) in the current study.

Student Other-Efficacy. Student beliefs in their teachers’ ability to teach them were assessed using the Student Other-Efficacy Questionnaire (Jackson et al., 2011b). The 9-item questionnaire was designed specifically to measure other-efficacy perceptions within the physical education environment. Items were scored on a 5-point rating scale for each participant and were all prefixed by: *Rate your confidence in your PE teacher’s ability to....*. Exemplar items include, ‘Motivate you even during hard or unfamiliar activities’, and ‘Treat all students fairly and equally regardless of how good they are at PE’. Scoring involved taking the mean of all items. The other-efficacy measure demonstrated good internal consistency ($\alpha = .92$ at Time 1 and $\alpha = .94$ at Time 2) in the current study.

Student Self-Regulatory Efficacy for Physical Activity. Students’ beliefs in their ability to manage various self-regulatory aspects of their physical activity participation over the upcoming three weeks were assessed using a 10-item instrument developed by Shields and Brawley (2007). The instrument assesses distinct aspects of self-regulatory capabilities, including participant’s perceived abilities to use effective exercise techniques, monitor

physical activity, and schedule exercise sessions. Responses are anchored on a 0 percent (not at all confident) to 100 percent (completely confident) scale and each item is prefixed by: by ‘*How confident are you that you can....*’ Exemplar items include, ‘Motivate yourself to get at least 30 minutes of activity a day, 3 times per week over the next three weeks’, and ‘Set realistic, weekly, exercise goals for yourself over the next 3 weeks’. Scores were summed and averaged to provide a mean efficacy score out of 100 percent for each participant. The self-regulatory efficacy for physical activity measure demonstrated good reliability ($\alpha = .90$ at Time 1 and $\alpha = .91$ at Time 2) in the current study.

Subjective measures of physical activity behaviour

Leisure Time Physical Activity. The WHO Health Behaviour in School Children (WHO HBSC) questionnaire was used to assess student’s leisure time physical activity behaviour (Booth, Okely, Chey & Bauman, 2001). This two-item measure assesses the frequency and duration of students’ physical activity behaviours that are enacted *outside of school hours*. The item: ‘Outside school hours: How often do you usually exercise in your free time, so much that you get out of breath or sweat’ was used to assess frequency of leisure time physical activity. Responses are anchored on a 1 (once a month or less) to 5 (every day) scale. Duration of leisure time physical activity was assessed using the item: ‘Outside school hours: How many hours do you usually exercise in your free time, so much that you get out of breath or sweat’. For this item responses are anchored on a 1 (none) to 6 (about 7 hours per week) scale. The measure has been reported to demonstrate moderate test-retest reliability (.22 to .60) and has demonstrated good predictive validity in relation to measures derived from the Multistage Fitness Test (Booth et al., 2001) amongst grade 8 and 10

students. Specifically, in the study by Booth and colleagues (2001) students classified as active from the questionnaire displayed significantly greater aerobic fitness than students classified as inadequately active. In the current study frequency and duration of leisure time physical activity were analyzed separately.

Within-class Physical Activity. Time spent by students in physical education classes pursuing moderate-to-vigorous physical activity behaviours were assessed using one select item from the Physical Activity Questionnaire for Adolescents (PAQ-A; Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997). The PAQ-A is designed to measure 7-day recall of the level of moderate and vigorous physical activity. The current study was specifically interested in student's within-class physical activity behaviour. The measure asked; "In the last 7 days, during physical education class, how often were you very active (playing hard, running, jumping, throwing)". Responses were scored on a 5 point scale with anchors, 'I don't do PE' (1), 'hardly ever' (2), 'sometimes' (3), 'quite often' (4) and 'always' (5). This single item provided a measure of subjective within-class physical activity behaviour.

Objective Measure of Physical Activity

Accelerometers. In addition to self-report measures, objective information about student physical activity patterns were collected through use of accelerometry. The Actigraph GT1M accelerometer (Actigraph™, LCC, Fort Walton Beach, FL, USA) is a dual-axis motion sensor that records vertical and horizontal accelerations allowing researchers to identify the *amount* of energy expenditure on a daily basis. Furthermore, accelerometers can be used to identify *when*, during the course of a given day, physical activity is being pursued. Accelerometers have been demonstrated to be feasible for use

with adolescents (Van Coevering et al., 2005). In the current study, adolescents were instructed to wear the accelerometer for all waking hours of the day and to only remove it for water-based activities. Participants were instructed to wear the monitor on, or just above, their right hip for five consecutive days (three week days and the two weekend days). The accelerometer measures an individual's acceleration (in "counts"), which is summed over a specified interval of time (an "epoch"). In the current study epoch lengths were specified at 30-seconds in order to capture the sporadic nature of adolescent physical activity (Treuth et al., 2007). The data was then downloaded to a computer. Activity counts were converted into metabolic equivalents (MET's) for each adolescent (Freedson, Pober, & Janz, 2005). Moderate-to-vigorous physical activity (MVPA) was specified to be an activity levels of >4 METs. From this it was possible to determine the duration of time that student's spent within physical education class and during leisure time pursuing MVPA. Students were required to have a minimum of three valid days (two weekdays and one weekend day) of data recording for MVPA values to be calculated. In the current study leisure time physical activity was defined as between 3pm-9pm on weekdays and all day on weekends. Within-class physical activity was calculated individually for each student based on when physical education class was scheduled. For within-class physical activity adolescents needed to be wearing the accelerometer for the duration of the physical education class for data to be considered valid. For leisure-time physical activity in the weekdays two hours of non-wear time during 3pm and 9pm were allowable. For weekends, adolescents needed to have 8 valid hours of wearing time (the sum of sedentary, light and MVPA). The average amount of time spent in physical education class engaging in MVPA was calculated for each adolescent by summing the total within-class MVPA minutes and

dividing by the total number of physical education classes the students had during the period of measurement. Leisure time MVPA was calculated separately for weekdays and weekends and then summed to provide a total score for leisure time MVPA across a week.

In addition to wearing the accelerometer, participants were asked to keep a Physical Activity Recall Diary for the 5 days. This allowed us to determine whether periods of “zero counts” represented a time when the participant did not wear the accelerometer or whether they represented periods in which the individual was totally still. Beyond this, ‘non-wear’ time was defined as 30 minutes or more of consecutive zero counts on the accelerometer. There is little agreement within the literature with regard to the best way to deal with ‘non-wear’, however a recent study (Rowlands, Esliger, Eady, & Eston, 2010) found the 30-minute cut-off to be the most appropriate for distinguishing between non-wear and stationary time (e.g., sitting, sleeping).

Data Analysis

Once questionnaires had been completed, participants’ responses were scanned into a computer and the data were saved as a Remark document; this was done separately for Time 1 and Time 2 data. Data were then exported to SPSS (Version 19) where data derived from participants were matched across the two time points. Following this, preliminary analyses were conducted to screen the data for entry errors, missing data and to identify outliers. To examine whether any differences existed based on those that did not complete the questionnaires at Time 2 versus those that did, we conducted a multivariate analysis of variance. In addition, univariate and multivariate outliers were examined. For cases with partial missing data (i.e., less than 50% per scale), within-person mean substitution was

employed by manually entering the calculation into composite scores to ensure a more conservative estimate of internal consistency (Tabachnick & Fidell, 2007). Descriptive statistics were calculated on all study variables, followed by the determination of univariate normality, which was examined through skewness and kurtosis values. Bivariate correlations were calculated between all study variables to determine patterns of associations. In addition, assumptions of linearity, normality, independence, and homoscedasticity were checked using residual scatterplots. Regression analyses were conducted to test the study hypothesis. Specifically, the independent variable (transformational teaching) was operationalized by Time 1 data, while the proposed mediators and outcomes variables were operationalized by Time 2 data. In light of the number of regression that were performed, a more conservative alpha value was set ($\alpha < .01$) in order to minimize the likelihood of making a type 1 error.

Finally, mediation analyses were conducted to examine the possible mechanisms affecting the relationship between the independent and dependent variables of interest. The causal steps approach (Baron & Kenny, 1986) is the most utilized when examining mediation in the social sciences. Baron and Kenny propose that a number of steps must be fulfilled for a variable to be considered a mediator. First, the independent variable significantly predicts the dependent variable (path c; see Figure 6). Second, the independent variable significantly predicts the proposed mediator variable (path a). Third, the proposed mediator significantly predicts the dependent variable when controlling for the independent variable (path b). Fourth (path c'), the relationship between the independent variable and the dependent variable, when controlling for the mediator, either decreases to zero (complete mediation) or decreases by a non-trivial amount (partial mediation). Despite the

frequent use of this method it has been criticized for its low statistical power and an overreliance on multiple regression analyses, or steps, to examine a single mediation pathway, steps which are not always considered necessary (Preacher & Hayes, 2004). The causal steps approach specifically examines the degree of mediation (indirect effect) via the outcome of $c - c'$ pathways. However, this difference is considered theoretically the same as the product of the $a*b$ pathways therefore, $a*b \approx c - c'$ (Preacher & Hayes, 2004). For this reason it is becoming increasingly recommended to perform a single test of $a*b$ rather than the series of steps proposed by Baron and Kenny (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

In the current study a bootstrapping procedure was conducted and reported to examine the significance of the $a*b$ estimates. This non-parametric procedure generates a new sample based on the original data (Preacher & Hayes, 2008). In the current study a bootstrap sample of 5000 was used. This procedure is considered superior to the causal steps approach as it does not assume normal distribution amongst the variables (Preacher & Hayes, 2008). The bootstrapping procedure produces 95% bias corrected and accelerated confidence intervals and mediation is present if the BCaCI does not contain zero (Preacher & Hayes, 2008). In the current study this method was used to examine simple mediation as well as multiple mediation.

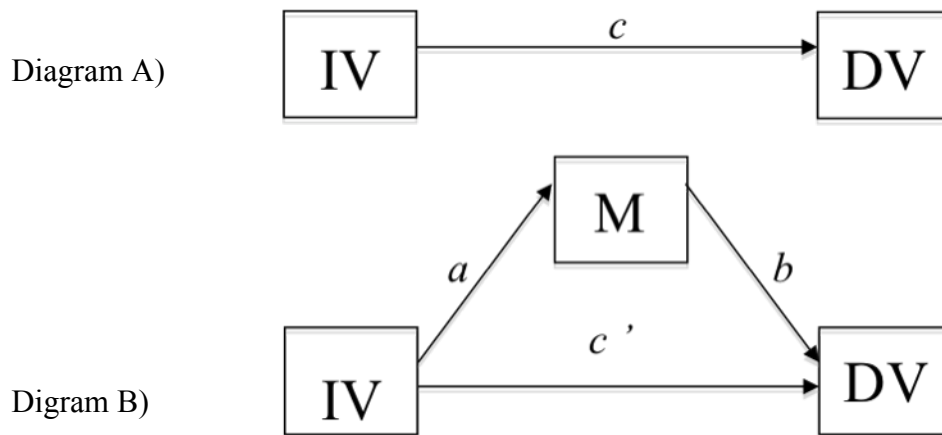


Figure 6. The mediation pathways proposed by Baron and Kenny (1986). Diagram A shows the total effect of the independent variable (IV) on the dependent variable (DV). Diagram B shows the direct effect of the IV on the DV through the mediator (M) and indirect pathways.

Chapter Three: Results

Preliminary Analysis

Prior to conducting the main analyses data were screened for data entry errors, missing data and potential outliers. Univariate outliers were assessed by examination of histograms and Z-scores. Participants with a Z-score of ± 3.29 on a scale ($n=2$) were identified as potential univariate outliers. The two univariate outliers were not removed from analysis, as within studies with a large sample size a small number of Z-scores that exceed 3.29 are expected (Tabachnick & Fidell, 2007). Furthermore, the responses from these individuals did not appear atypical. Multivariate outliers were assessed by examining Mahalanobis distances. Fifteen participants were identified as having a mahalanobis distance greater than $\chi^2(8) = 26.13$. These cases were also included in the analysis as participants' responses did not appear atypical within the sample (Tabachnick & Fidell, 2007).

A 2 (gender: male, female) X 2 (drop out: dropout versus retained at Time 2) between subjects multivariate analysis of variance (MANOVA) was conducted on the eight dependent variables assessed at Time 1. The overall multivariate effect for drop out was significant, $F(8, 881) = 2.20, p = .03$, partial $\eta^2 = .02$, as was the overall multivariate effect for gender, $F(8, 881) = 9.81, p < .001$, partial $\eta^2 = .08$. The drop out X gender interaction was non significant, $F(8, 881) = .54, p = .83$. Follow-up univariate analyses revealed that girls reported lower levels of self-efficacy ($p < .001$, partial $\eta^2 = .05$), RISE beliefs ($p < .001$, partial $\eta^2 = .02$), and self-regulatory efficacy ($p = .001$, partial $\eta^2 = .01$) than boys. Furthermore, girls reported lower frequency ($p < .001$, partial $\eta^2 = .02$), and duration ($p < .001$, partial $\eta^2 = .02$) of leisure time physical activity as well as lower levels of within

class physical activity ($p < .01$, partial $\eta^2 = .01$) compared to boys. In light of these findings, separate subsequent analyses were conducted for males and females.

In addition, individuals who did not provide data at Time 2 reported lower levels of transformational teaching perceptions ($p < .01$, partial $\eta^2 = .01$) and other-efficacy ($p < .01$, partial $\eta^2 = .01$) beliefs than those who provided data at both time points.

Descriptive Statistics

Descriptive statistics are reported for all study variables at both Time 1 and Time 2 in Table 1. The intercorrelations between the four dimensions of transformational teaching are provided in Table 2 and 3. In light of the high intercorrelations between these subscales (.57-.83 at Time 1), as well as empirical evidence for a higher-order operationalization of measure derived from the TTQ, (Beauchamp et al., 2010) a composite measure of transformational teaching was used in this study. Therefore, no multicollinearity diagnostics were examined based on the use of a single independent variable.

Bivariate correlations between all study variables at Time 1 and Time 2 are shown in Table 4 and 5. Of particular relevance to the current research, higher levels of perceptions of transformational teaching at Time 1 were associated with higher levels of various Time 2 cognitive outcomes including self-efficacy (.41), other-efficacy (.61-.68), and RISE (.44-.54). Furthermore, perceptions of transformational teaching at Time 1 were positively associated with within-class physical activity (.17-.24). However, no association was found between perceptions of transformational teaching at Time 1 and frequency or duration of leisure time physical activity at Time 2.

In addition, Bivariate correlations were conducted to examine the relationship between subjective and objective measures of physical activity with the sub-sample of 53 participants. On the basis of the small sample size and similar patterns of relationships between the independent variable (transformational teaching) and criterion variables for males (see Table 4) and females (Table 5), the correlations between self-report and objective measures of physical activity were reported for the entire sample (see Table 6). Bivariate correlations were also conducted to examine the relationship between objective measures of physical activity and all other study variables for the entire sample (see Table 7).

Table 1*Summary of Descriptive Statistics for all Study Variables*

	Range	M(SD)		Skewness		Kurtosis	
		Males	Females	Males	Females	Males	Females
Transformational Teaching T1	0-16	10.45(3.43)	10.56(3.38)	-0.47(.12)	-0.60(.13)	-0.40(.25)	-0.01(.26)
Transformational Teaching T2	0-16	10.74(3.62)	10.57(3.38)	-0.59(.12)	-0.85(.13)	-0.32(.25)	0.66(.26)
Self-Efficacy T1	1-5	4.07(.70)	3.66(.72)	-0.80(.12)	-0.41(.13)	0.06(.25)	-0.04(.26)
Self-Efficacy T2	1-5	4.09(.70)	3.75(.70)	-0.69(.12)	-0.48(.13)	-0.12(.25)	0.69(.26)
Other-Efficacy T1	1-5	3.73(.87)	3.71(.84)	-0.59(.12)	-0.60(.13)	-0.15(.25)	0.07(.26)
Other-Efficacy T2	1-5	3.72(.90)	3.66(.87)	-0.65(.12)	-0.75(.13)	-0.12(.25)	0.47(.26)
RISE T1	1-5	3.97(.76)	3.68(.73)	-0.84(.12)	-0.42(.13)	0.51(.25)	0.09(.26)
RISE T2	1-5	3.96(.81)	3.72(.76)	-0.83(.12)	-0.50(.13)	0.35(.25)	0.46(.26)
Self-Regulatory Efficacy T1	0-100	73.19(20.34)	67.99(22.86)	-0.81(.12)	-0.28(.13)	0.14(.25)	1.70(.26)
Self-Regulatory Efficacy T2	0-100	72.36(21.48)	67.06(22.60)	-1.10(.12)	-0.74(.13)	0.97(.25)	0.11(.26)
Self-report Frequency of LTPA T1	1-5	3.35(1.00)	2.96(1.06)	-0.52(.12)	-0.18(.13)	0.10(.25)	-0.56(.26)
Self-report Frequency of LTPA T2	1-5	3.38(.98)	2.96(.97)	-0.40(.12)	-0.18(.13)	0.08(.25)	-0.09(.26)
Self-report Duration of LTPA T1	1-6	4.39(1.31)	3.80(1.43)	-0.63(.12)	-0.31(.13)	-0.22(.25)	-0.71(.26)
Self-report Duration of LTPA T2	1-6	4.41(1.27)	3.79(1.34)	-0.78(.12)	-0.29(.13)	0.16(.25)	-0.36(.26)
Self-report Within-class Physical Activity T1	1-5	3.95(.91)	3.75(.81)	-0.68(.12)	-0.66(.13)	0.13(.25)	0.78(.26)
Self-report Within- class Physical Activity T2	1-5	3.99(.90)	3.65(.91)	-0.65(.12)	-0.64(.13)	0.06(.25)	0.53(.26)

Table 2*Summary of Intercorrelations for scores on the Transformational Teaching Questionnaire for Males*

	1	2	3	4	5	6	7	8
1. Idealized Influence T1	-							
2. Inspirational Motivation T1	.79	-						
3. Intellectual Stimulation T1	.75	.74	-					
4. Individualized Consideration T1	.76	.76	.66	-				
5. Idealized InfluenceT2	.72	.62	.59	.62	-			
6. Inspirational Motivation T2	.67	.69	.58	.65	.86	-		
7. Intellectual Stimulation T2	.61	.57	.68	.55	.81	.78	-	
8. Individualized Consideration	.63	.62	.54	.68	.84	.85	.72	-

Note: All correlations are significant, $p < 0.01$ level (2-tailed)

Table 3*Summary of Intercorrelations for scores on the Transformational Teaching Questionnaire for Females*

	1	2	3	4	5	6	7	8
1. Idealized Influence T1	-							
2. Inspirational Motivation T1	.80	-						
3. Intellectual Stimulation T1	.75	.74	-					
4. Individualized Consideration T1	.79	.83	.68	-				
5. Idealized InfluenceT2	.73	.62	.57	.61	-			
6. Inspirational Motivation T2	.63	.67	.55	.61	.82	-		
7. Intellectual Stimulation T2	.55	.56	.63	.51	.77	.76	-	
8. Individualized Consideration	.63	.63	.53	.68	.83	.85	.70	-

Note: All correlations are significant, $p < 0.01$ level (2-tailed)

Table 4*Summary of Intercorrelations for scores on all study variables for males*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Time 1																
1. TT	-															
2. Self-Efficacy	.47**	-														
3. Other-Efficacy	.80**	.52**	-													
4. RISE	.58**	.81**	.64**	-												
5. Self-Regulatory Efficacy	.19**	.56**	.20**	.43**	-											
6. Self-report Frequency of LTPA	.04	.43**	.05	.30**	.57**	-										
7. Self-report Duration of LTPA	.06	.41**	.05	.32**	.57**	.77**	-									
8. Self-report Within-class PA	.28**	.48**	.32**	.40**	.28**	.27**	.22**	-								
Time 2																
9. TT	.75**	.36**	.71**	.49**	.15**	.03	.01	.25**	-							
10. Self-Efficacy	.41**	.70**	.42**	.65**	.45**	.39**	.37**	.39**	.44**	-						
11. Other-Efficacy	.68**	.39**	.68**	.51**	.18**	.07	.02	.27**	.85**	.51**	-					
12. RISE	.54**	.59**	.52**	.66**	.40**	.27**	.26**	.33**	.67**	.73**	.69**	-				
13. Self-Regulatory Efficacy	.17**	.45**	.13**	.35**	.73**	.53**	.56**	.27**	.14**	.47**	.17**	.37**	-			
14. Self-report Frequency of LTPA	.07	.45**	.08	.34**	.55**	.69**	.59**	.25**	.06	.44**	.12*	.34**	.64**	-		
15. Self-report Duration LTPA	.05	.38**	.06	.33**	.50**	.63**	.64**	.21**	.04	.37**	.09	.29**	.60**	.69**	-	
16. Self-report Within-class PA	.24**	.32**	.26**	.27**	.17**	.21**	.13*	.45**	.28**	.36**	.30**	.34**	.21**	.22**	.17**	-

Note: * $p < .05$, ** $p < .01$.

Table 5*Summary of Intercorrelations for scores on all study variables for females*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Time 1																
1. TT	-															
2. Self-Efficacy	.39**	-														
3. Other-Efficacy	.83**	.49**	-													
4. RISE	.52**	.82**	.63**	-												
5. Self-Regulatory Efficacy	.14**	.45**	.21**	.39**	-											
6. Self-report Frequency of LTPA	.06	.30**	.10	.24**	.51**	-										
7. Self-report Duration of LTPA	.07	.36**	.15**	.29**	.57**	.81**	-									
8. Self-report Within-class PA	.19**	.42**	.27**	.36**	.28**	.22**	.23**	-								
Time 2																
9. TT	.73**	.29**	.69**	.44**	.20**	.10*	.10	.14**	-							
10. Self-Efficacy	.41**	.74**	.45**	.69**	.43**	.25**	.31**	.40**	.43**	-						
11. Other-Efficacy	.61**	.31**	.69**	.46**	.19**	.11*	.14**	.15**	.84**	.50**	-					
12. RISE	.44**	.64**	.51**	.70**	.37**	.26**	.28**	.31**	.53**	.78**	.60**	-				
13. Self-Regulatory Efficacy	.17**	.39**	.21**	.34**	.73**	.53**	.53**	.17**	.23**	.44**	.23**	.36**	-			
14. Self-report Frequency of LTPA	.05	.26**	.09	.20**	.49**	.70**	.62**	.16**	.06	.26**	.13*	.22**	.55**	-		
15. Self-report Duration of LTPA	.002	.30**	.07	.24**	.52**	.66**	.67**	.19**	.06	.31**	.14**	.28**	.56**	.77**	-	
16. Self-report Within-class PA	.17**	.32**	.21**	.27**	.24**	.23**	.21**	.43**	.23**	.41**	.28**	.41**	.21**	.20**	.24**	-

Note: * $p < .05$, ** $p < .01$.

Table 6*Summary of the Intercorrelations for scores of self-report and objective measures of physical activity*

	1	2	3	5	6	7	8	9	11	12
Time 1										
1. Self-report Frequency of LTPA	-									
2. Self-report Duration of LTPA	.81**	-								
3. Self-report Within-class PA	.17	.12	-							
5. Objective within-class PA	.10	.18	.22	-						
6. Objective LTPA	.34*	.26	.06	-.07	-					
Time 2										
7. Self-report Frequency of LTPA	.52**	.47**	.09	.08	.12	-				
8. Self-report Duration of LTPA	.64**	.64**	.30*	.24	.21	.55**	-			
9. Self-report Within-class PA	.10	.21	.62**	.21	-.05	-.01	.18	-		
11. Objective within-class PA	.16	.23	.23	.36*	.20	.09	.33*	.18	-	
12. Objective LTPA	.06	.07	.01	.16	.11	.07	.15	.14	.35*	-

N = 53, Note: * $p < .05$, ** $p < .01$.

Table 7*Summary of the Intercorrelations between objective measures of physical activity and other study variables*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Time 1														
1. TT	-													
2. Self-Efficacy	.29*	-												
3. Other Efficacy	.85**	.39**	-											
4. RISE	.36**	.82**	.49**	-										
5. Self-Regulatory Efficacy	.42**	.46**	.44**	.50**	-									
6. Objective Within-class PA	.08	.13	.09	.15	.22	-								
7. Objective LTPA	.04	.29	.18	.24	-.11	-.07	-							
Time 2														
8. TT	.69**	.31*	.71**	.43**	.35**	.17	.13	-						
9. Self-Efficacy	.31*	.75**	.46**	.79**	.42**	.15	.29	.45**	-					
10. Other Efficacy	.62**	.30*	.71**	.42**	.29**	.20	.12	.85**	.54**	-				
11. RISE	.34*	.72	.47**	.76**	.43**	.20	.17	.59**	.89**	.62**	-			
12. Self-Regulatory Efficacy	.27	.34*	.16	.42**	.53**	.31*	-.03	.18	.39**	.10	.34*	-		
13. Objective Within-class PA	-.04	.13	.01	.02	.02	.39*	.20	-.02	.06	-.05	-.03	-.06	-	
14. Objective LTPA	-.07	.36*	.18	.16	.06	.16	.11	.14	.31*	.13	.39*	.03	.35*	-

N = 53, Note: * $p < .05$, ** $p < .01$.

Main Analyses

Transformational Teaching and Physical Activity Behaviour

The first two hypotheses presented in this thesis corresponded to the relationship between perceptions of transformational teaching behaviours and student physical activity, both in relation to within-class and leisure time activities.

Hypothesis 1. A regression analysis was conducted to examine the relationship between transformational teaching at Time 1 and within-class physical activity behaviour at Time 2. For males, there was a positive relationship between transformational teaching and self-reported within-class physical activity, ($\beta = .24$ $F(1,381) = 24.19$, $adjR^2 = .06$, $p < .01$). Furthermore, for females there was a significant relationship between transformational teaching and self-reported within-class physical activity, ($\beta = .17$ $F(1,350) = 10.11$, $adjR^2 = .03$, $p < .01$). Given that the correlation between transformational teaching at Time 1 and objective measures of within-class physical activity at Time 2 was not significant no subsequent regression analysis was conducted.

Hypothesis 2. Two regression analyses were conducted to examine the relationship between transformational teaching at Time 1 and frequency and duration of leisure-time physical activity behaviour at Time 2. No significant relationship was found between transformational teaching and frequency of leisure-time physical activity for males, ($\beta = .07$, $F(1, 381) = 1.60$, $adjR^2 = .002$, $p > .05$) or females, ($\beta = .05$, $F(1, 351) = 0.86$, $adjR^2 = .000$, $p > .05$). In addition, no significant relationship was reported between transformational teaching at Time 1 and duration of leisure time physical activity at Time 2 for males, ($\beta = .05$, $F(1, 382) = 1.09$, $adjR^2 = .000$, $p > .05$) or females, ($\beta = .002$, $F(1, 351) = .002$, $adjR^2 = -.003$, $p > .05$). As the correlation between transformational teaching at Time 1 and objective measures of physical activity at Time 2 were not significant no subsequent regression analysis was conducted.

Transformational Teaching and Student Self-Efficacy Beliefs

The next set of hypotheses concerned the relationships between perceptions of transformational teaching, students' physical education self-efficacy beliefs and physical activity behaviour. It was predicted that transformational teaching would be positively associated with self-efficacy beliefs for physical education activities (hypothesis 3). In addition, it was predicted that there would be a positive association between physical education self-efficacy beliefs and within-class physical activity behaviour (hypothesis 4) and a significant relationship between physical education self-efficacy and leisure-time physical activity behaviour (hypothesis 5).

Hypothesis 3. Self-efficacy beliefs for physical education (Time 2) were regressed on transformational teaching (Time 1). For males, transformational teaching at Time 1 was positively related to physical education self-efficacy beliefs at Time 2 ($\beta = .41$, $F(1,385) = 77.84$, $adjR^2 = .17$, $p < .001$). For females, transformational teaching at Time 1 was positively related to physical education self-efficacy beliefs at Time 2 ($\beta = .41$, $F(1,356) = 70.18$, $adjR^2 = .16$, $p < .001$).

Hypothesis 4. The relationship between physical education self-efficacy beliefs at Time 2 and within-class physical activity behaviour at Time 2 was examined. Support for this hypothesis was found for males ($\beta = .36$, $F(1,383) = 56.08$, $adjR^2 = .13$, $p < .001$) and for females ($\beta = .41$, $F(1,355) = 73.05$, $adjR^2 = .17$, $p < .001$). No regression analysis was conducted to examine the relationship between physical education self-efficacy and objective within-class physical activity as a non-significant bivariate correlation was reported.

Hypothesis 5. Regression analyses revealed that there was a positive association between physical education self-efficacy at Time 2 and frequency of leisure-time physical activity at Time 2 for males ($\beta = .44$, $F(1,383) = 93.63$, $adjR^2 = .19$, $p < .01$) and for females ($\beta = .26$, $F(1,357) = 26.69$, $adjR^2 = .07$, $p < .001$). In addition a significant relationship was found between physical education self-efficacy at Time 2 and duration of leisure-time physical activity at Time 2 for males

($\beta = .37$, $F(1,384) = 61.77$, $adjR^2 = .14$ $p < .01$) and for females ($\beta = .31$, $F(1,357) = 38.31$, $adjR^2 = .09$, $p < .001$).

Regression analyses were also conducted to examine the relationship between physical education self-efficacy at Time 2 and the average number of minutes students spent engaged in moderate-to-vigorous leisure time physical activity at Time 2. Results revealed no significant relationship between physical education self-efficacy and objective measures of leisure time physical activity ($\beta = .01$, $F(1,41) = 4.29$, $adjR^2 = .10$, $p > .01$).

The Mediating Effect of Self-Efficacy

Students' self-efficacy beliefs for physical education class were examined as a mediator in the relationship between perceptions of transformational teaching behaviour and students' within-class physical activity behaviour (hypothesis 13).

Results of the bootstrapping procedure revealed that for males the relationship between transformational teaching and within-class physical activity was mediated by self-efficacy beliefs (point estimate = 0.0326; BCa CI = 0.0199 to 0.0474; see Figure 7). Zero is not in the 95% confidence interval, therefore, the indirect effect is significantly different from zero at $p < .05$ (two tailed) and mediation is supported. For females, bootstrapping analyses revealed that the relationship between transformational teaching and within-class physical activity behaviour was mediated by self-efficacy beliefs (point estimate = 0.0439; BCa CI = 0.0295 to 0.0612; see Figure 8).

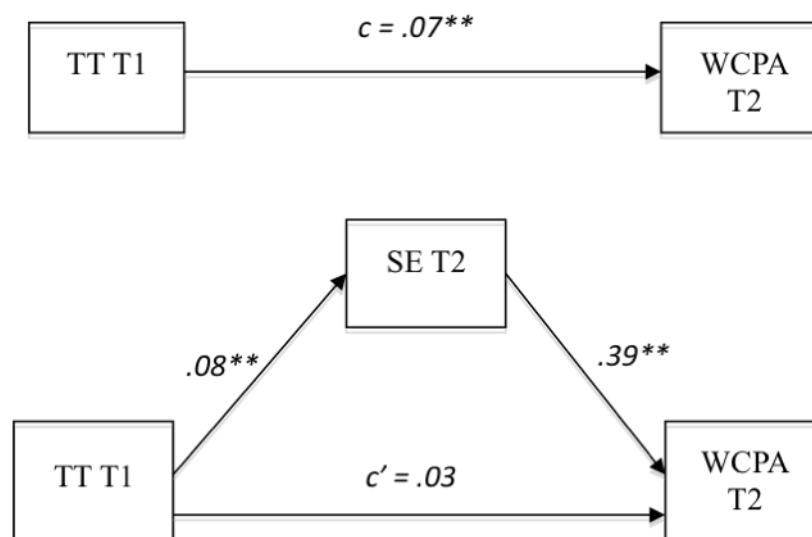


Figure 7. Self-efficacy as a mediator of the relationship between transformational teaching and within-class physical activity behaviour for males. * $p < .01$, ** $p < .001$. Numbers represent unstandardized path coefficients. TT = transformational teaching, SE = self-efficacy, WCPA = within-class physical activity. T1 = Time 1, T2 = Time 2. c = total effect of TT on WCPA, c' = direct effect of TT on WCPA.

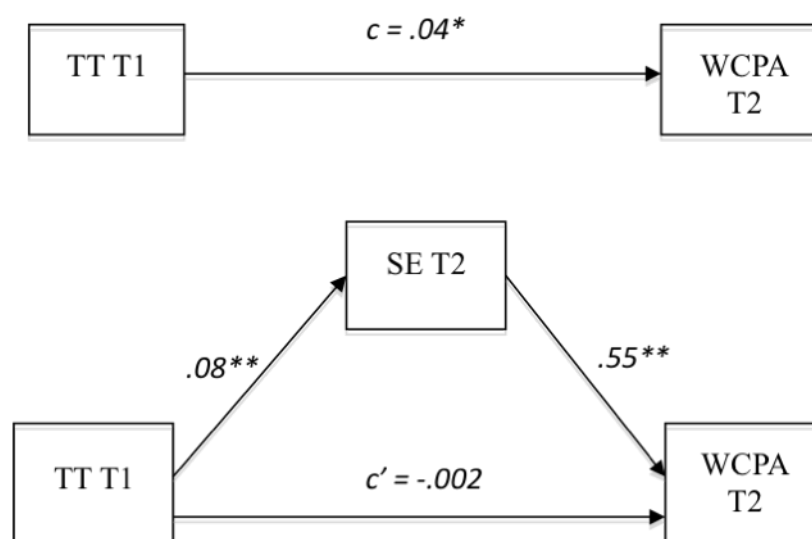


Figure 8. Self-efficacy as a mediator of the relationship between transformational teaching and within-class physical activity behaviour in females. * $p < .01$, ** $p < .001$. Numbers represent unstandardized path coefficients. TT = transformational teaching, SE = self-efficacy, WCPA = within-class physical activity. T1 = Time 1, T2 = Time 2. c = total effect of TT on WCPA, c' = direct effect of TT on WCPA.

Self-Efficacy as a Mediator of the Relationship between Transformational Teaching and Leisure-Time Physical Activity Behaviour.

Given that no relationship was found between transformational teaching and leisure-time physical activity behaviour for males or females, the mediation effect of self-efficacy was not examined (hypothesis 15). The necessity of a significant total effect for the examination of mediation is a controversial issue. Preacher and Hayes (2004) comment that the presence of a mediation effect implies that there is a significant total relationship between the independent and the dependent variable. This is in line with Baron and Kenny's step 1 of the casual approach to mediation analysis. However, according to Preacher and Hayes (2004), an indirect effect may be present when the relationship between the independent variable and dependent variable is *not* statistically significant. Therefore, whether or not the indirect effect reflects mediation should be judged by examination of the total effect (Preacher & Hayes, 2004). Given that the current research is concerned with mediation effects between variables, non-significant total effects between the IV and DV were not examined further.

Transformational Teaching and RISE Beliefs

The relationships between (a) transformational teaching and RISE beliefs and (b) students' RISE beliefs and physical education self-efficacy beliefs were examined. Recall that it was predicted that there would be a positive association between perceptions of transformational teaching at Time 1 and RISE beliefs at Time 2 (hypothesis 6). Furthermore, a positive association was predicted between RISE beliefs and physical education self-efficacy beliefs at Time 2 (hypothesis 7).

Hypothesis 6. RISE appraisals at Time 2 were regressed on transformational teaching at Time 1. Regression analysis revealed a significant positive relationship for males ($\beta = .54$, $F(1,384) = 154.44$, $adjR^2 = .29$, $p < .001$). For females, there was also a significant positive relationship ($\beta = .44$, $F(1,356) = 83.79$, $adjR^2 = .19$, $p < .001$). *Hypothesis 7.* Regression analysis revealed a

significant relationship between RISE appraisals at Time 2 and physical education self-efficacy beliefs at Time 2 for males, ($\beta = .73$, $F(1,386) = 450.09$, $adjR^2 = .54$, $p < .001$) and females ($\beta = .78$, $F(1,362) = 551.74$, $adjR^2 = .60$, $p < .001$).

RISE as a Mediator of the Relationship between Transformational Teaching and Student's Physical Education Self-Efficacy Beliefs.

Results of the bootstrapping procedure to test RISE as a mediator in the relationship between transformational teaching and students' physical education self-efficacy beliefs (hypothesis 12) revealed that for males this relationship was mediated by RISE beliefs (point estimate = 0.0781; BCa CI = 0.0633 to 0.0949; see Figure 9). For females, the relationship between transformational teaching and students physical education self-efficacy beliefs was also mediated by RISE beliefs (point estimate = 0.0615; BCa CI = 0.0417 to 0.0802; see Figure 10).

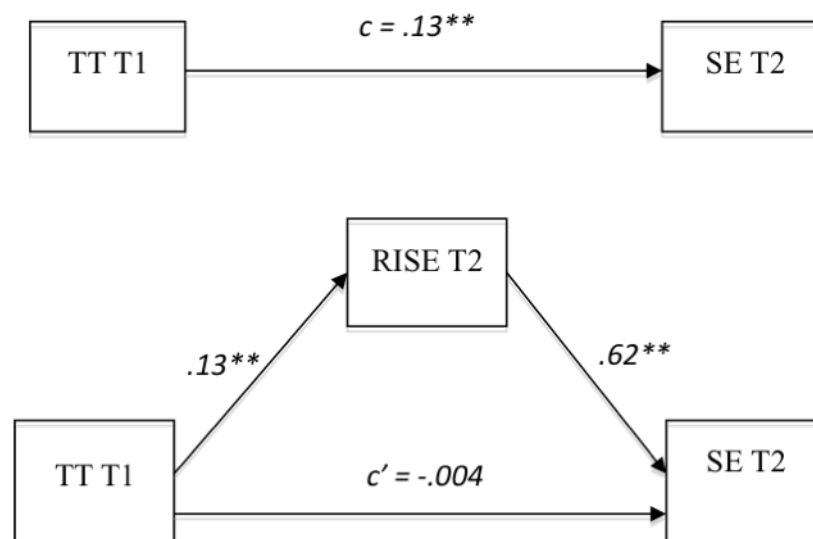


Figure 9. Relation-inferred self-efficacy (RISE) as a mediator of the relationship between transformational teaching and students' self-efficacy beliefs for physical education for males. * $p < .01$, ** $p < .001$. Numbers represent unstandardized path coefficients. TT = transformational teaching, RISE = relation-inferred self-efficacy, SE = self-efficacy. T1 = Time 1 & T2 = Time 2. c = total effect of TT on SE, c' = direct effect of TT on SE.

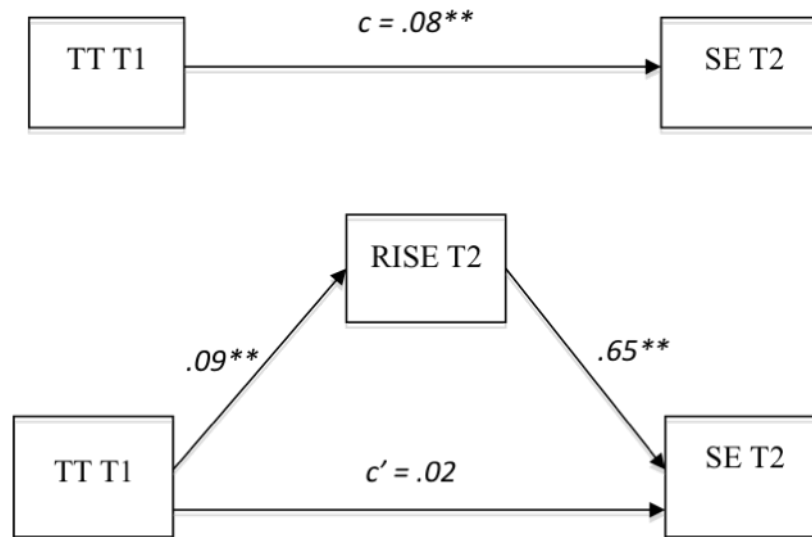


Figure 10. Relation-inferred self-efficacy (RISE) as a mediator of the relationship between transformational teaching and students' self-efficacy beliefs for physical education for females. * $p < .01$, ** $p < .001$. Numbers represent unstandardized path coefficients TT = transformational teaching, RISE = relation-inferred self-efficacy, SE = self-efficacy. T1 = Time 1 & T2 = Time 2. c = total effect of TT on SE, c' = direct effect of TT on SE.

Transformational Teaching and Other-Efficacy Beliefs

It was predicted that transformational teaching would display a positive association with students' other-efficacy beliefs (hypothesis 8). Furthermore, it was predicted that there would be a significant positive relationship between students' other-efficacy beliefs and self-reported within-class physical activity behaviour (hypothesis 9).

Hypothesis 8. Other-efficacy beliefs at Time 2 were regressed on transformational teaching at Time 1 and revealed a significant positive relationship for males ($\beta = .68$, $F(1,382) = 328.91$, $adjR^2 = .46$, $p < .01$) and females ($\beta = .61$, $F(1,356) = 213.35$, $adjR^2 = .37$, $p < .01$).

Hypothesis 9. Regression analysis revealed that there was a significant positive relationship between other-efficacy beliefs at Time 2 and self-reported within-class physical activity behaviour at

Time 2 for males ($\beta = .30$, $F(1,380) = 38.24$, $adjR^2 = .09$, $p < .01$) and females ($\beta = .28$, $F(1,355) = 30.56$, $adjR^2 = .08$, $p < .01$). In light of the fact that the bivariate correlation between other-efficacy and objective measures of within-class physical activity was not significant, no further regression analysis was conducted.

Other-Efficacy as a Mediator of the Relationship between Transformational Teaching and Within-class Physical Activity Behaviour.

The results of the bootstrapping procedure revealed that for males the relationship between transformational teaching and within class physical activity (hypothesis 14) was mediated by students' other efficacy beliefs (point estimate = .0432; BCa CI = .0174 to 0.0694; see Figure 11). For females, the relationship was similarly mediated by other efficacy beliefs (point estimate = .0494; BCa CI = .0252 to .0740; see Figure 12).

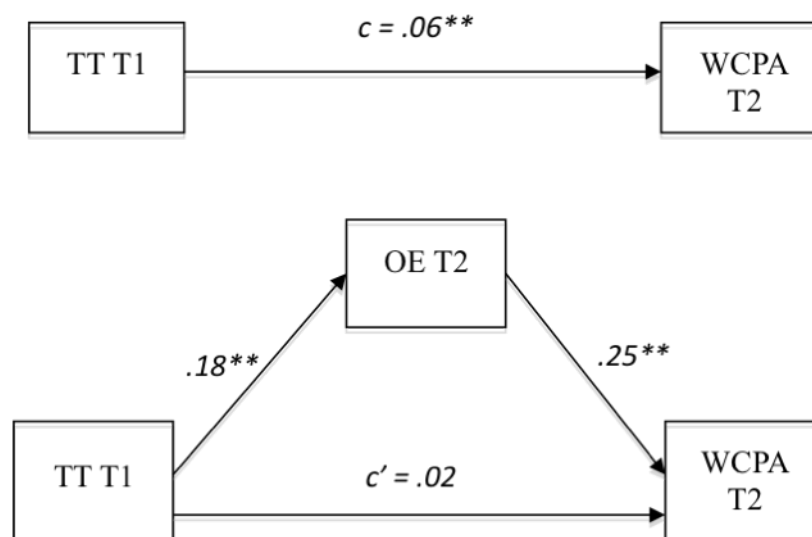


Figure 11. Other-efficacy beliefs as a mediator of the relationship between transformational teaching and students' within-class physical activity behaviour for males. * $p < .01$, ** $p < .001$. Numbers represent unstandardized path coefficients. TT = transformational teaching, OE = other-efficacy, WCPA = within-class physical activity. T1 = Time 1 & T2 = Time 2. c = total effect of TT on WCPA, c' = direct effect of TT on WCPA.

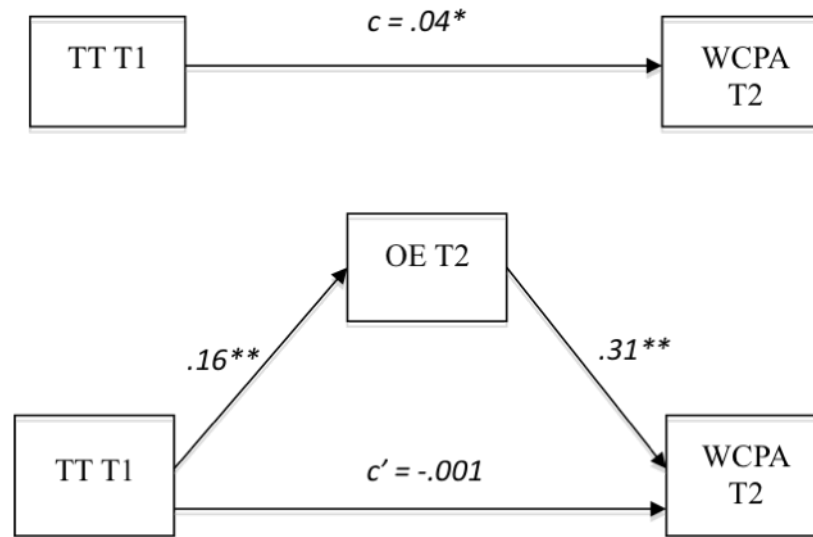


Figure 12. Other-efficacy beliefs as a mediator of the relationship between transformational teaching and students' within-class physical activity behaviour for females. * $p < .01$, ** $p < .001$. Numbers represent unstandardized path coefficients. TT = transformational teaching, OE = other-efficacy, WCPA = within-class physical activity. T1 = Time 1 & T2 = Time 2. c = total effect of TT on WCPA, c' = direct effect of TT on WCPA.

Transformational Teaching and Student Self-Regulatory Efficacy

The relationship between (a) students' perceptions of transformational teaching and self-regulatory efficacy and (b) students' self-regulatory efficacy and leisure time physical activity was examined. It was predicted that there would be a positive association between students' perceptions of transformational teaching and students' self-regulatory efficacy beliefs (hypothesis 10), as well as a positive association between students' self-regulatory efficacy beliefs and frequency and duration of leisure-time physical activity behaviour (hypothesis 11).

Hypothesis 10. Students' self-regulatory efficacy beliefs at Time 2 was regressed on perceptions of transformational teaching at Time 1, and revealed a significant positive relationship for males ($\beta = .17$, $F(1,385) = 10.80$, $adjR^2 = .025$, $p < .01$) and females ($\beta = .17$, $F(1,353) = 10.30$, $adjR^2 = .026$, $p < .01$).

Hypothesis 11. In males, self-regulatory efficacy measured at Time 2 was significantly related to frequency of leisure-time physical activity behaviour at Time 2 ($\beta = .64$, $F(1,383) = 268.67$, $adjR^2 = .41$, $p < .01$). In females the findings were similar ($\beta = .55$, $F(1,356) = 153.67$, $adjR^2 = .30$, $p < .01$). Furthermore, students' self-regulatory efficacy beliefs at Time 2 were positively associated with duration of leisure-time physical at Time 2 in males ($\beta = .60$, $F(1,384) = 210.68$, $adjR^2 = .35$, $p < .01$) and in females ($\beta = .56$, $F(1,356) = 160.49$, $adjR^2 = .31$, $p < .01$). In light of the fact that the bivariate correlation between self-regulatory efficacy and measures of objective leisure time physical was not significant no further regression analysis was conducted.

Self-Regulatory Efficacy as a Mediator of the Relationship between Transformational Teaching and Leisure-Time Physical Activity Behaviour.

In light of the fact that the relationship between transformational teaching and leisure-time physical activity was non-significant for both males and females the mediation effect of self-regulatory efficacy was not examined (hypothesis 16).

Transformational Teaching and Within-class Physical Activity Behaviour: Testing Multiple Mediation

Simple mediation analysis revealed that students' physical education self-efficacy and other-efficacy beliefs mediated the relationship between students' perceptions of transformational teaching and self-reported measures of within-class physical activity behaviour for both males and females. Therefore, a multiple mediation analysis was conducted to *simultaneously* examine the mediational effects of both physical education self-efficacy and other-efficacy beliefs. There are a number of advantages to testing a single multiple mediation model as opposed to testing separate simple mediation models (Preacher & Hayes, 2008). First, it is possible to determine the extent to which a specific variable mediates the relationship between the IV and DV, while controlling for

other variables. Second, it is possible to determine the magnitude of a specific indirect effect in comparison to other variables within the mediation model. Such an approach helps to minimize the likelihood of making a Type 1 error.

Results of the multiple mediation analysis revealed that the *total* relationship between transformational teaching and within-class physical activity behaviour was mediated by student physical education self-efficacy and other-efficacy beliefs in males (point estimate = .0524, BCaCI = .0265 to .0765; see Figure 13 & Table 8) and in females (point estimate = .0662, BCaCI = .0432 to .0920; see Figure 14 & Table 9). However, examination of the *specific indirect effects* revealed that, in males, self-efficacy was the only significant contributor to the mediation model (point estimate = .0302, BCaCI = .0172 to .0458). However, in females, examination of the specific indirect effects revealed that both self-efficacy and other-efficacy beliefs were significant mediators of the relationship between transformational teaching and self-report measures of within class physical activity behaviour.

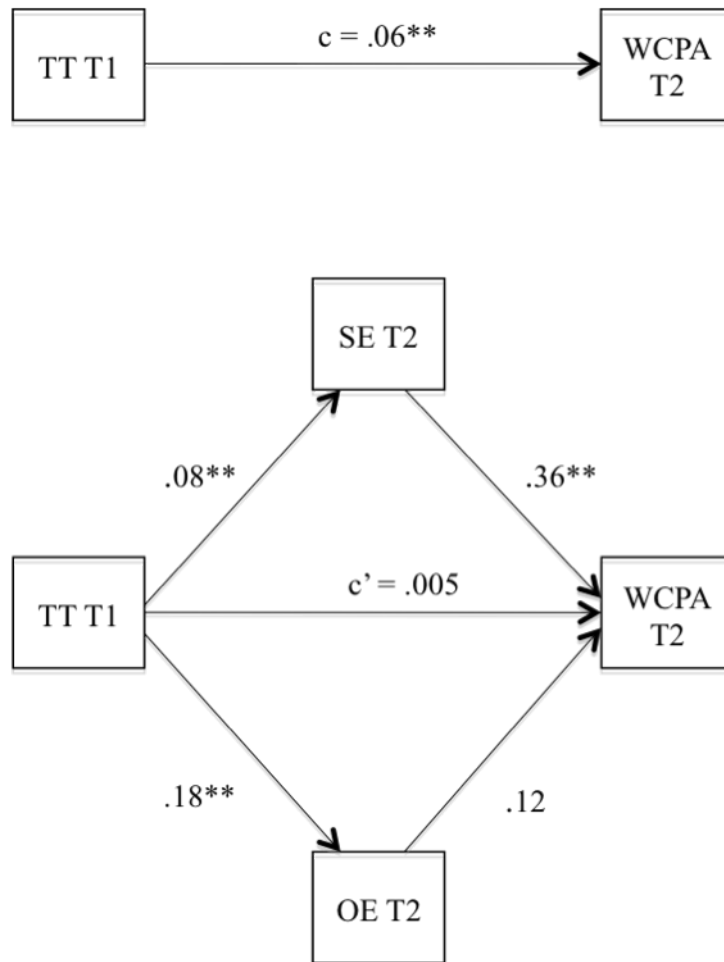


Figure 13. Multiple mediation of physical education self-efficacy and other-efficacy in the relationship between transformational teaching and within-class physical activity behaviour for males. * $p < .01$, ** $p < .001$. Numbers represent unstandardized path coefficients. TT = transformational teaching, OE = other-efficacy, WCPA = within-class physical activity. T1 = Time 1 & T2 = Time 2. c = total effect of TT on WCPA, c' = direct effect of TT on WCPA.

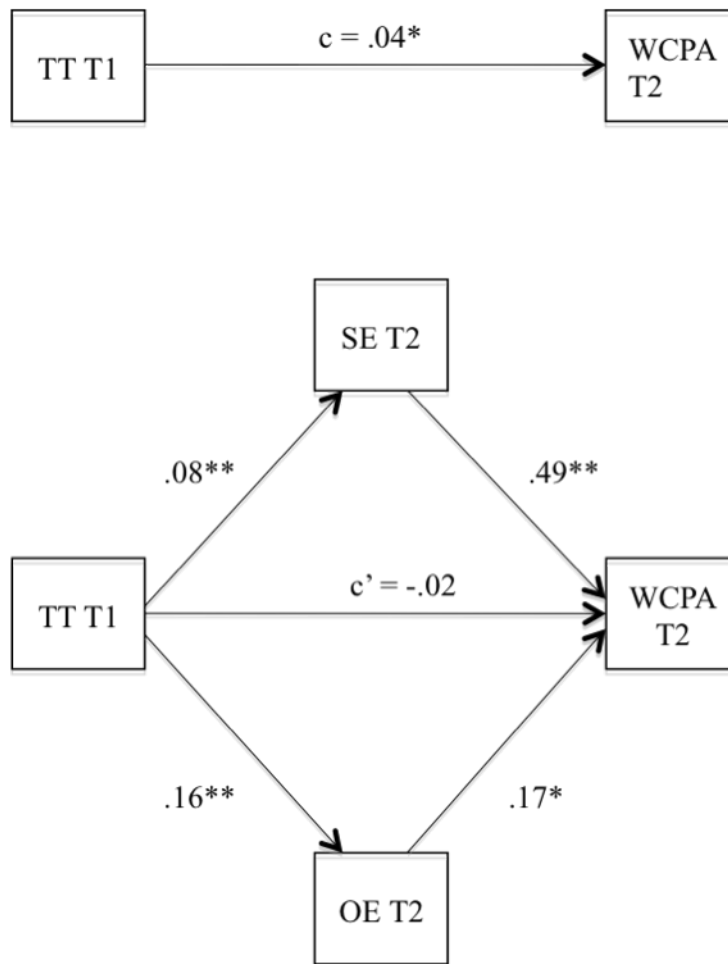


Figure 14. Multiple mediation of physical education self-efficacy and other-efficacy in the relationship between transformational teaching and within-class physical activity behaviour for females. $* p < .01$, $** p < .001$. Numbers represent unstandardized path coefficients. TT = transformational teaching, OE = other-efficacy, WCPA = within-class physical activity. T1 = Time 1 & T2 = Time 2. c = total effect of TT on WCPA, c' = direct effect of TT on WCPA

Table 8

Mediation analyses of self-efficacy and other-efficacy in the relationship between transformational teaching and within-class physical activity behaviour for males

	Point Estimate	Lower	Bootstrapping BCa 95% CI Upper	AdjR ²
Simple indirect effects				
Self-efficacy	.0326	.0199	.0474	.132*
Other-efficacy	.0432	.0174	.0694	.083*
Multiple indirect effects				
Self-efficacy	.0302	.0172	.0458	.139*
Other-efficacy	.0222	-.0044	.0485	
Total	.0524	.0265	.0765	

Unstandardized coefficients were reported. Number of bootstrap resamples = 5000. BCaCI = Bias Correlated and Accelerated confidence Intervals. * $p < .001$

Table 9

Mediation analyses of self-efficacy and other-efficacy in the relationship between transformational teaching and within-class physical activity behaviour for females

	Point Estimate	Lower	Bootstrapping BCa 95% CI Upper	AdjR ²
Simple indirect effects				
Self-efficacy	.0439	.0295	.0612	.159*
Other-efficacy	.0494	.0252	.0740	.078*
Multiple indirect effects				
Self-efficacy	.0387	.0248	.0562	.172*
Other-efficacy	.0275	.0057	.0533	
Total	.0663	.0432	.0920	

Unstandardized coefficients were reported. Number of bootstrap resamples = 5000. BCaCI = Bias Correlated and Accelerated confidence Intervals. * $p < .001$

Chapter Four: Discussion

Transformational leadership theory has become the most widely studied leadership framework over the past two decades (cf. Barling et al., 2010). Given that effective leadership is proposed to be synonymous with effective teaching (Beauchamp et al., 2010), the purpose of the present research was to apply the tenets of transformational leadership theory (cf. Bass & Riggio, 2006) to the physical education setting in order to develop a greater understanding of the relationship between perceptions of teacher behaviour and student outcomes. Specifically, grade 10 students' perceptions of teachers' transformational behaviours were examined in relation to within-class and leisure-time physical activity behaviour. Furthermore, we examined whether these relationships were mediated by intrapersonal (physical education self-efficacy, self-regulatory efficacy) and interpersonal (RISE, other-efficacy) efficacy beliefs. Results revealed that transformational teaching significantly predicted a self-reported measure of within-class but not leisure time physical activity behaviour. Furthermore, the relationship between transformational teaching and self-reported within-class physical activity was mediated by physical education self-efficacy beliefs in males and both physical education self-efficacy and other-efficacy beliefs in females. Results from a sub-sample of 53 students revealed no significant relationship between transformational teaching and objective measures of physical activity behaviour both in relation to within-class and leisure-time activities.

On the basis of a multivariate effect for gender that was detected in the preliminary analyses, separate (main) analyses were conducted for males and females. Examination of the univariate effects revealed that males reported higher levels of within-class physical activity behaviour, as well as frequency and duration of leisure time physical activity than females. In addition males reported higher levels of self-efficacy, RISE, and self-regulatory efficacy than females. While the sizes of these differences were small (i.e., small effect sizes), this finding is consistent with (a) results of a prominent meta-analysis that found boys to be more physically active than girls (Sallis, Prochaska,

& Taylor, 2000), and (b) findings from both academic and physical activity contexts that boys tend to report higher levels of self-efficacy than girls (Eccles, 1983; Winters, Petosa, & Charlton, 2003). With regard to this latter finding, it has been suggested that males have a general tendency to overestimate their capabilities while females underestimate their abilities (Zuckerman, 1979). Nevertheless, in spite of these mean differences between males and females, the *patterns of results* between the independent (transformational teaching) and criterion measures in this study were largely the same for both males and females.

Transformational Teaching and Relational Efficacy Beliefs

Research within educational contexts has demonstrated that teachers' behaviours toward their students can directly influence students' self-efficacy beliefs (Schunk & Pajares, 2002). Furthermore, students' beliefs regarding their interactions with teachers have been shown to impact subsequent academic success (Martin & Dowson, 2009). With this in mind, Lent and Lopez (2002) proposed a tripartite framework which suggests that in the context of student-teacher interactions, a network of efficacy constructs exists that include interpersonal beliefs (i.e., RISE, other-efficacy) in addition to self-efficacy beliefs. RISE perceptions are concerned with what one perceives a significant other to think of one's capabilities and as such may be interpreted either correctly or incorrectly. RISE represents a meta-perception that is largely influenced by the feedback an individual receives from a significant other. Consequently, these perceptions are theorized to supplement the primary sources of self-efficacy proposed by Bandura (1997). Lent and Lopez (2002) propose that these relational efficacy beliefs may be crucial in shaping students' experiences in school.

Recent research by Beauchamp, Barling and Morton (2010) within physical education demonstrated that displays of transformational teaching behaviour were prospectively related to improvements in student self-efficacy beliefs. However, it is noteworthy that research has yet to

examine the relationships between student perceptions of transformational teaching in relation to student RISE and other-efficacy beliefs.

Consistent with previous findings, the results of the current study suggest that transformational teaching accounted for significant variance in males' and females' self-efficacy beliefs to perform activities in school physical education ($adjR^2 = .16$ to $.17$). In addition, transformational teaching accounted for significant variance in student RISE appraisals in both females and males ($adjR^2 = .19$ -. $.29$), while these RISE appraisals accounted for over half of the variance in student physical education self-efficacy beliefs ($adjR^2 = .54$). Bootstrapping analysis revealed that the relationship between transformational teaching and students' physical education self-efficacy beliefs was mediated by RISE appraisals. This finding suggests that through the display of transformational teaching behaviours students tend to believe that their teacher views them as highly competent (i.e., high RISE), and that these RISE beliefs plays an important role in strengthening students confidence in their own abilities (i.e., self-efficacy). These findings are consistent with theory (Lent & Lopez, 2002) as well as research within the sport (Jackson & Beauchamp, 2010) and physical education (Jackson et al., 2011b) settings.

In a similar regard, it was also predicted that when teachers display behaviours that empower and inspire students, intellectually challenge them and acts as role models, students will tend to respond with higher levels of other-efficacy. In line with this, results revealed that transformational teaching accounted for significant variance in female and male students' other-efficacy beliefs ($adjR^2 = .37$ - $.46$). That is, when students perceived their teacher to display high levels of transformational behaviours they reported greater confidence in their teacher's ability to teach them. This finding mirrors those reported within organizational contexts in which leaders' use of transformational behaviours was positively associated with followers' ratings of leader effectiveness (Judge & Piccolo, 2004).

Taken together, the effects detected for transformational teaching indicate that this construct makes a unique contribution to the relational efficacy beliefs of students within physical education settings. That is, when teachers display behaviours that empower and inspire students while displaying genuine care and concern (i.e., elevated transformational teaching), students tend to report (a) greater confidence in their teachers' ability to teach them, and (b) estimate that their teacher is confident in their own abilities, which may serve to heighten students' personal belief in their ability (i.e., RISE acted as a mediator of the effects of transformational teaching in relation to students' self-efficacy beliefs).

Transformational Teaching and Self-Regulatory Efficacy Beliefs

In addition to examining students' relational efficacy beliefs, the current study sought to examine the extent to which perceptions of transformational teaching predicted students' self-regulatory efficacy beliefs. Self-regulatory efficacy refers to an individual's belief in his/her ability to set goals, monitor and adjust one's own behaviour in the face of challenges and setbacks. Bandura (1997) proposed that the development of self-regulatory skills is enhanced through enlisting the help of individuals who are influential and knowledgeable (e.g., teachers). In line with this, it was predicted that when teachers display behaviours that encourage and support students to go above and beyond what they thought possible (transformational behaviours), students would display greater self-regulatory efficacy. In the current study transformational teaching accounted for significant variance in male and female students' self-regulatory efficacy beliefs. It should be noted, however, that in each case the amount of variance being explained was somewhat limited ($adjR^2 = .03$)

With this in mind, while transformational teachers may successfully model specific tasks required of students within the classroom (i.e., basketball skills) there may be less opportunity to model self-regulatory behaviours (i.e., how to monitor and regulate exercise during leisure time). It

is possible that these self-regulatory skills are more likely to develop within the familial environment. Interestingly, Shields and colleagues (2008) found that a family's social influence accounted for 14% of the variance in adolescents' self-regulatory efficacy, which in turn predicted adolescents' participation in physical activity.

Student Efficacy Beliefs and Physical Activity Behaviour.

Guided by theory (Bandura, 2004; Lent & Lopez, 2002) and drawing from existing physical education and physical activity research with adolescents (Hagger et al., 2005; Ryan & Dzewaltoski, 2002), the current research explored the associations between student efficacy perceptions and within-class as well as leisure time physical activity behaviour. Analyses revealed that student physical education self-efficacy and other-efficacy beliefs were significant predictors of self-reported within-class physical activity behaviour. Furthermore, student physical education self-efficacy and self-regulatory efficacy were significant predictors of self-reported leisure time physical activity.

These findings suggest that when students feel confident that their teacher has the skills to effectively teach them (i.e., high other efficacy) they will tend to engage in greater amounts of moderate to vigorous physical activity during class. In addition, when students believe that they are able to complete the tasks required of them in physical education (i.e., high self-efficacy) they will be more physically active during class (a proximal outcome) as well as utilize this self-efficacy as motivation to be physically active during leisure time (a more distal outcome). These findings are consistent with recent research conducted by Jackson and colleagues (2011b) who found that when students scored highly on self-efficacy for tasks in physical education class they prospectively reported higher levels of leisure-time physical activity one week later. Interestingly, Jackson and colleagues also reported that higher levels of physical education self-efficacy were positively associated with more favorable leisure-time exercise self-efficacy perceptions. Therefore, it is

possible that this task-specific efficacy belief displays generality across physical activity settings allowing beliefs specific to physical education class to be utilized in other similar, yet contextually distinct, environments.

With regards to student self-regulation, results revealed that self-regulatory efficacy beliefs accounted for significant variance in males' ($adjR^2 = .35$ to $.41$) and females' ($adjR^2 = .30$ to $.31$) self-reported leisure time physical activity behaviour. This finding mirrors those by Petosa and colleagues (2005) who reported that the ability to self-regulate accounted for similar amounts of the variance in high school students' leisure-time physical activity behaviour. The current findings support the notion that when examining activities of daily living an adolescent's belief in his/her ability to self-regulate may be more salient than one's efficacy beliefs to conduct the specific physical activity tasks in the context of the school curriculum. Therefore, enhancing students' beliefs in their ability to set goals, monitor progress and overcome barriers, in addition to learning specific skills, may be particularly salient in order to promote greater physical activity outside of the classroom.

Taken together, these results highlight the importance of the development of positive efficacy beliefs among adolescents and the salience of these beliefs in relation to physical activity both within and outside of schools. It must be noted, however, that no significant relationships were reported between students' efficacy beliefs and objective measures of physical activity behaviour. As such, caution must be taken when interpreting the above results. While it is certainly conceivable that students' efficacy beliefs are unrelated to objective measures of physical activity, it is also possible that this relationship (or lack thereof) can be explained by a methodological confound. Specifically, students were required to report their self-efficacy beliefs *in general* with regard to physical education and their self-regulatory efficacy beliefs in the upcoming *three weeks* with regard to leisure-time activities. However, accelerometer data were only accumulated for a maximum of three week days for physical education classes and five days for leisure time activities. Furthermore,

in line with our inclusion criteria (Freedson, Pober & Janz, 2005), some students only provided physical activity data for one class, in the case of the within-class measure, and three days in the case of our leisure-time physical activity measure. As such, there was a lack of direct *concordance* between the efficacy beliefs of interest and the behavioural outcome being operationalized (i.e., physical activity) by our objective measures. Such a lack of correspondence has been highlighted by Bandura (1997) as a substantive reason for the lack of prediction in terms of the role of (self-) efficacy beliefs.

Transformational Teaching and Physical Activity Behaviour

Research within a variety of domains has suggested that when leaders display transformational behaviours followers consistently show enhanced achievement levels (Barling et al., 1996; Charbonneau et al., 2001; Dvir et al., 2002). In the educational domain, qualitative research by Morton and colleagues (2010) reported that physical education teachers' displays of transformational teaching were positively associated with elevated in-class physical activity, as well as leisure time physical activity. Results of the current research revealed that transformational teaching significantly predicted students' self-reported within-class physical activity behaviour, however, the magnitude of the relationship was small ($adjR^2 = .03 - .06$).

It should be noted, however, that the average amount of contact time that teachers had with students in this study was between two and three times per week, for just over an hour. It is possible that in order to maximize their influence teachers require greater opportunities to interact with students through displays of transformational teaching in order to sufficiently impact upon behavioural outcomes (Beauchamp & Morton, 2011). That being said, the positive association found between transformational teaching and within-class physical activity is small, yet consistent with theory (Bass & Riggio, 2006) and previous research (Beauchamp et al., 2010) and supports the utility of transformational teaching within the physical education setting. Furthermore, the multiple

mediation analysis revealed that, for males, the relationship between transformational teaching and within-class physical activity was mediated by student physical education self-efficacy beliefs. However, for females this relationship was mediated by both physical education self-efficacy and other-efficacy beliefs. This suggests that for boys the process through which transformational teaching may work to predict physical activity behaviour during class, occurs via the beliefs that boys have in their own ability to conduct specific tasks during class. For girls, on the other hand, both beliefs in one's own capabilities and beliefs in the teachers capabilities acted as the mechanisms through which perceptions of transformational teaching predicted within class behavioural engagement.

In spite of these findings with regard to self-reported physical activity, it should also be noted that when physical activity was assessed through objective measures (i.e., accelerometry) there was no significant relationship between transformational teaching and within-class physical activity behaviour. It should also be noted, however, that the correlation between the self-reported and accelerometer-derived measures of within-class physical activity was very small ($r = .18$). It is conceivable that this lack of concordance between the measures of physical activity within physical education class is due to the measures examining different things. Specifically, in relation to objective measures of physical activity, students were required to have a minimum of one valid physical education class (1hr or more of valid data), with the maximum number of classes measured being three. On the other hand, the self-reported measure of physical activity within-class examined students' level of physical activity over the past seven days. It is possible that assessing students' level of physical activity within-class through examination of one or two physical education classes was inadequate to provide a clear picture of students' general level of physical activity behaviour during physical education class. For example, if during data collection students were participating in a relatively static activity in class such as golf then recorded levels of moderate-to-vigorous activity may be much lower than if students were taking part in other, more active, classes. It is possible

that, the self-reported recall measure may provide a broader indicator of students' regular physical activity levels in class.

In terms of leisure time physical activity, no significant relationship was found between transformational teaching and both self-reported and objective measures of frequency and duration of leisure time physical activity. While these findings do not support hypothesis 2, they may not be surprising. Specifically, student's within-class physical activity represents a more proximal behaviour in relation to the teaching behaviours of interest than leisure time physical activity, which is considered a more distal behaviour. Thus, it would be expected that a stronger relationship would be seen between transformational teaching and variables salient to within-class activities.

There are a number of factors that might buffer the extent to which transformational teaching behaviours translate into leisure time behavioural outcomes among adolescents. For example, students may not have access to safe-exercising environments or cultural expectations within the familial setting may discourage regular physical activity behaviour. In these cases, the extent to which transformational teaching influences physical activity behaviour outside the school environment is likely to be minimal (see Beauchamp and Morton, 2011 for review).

As with within-class physical activity, correlations between the self-reported (frequency and duration) and accelerometry measures of leisure time physical activity were very small ($r = .07$ to $.15$). Previous research has consistently reported low correlations between motion sensors (such as accelerometers) and self-reported estimates of physical activity (Dishman, Darracott, & Lambert, 1992; Epstein, Paluch, Coleman, Vito, & Anderson, 1996). While, it is evident that the lack of concordance between self-report and objective measures of physical activity behaviour is not uncommon, the magnitude of this divergence in the current study remains unclear. Although, it is conceivable that transformational teaching does not significantly relate to objective measures of physical activity behaviour, it is important to note potential methodological factors that could account for the current associations (or lack thereof). Specifically, the self-reported measure of

leisure time physical activity asked students to recall their physical activity behaviour outside of school hours, with no specified time frame. On the other hand, the objective measure of leisure-time physical activity required students to have three valid days of data to be included in analyses. As previously highlighted three days of valid data may not provide a clear representation of adolescents' general activity levels. In sum, it would appear that the self-report measures represent a more general measure of students' regular physical activity behaviour while objective measures (i.e., accelerometry) provide a narrower evaluation of behaviour during a more restricted time frame. Taken together, neither self-report nor accelerometry represent a 'gold standard' for measuring physical activity behaviour and the clear lack of congruence between measures derived from these instruments is a result of limitations in both measures.

Study Limitations and Future Directions

This thesis provides an important contribution to our current understanding of the relationship between perceptions of teaching behaviour and student cognition and physical activity within physical education contexts. However, it is not without its limitations. First and foremost is the lack of concordance reported between self-reported and objective measures of physical activity behaviour, as discussed in detail above.

As a second potential limitation, it is important to note that the causal ordering of variables in the mediation analyses were based on theory. However, Lent and Lopez (2002) acknowledge that an individual's self-efficacy beliefs may also influence his/her RISE appraisals, and as such it is possible that the relationship between these two variables may operate in a bi-directional manner. This reciprocal association was supported by qualitative research within the sport by Jackson et al. (2009). Future research should seek to examine the potential bi-directional nature of these relational efficacy beliefs within physical education and other academic settings. Furthermore, it would be

interesting to examine how relational efficacy beliefs of both students *and* teachers interact with one another.

A third limitation corresponds to the issue of causality. Based on the observational design utilized in this study causality cannot be inferred from the current findings. Specifically, in light of the fact that the independent variable (transformational teaching) was not manipulated (via experimentation) in the current study it is possible that other extraneous variables could account for the relationships examined in this thesis (Campbell & Stanley, 1963). Future research should make use of field-based experimental designs in order to establish causality in terms of the *effects* of transformational teaching in relation to the mediator and criterion variables operationalized in the current research. This would ideally involve two steps. First, a pretest-posttest control group design could be utilized to examine the effects of manipulating transformational teaching in relation to student efficacy beliefs and physical activity behaviour. Secondly, the same design should be used to examine how manipulations designed to enhance students' tripartite efficacy perceptions influence physical activity behaviour both within and outside the school environment.

As a fourth limitation, the use of standard regression analyses assumes that responses from different students are independent of one another (Tabachnick & Fidell, 2007). However, students are clustered within classes, which are themselves clustered within schools (Goldstein, 1995). Given the high interdependence that exists with school classes it is likely that interactions that students have with the same (physical education) teacher will account for some of the shared variance in student outcomes. To account for this nesting, future research should utilize multilevel modeling (Goldstein, 1995) to examine the effects of transformational teaching in relation to student outcomes at both the student and class levels.

A fifth limitation relates to the finding of a significant multivariate effect between individuals who were retained at Time 2 and those who dropped out following Time 1 data collection. The current study reported a 17.4% attrition rate between Time 1 and Time 2. Participant

attrition presents a potential threat to external validity, insofar as the prospective findings may not generalize to those who dropped out at Time 2. Examination of the univariate effects revealed that individuals who dropped out of the study following Time 1 data collection reported lower perceptions of transformational teaching and other-efficacy beliefs than those who were retained at Time 2. While the effect sizes were small (partial $\eta^2 = .01$) the findings do suggest that when students perceive teachers as lacking the appropriate skills necessary to effectively teach or when teachers display less care of concern for students (i.e., lower levels of transformational teaching), then students may be more likely to skip classes or stay away from school.

A final limitation relates to the geographical location of studies examining transformational teaching. While transformational leadership behaviours have been found to exist in a variety of cultures (cf. Barling et al., 2010), transformational teaching research has been consistently studied within the same geographical location, namely the lower mainland of British Columbia. Future research among different Canadian regions and international populations is necessary to establish the utility of the transformational teaching construct across diverse physical education contexts. Furthermore, a number of schools that were invited to take part in the research declined due to a variety of reasons including lack of time and potential concern that the researchers were evaluating teachers. It is possible that those who declined differed in meaningful ways from those who accepted (Bryman, 2004). While no speculation can be made as to what these differences may be, future research should endeavor to obtain a representative sample of the population of interest.

In addition to addressing these limitations within future work, research is also encouraged that considers examining potential aspects of the school and home environment that may *moderate* the effects of transformational teaching. In relation to variables salient within-class, it is possible that the amount of contact time students have with teachers could affect the degree to which students are influenced by teachers' transformational behaviours. In addition the sex of the teacher, the teacher's level of coaching involvement outside the classroom and students' sporting background

may potentially moderate the relationship between transformational teaching and variables salient to within-class physical activity. With regard to leisure time cognitions and behaviours it is possible that constraints outside of the classroom may buffer the extent to which transformational teaching influences students outside of the classroom. For example, if students live in unsafe neighborhoods then the opportunities to engage in physical activity may be limited and any motivation or confidence developed within physical education may not be transferrable to this leisure-time context.

Practical Implications

From an applied perspective, the findings of this study support the utility of the transformational teaching framework in the prediction of adaptive adolescent cognitions and physical activity behaviours. As such, secondary school physical education teachers should be encouraged to foster transformational behaviours that involve role modeling (Idealized Influence), encouraging and inspiring student to achieve their goals (Inspirational Motivation), intellectually challenging students in class (Intellectual Stimulation), and providing individual support with regard to students' physical and psychological needs (Individualized Consideration). The results of this study suggest that displays of these behaviours by teachers can predict elevated personal and relational efficacy beliefs among students as well as enhanced levels of physical activity during physical education classes. Furthermore, in line with previous research (McAuley & Blissmer, 2000; Rodgers & Sullivan, 2001) elevated personal efficacy beliefs (physical education self-efficacy, self-regulatory efficacy) were positively related to higher levels of physical activity outside of school time. This suggests that targeting the sources of self-efficacy may represent a viable means of enhancing leisure-time physical activity behaviours among adolescents.

As a final observation, it is worth noting that research in organizational domains has reported that transformational leadership can be developed through one-day workshops (Barling et al., 1996).

In line with this, transformational leadership training initiatives and interventions could be incorporated into continuing professional development workshops with teachers, with a view to support teachers in their use of transformational leadership principals with students.

Conclusion

School-based physical education provides a unique opportunity for large numbers of adolescents to engage in regular physical activity. Positive experiences during physical education have been shown to relate to improvements in self-esteem (Bailey, 2006), positive affect (Standage, Duda, & Ntoumanis, 2005) and even academic achievement (Trudeau & Shepard, 2008). Furthermore, perceptions of teacher behaviour within physical education settings have been found to be positively associated with adaptive student outcomes (Beauchamp et al., 2010; Hagger et al., 2009). The purpose of this study was to examine the utility of the transformational teaching framework in the prediction of student cognition and behaviour. Results of the current research revealed that displays of transformational teaching are able to predict enhanced personal (physical education self-efficacy, self-regulatory efficacy) and relational (RISE, other-efficacy) efficacy beliefs among adolescents within the context of school physical education. In addition, student RISE beliefs were found to be associated with students' confidence in their own abilities (i.e., high self-efficacy) in physical education classes, while physical education self-efficacy was shown to mediate the relationship between transformational teaching and adolescents' self-reported activity levels within class time. Future experimental research is clearly required to establish the causal nature of the relationships between the variables of interest operationalized in this study. Nevertheless, from a conceptual perspective, the current findings add to, and deepen, our understanding of the social cognitive processes at work within educational settings, and provide a firm foundation for future work in this area.

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Appendix A - Descriptive Statistics for Participants at Time 2

Demographic Characteristics of Participants at Time 2

	All N = 753 %	Boys N = 383 (51%)	Girls N = 370 (49%)
Age:			
14	1	1	.5
15	51	53	49.5
16	43	41	45
17 +	5	5	5
Grade:			
9	1	1	0
10	96	96	97
11 +	3	3	3
Birthplace			
Canada	58	54	63
China	10	10	10
Korea	9	10	8
Taiwan	5	6	5
Other	18	20	14

Appendix B – Participant Information Letter



Psychology of Exercise, Health, and
Physical Activity Laboratory
School of Human Kinetics
War Memorial Gym

122- 6081 University Blvd, Vancouver, BC, V6T 1Z1

Student Information Letter Adolescent Health Promotion – The Role of Teachers

Principal Investigator:
Mark R. Beauchamp, Ph.D.
School of Human Kinetics
University of British Columbia

Co-Investigator:
Jessica Bourne, BSc
School of Human Kinetics
University of British Columbia

We are researchers from the University of British Columbia (UBC). We are interested in your attitudes towards the teaching strategies that your teachers use in physical education and also your attitudes and behaviours towards physical activity. In three weeks time we will be coming to your school and we will invite you to complete a survey. This should take 15-20 minutes of your time and this will be done during physical education class, first in April 2011 and again in May 2011. The information you provide will help us to better understand what motivates adolescents to lead a healthy lifestyle.

We want to hear your opinion on these issues as your views are very important to us. Please know that your involvement in this study is voluntary. It's up to you if you want to take part or not. If for ANY reason, you do not want to take part in this study that's fine, you don't have to. If you decide to take part, you will also be free to withdraw at any time without having to give any reason. If you drop out you will not experience ANY negative consequences at all.

If you decide to take part, you will not be asked to put your name on the survey and your answers will be kept private, and will not be shared with ANYONE else. That means your responses will be combined with those of other students and so no-one will know how you have answered the questions except you. All completed surveys will be kept in a locked cabinet at UBC. Your survey will not be made available to anyone other than the researchers involved in this study.

As part of this study a randomly selected subsample of students (approximately 60) will also be invited to wear a physical activity monitor (called an accelerometer), for a 5-day period at each of the two data collection periods. These monitors are small devices worn around the waist (it's the size of a small pack of cards) and measure how much energy students are expending on a daily basis. As with the questionnaires, if you are invited to wear an accelerometer your involvement is

completely voluntary and you do not have to take part in this aspect of the study if you don't want to. All of the energy expenditure information that is collected by these accelerometers will remain confidential and will not be made available to anyone other than the researchers involved in this study.

There are no known risks associated with participation in this study. If you have any questions about what is involved please contact Dr. Mark Beauchamp by email or phone. His email address and phone number are at the top of this page. Alternatively, if you have any concerns about your rights or treatment as a research subject please contact the 'Research Subject Information Line' in the UBC Office of Research Services at (604) 822-8598 or if long distance email to RSIL@ors.ubc.ca.

We would also like you to take the parental information letter that's attached to this letter and give it to one of your parents/legal guardians. If your parents do not speak English, please let us know what language they do speak and we will give you a translated copy of this letter. If for any reason they wish for you not to take part in this study they can let us know by phone or by email, or they can sign and return the attached letter.

We look forward to seeing you in a few weeks time.

Thank you for your help,

Mark Beauchamp, PhD

Jessica Bourne, BSc

Appendix C – Parental Information and Consent Letter



Psychology of Exercise, Health, and
Physical Activity Laboratory
School of Human Kinetics
War Memorial Gym

122- 6081 University Blvd, Vancouver, BC, V6T 1Z1

Parent/Guardian Information Letter Adolescent Health Promotion Study – The Role of Teachers

Mark Beauchamp, PhD (Principal Investigator)
School of Human Kinetics
University of British Columbia

Jessica Bourne, BSc
School of Human Kinetics
University of British Columbia

Dear Parent,

My name is Jessica Bourne and I'm a graduate research assistant at the University of British Columbia. I am currently involved in a program of research that is designed to better understand the role of teachers in the promotion of physical activity behaviours (within physical education class and leisure time) among adolescents. In three weeks time I will be going in to your child's school and will be inviting students to complete a survey, and again in May 2011. In this survey we will ask students a series of questions about their perceptions of teaching behaviours and also about their attitudes and behaviours toward physical activity. You can view a copy of the questionnaire that your child will be asked to complete on our website:

<http://educ.ubc.ca/faculty/markbeauchamp/index.html>

It will take students approximately 15-20 minutes to complete the surveys. None of the questions that we ask are of a delicate or intrusive nature and there are no known risks associated with students' involvement in this study. Student participation is entirely voluntary, and even if students initially choose to take part in this study they may subsequently withdraw at any time without having to give any reason and without experiencing any negative consequences.

Your child will not be asked to put his/her name on the survey and the answers your child provides will be combined with those of other students who are taking part in this research and any information students provide will remain completely confidential. All completed questionnaires will be kept in a locked and secure room in the War Memorial Gym the University of British Columbia and shall not be made available to anyone other than the researchers involved in this study.

As part of this study a randomly selected subsample of students (approximately 60) will also be invited to wear a physical activity monitor (called an accelerometer), for a 5-day period at each of the two data collection points. These monitors are small devices worn around the waist (it's the size of a small pack of cards) and measure how much energy students are expending on a daily basis. As with the questionnaires, all the energy expenditure information that is collected by these accelerometers will remain confidential and will not be available to anyone other than the researchers involved in this study.

If you **DO NOT** wish for your child to take part in this research, all we ask you to do is complete this form and return it to your child's teacher. Alternatively, you can email or phone myself or Dr. Beauchamp using the contact details identified above and we will ensure that your son/daughter does not take part in this study. Also, even if you have consented for your child to take part in this study, we also require his/her own consent as well before s/he can be invited to take part. If you have any questions or want further information about the study please contact myself or Dr. Mark Beauchamp at (604) 822 4864. Alternatively, if you have any concerns about your rights or treatment as a research subject please contact the 'Research Subject Information Line' in the UBC Office of Research Services at (604) 822-8598 or if long distance email to RSIL@ors.ubc.ca.

SO, IF YOU **DO NOT** WANT YOUR CHILD TO TAKE PART PLEASE SIGN THIS FORM AND RETURN THIS TO YOUR CHILD'S TEACHER:

I.....
(Parent/Guardian Name)

DO NOT wish for my child
(Child's Name)
to take part in this research.

Signed..... Date.....
(Parent/Guardian Name)

Yours sincerely,

Mark Beauchamp, PhD
(Principal Investigator)

Jessica Bourne, BSc

This letter is also available in Chinese, Korean, Spanish, Polish, and Farsi.

Appendix D – Student Questionnaire



Psychology of Exercise, Health, and
Physical Activity Laboratory
School of Human Kinetics
War Memorial Gym

122- 6081 University Blvd, Vancouver, BC, V6T 1Z1

Student Survey **Students' Attitudes toward Physical Education**

Principal Investigator:
Mark R. Beauchamp, Ph.D.
School of Human Kinetics
University of British Columbia

Co-Investigator:
Jessica Bourne, BSc
School of Human Kinetics
University of British Columbia

We are researchers from the University of British Columbia (UBC). We are interested in what you think about physical education. The information you provide will help us to understand what motivates adolescents to be physically active.

We want to hear your opinion on these issues. There are no right or wrong answers. There are no good or bad answers and this is NOT a test. It will take about 15-20 minutes to complete this questionnaire package. You are asked to do this on your own. Your answers are very important to us so please make sure you complete all answers honestly.

If you have any questions please just ask the researcher. If for ANY reason, you do not want to take part in this study that's fine, you don't have to. It is up to you if you want to take part or not. You are also free to withdraw at any time without having to give any reason. If you drop out you will not experience ANY negative consequences at all.

DO NOT PUT YOUR NAME ON THIS SURVEY. Your answers will be kept confidential. Your responses will be combined with those of other students and so no one will know how you answered the questions except you. All completed surveys will be kept in a secure and locked room in the War Memorial Gym at UBC. Your questionnaire will not be made available to anyone other than the researchers involved in this research.

There are no known risks associated with participation in this study. If you have any questions about what is involved please contact Dr. Mark Beauchamp by email or phone. His email address and phone number are at the top of this page. Alternatively, if you have any concerns about your rights or treatment as a research subject please contact the 'Research Subject Information Line' in the

UBC Office of Research Services at (604) 822-8598 or if long distance email to RSIL@ors.ubc.ca.

By completing this questionnaire you are agreeing to participate in this study. Please read the instructions carefully. Once you have finished, please check to see that all questions have been answered. When you have finished just return the questionnaire to the researcher.

Following the study a summary report will be available. If you would like a copy please contact Dr. Mark Beauchamp at the address above.

Thank you for your help,

Mark Beauchamp, PhD

Jessica Bourne BSc

Questionnaire

PART A: Background Information

A1. Date of Birth: _____ (Day) _____ (Month) 19 _____ (Year)

A2. Place of Birth: _____ (City) _____ (Country)

A3. What is your age (years): _____

A4. Gender (check one): ☐ Male ☐ Female

A5. School Name: _____

A6a. Class Name: _____ **A6b.** Grade: _____

A7. How do you describe yourself in terms of your ethnic origin? PLEASE CHECK **ALL** THAT APPLY.

	✓		✓		✓
Canadian	<input type="checkbox"/>	East Indian	<input type="checkbox"/>	American (USA)	<input type="checkbox"/>
Native/Aboriginal	<input type="checkbox"/>	Dutch	<input type="checkbox"/>	Norwegian	<input type="checkbox"/>
Chinese	<input type="checkbox"/>	Persian	<input type="checkbox"/>	Italian	<input type="checkbox"/>
British	<input type="checkbox"/>	Polish	<input type="checkbox"/>	Korean	<input type="checkbox"/>
Irish	<input type="checkbox"/>	Hispanic	<input type="checkbox"/>	Filipino	<input type="checkbox"/>
German	<input type="checkbox"/>	Russian	<input type="checkbox"/>	South Asian	<input type="checkbox"/>
French	<input type="checkbox"/>	Vietnamese	<input type="checkbox"/>	Japanese	<input type="checkbox"/>

Other _____

A8. What are the first three digits on your postal code (e.g., V6T.....): _____

A9. What is your mother/female guardian's job? _____

A10. What is your father/male guardian's job? _____

A11. Today's date: _____ (Day) _____ (Month) 20 _____ (Year)

PART B

In this section we would like you to describe the teaching style of your physical education teacher. To answer each question, please circle the number that best describes what you think. **If a question is irrelevant, or if you are unsure or do not know the answer, leave the answer blank.** Please be as honest as possible, and answer how frequently each statement fits the teacher you are describing

Use the following rating scale:

Not at all	Once in a while	Sometimes	Fairly often	Frequently
0	1	2	3	4

MY PHYSICAL EDUCATION TEACHER:

1. Shows that s/he cares about me.....	0	1	2	3	4
2. Acts as a person that I look up to.....	0	1	2	3	4
3. Creates lessons that really encourage me to think.....	0	1	2	3	4
4. Demonstrates that s/he believes in me.....	0	1	2	3	4
5. Treats me in ways that build my respect.....	0	1	2	3	4
6. Is enthusiastic about what I am capable of achieving.....	0	1	2	3	4
7. Provides me with tasks and challenges that get me to think in different ways.....	0	1	2	3	4
8. Motivates me to try my hardest	0	1	2	3	4
9. Tries to know every student in the class.....	0	1	2	3	4
10. Gets me to question my own and others' ideas.....	0	1	2	3	4
11. Tries to help students who might be struggling.....	0	1	2	3	4
12. Talks about his/her personal values.....	0	1	2	3	4
13. Encourages me to look at issues from different sides.....	0	1	2	3	4
14. Recognizes the needs and abilities of each student in the class.....	0	1	2	3	4
15. Is optimistic about what I can accomplish.....	0	1	2	3	4
16. Behaves as someone that I can trust.....	0	1	2	3	4

PART C

The following statements focus on **your PE lessons**. There are no right or wrong answers to any of these questions, and we would simply like you to **rate your confidence in your ability at this moment in time in your PE lessons...**

So, please HONESTLY rate <u>YOUR CONFIDENCE IN YOUR ABILITY</u> to...	No confidence at all	Low confidence	Moderate confidence	High confidence	Complete confidence
1. Try your hardest in every PE class	1	2	3	4	5
2. Be physically fit enough to always perform well in PE	1	2	3	4	5
3. Be enthusiastic in PE, even when the activity is hard or unfamiliar to you	1	2	3	4	5
4. Learn all the skills and activities you are taught, even the most difficult ones	1	2	3	4	5
5. Carry out your PE teacher's instructions at all times	1	2	3	4	5
6. Perform all the skills you are taught in PE	1	2	3	4	5
7. Attempt all the activities you cover in PE, even the hard or unfamiliar ones	1	2	3	4	5
8. Practice and improve your skills in PE	1	2	3	4	5
9. Perform well whenever you play games against classmates in PE	1	2	3	4	5

PART D

This time, the statements focus on **your PE teacher**. Again, there are no right or wrong answers to any of these questions. This time, we would like you to **rate your confidence in your PE teacher's ability at this moment in time...**

So, please HONESTLY rate <u>YOUR CONFIDENCE IN YOUR PE TEACHER'S ABILITY</u> to...	No confidence at all	Low confidence	Moderate confidence	High confidence	Complete confidence
1. Make sure your PE classes are always active and energetic enough for you	1	2	3	4	5
2. Motivate you even during hard or unfamiliar activities	1	2	3	4	5
3. Be an expert in all the sports and activities you do in PE	1	2	3	4	5
4. Make sure your PE classes are always enjoyable, even during hard or unfamiliar activities	1	2	3	4	5
5. Always encourage you, even when you make a mistake or find something difficult	1	2	3	4	5
6. Give you enough attention and feedback to help you improve in PE	1	2	3	4	5
7. Provide a variety of activities that makes your PE classes interesting	1	2	3	4	5
8. Always treat all students fairly	1	2	3	4	5
9. Make sure PE classes are not too easy or too hard for you	1	2	3	4	5

PART E

The final statements focus on you again, but this time we would like you to **estimate (or guess) how confident your PE teacher is in your ability in PE at this moment in time**. So, we're not focusing on how confident you are; we're focusing on what you *think* your PE teacher's confidence is in you. Just as before, there are absolutely no right or wrong answers at all, please just be honest...

So, please <u>ESTIMATE HOW CONFIDENT YOUR PE TEACHER IS IN YOUR ABILITY</u> to...	No confidence at all	Low confidence	Moderate confidence	High confidence	Complete confidence
1. Try your hardest in every PE class	1	2	3	4	5
2. Be physically fit enough to always perform well in PE	1	2	3	4	5
3. Be enthusiastic in PE, even when the activity is hard or unfamiliar to you	1	2	3	4	5
4. Learn all the skills and activities you are taught, even the most difficult ones	1	2	3	4	5
5. Carry out your PE teacher's instructions at all times	1	2	3	4	5
6. Perform all the skills you are taught in PE	1	2	3	4	5
7. Attempt all the activities you cover in PE, even the hard or unfamiliar ones	1	2	3	4	5
8. Practice and improve your skills in PE	1	2	3	4	5
9. Perform well whenever you play games against classmates in PE	1	2	3	4	5

PART F

Please indicate how confident you are in your ability to manage that aspect of exercise participation (**outside of school hours**) over the NEXT 3 weeks, using the following scale:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all

Somewhat

Completely

How confident are you that you can.....

	Confidence (0-100)
1. Motivate yourself to get at least 30 minutes of activity a day, 3 times per week over the next three weeks?	
2. Use safe, effective exercise technique (e.g., warm-up, stretching) over the next 3 weeks?	
3. Schedule exercise sessions into your weekly routine so that you get at least 30 minutes of exercise a day, 3 times per week over the next 3 weeks?	
4. Plan exercise sessions that will be at least moderately difficult (e.g., have you breathing a little hard, your heart rate increases) over the next 3 weeks?	
5. Monitor your exercise progress by recording what exercises you do, how often you do them and for how long over the next 3 weeks?	
6. Set realistic, weekly exercise goals for yourself (e.g., exercising 3 days/week) over the next 3 weeks?	
7. Return to exercising after missing a session over the next 3 weeks?	
8. Monitor and regulate the intensity of your exercise so that it is moderately difficult over the next 3 weeks?	
9. Develop solutions to cope with potential barriers that can interfere with your exercise over the next 3 weeks?	
10. Plan exercises that fit within your other daily activities over the next 3 weeks?	

PART G

In this section of the questionnaire we are interested in finding out **how much time** you spend involved in **physical activity**.

Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time.

Physical activity can be done in sports, playing with friends, or walking to school.

Some examples of **physical activity** are running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, soccer, basketball, football, & surfing.

Add up all the time you spend in physical activity each day.

1. Over the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?

☐ 0 days ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 days

2. Over a typical or usual week, on how many days are you physically active for a total of at least 60 minutes per day?

☐ 0 days ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 days

The following two questions correspond to physical activity **outside school hours**:

3. **Outside school hours:** How often do you usually exercise in your free time, so much that you get out of breath or sweat?

- | | | | | |
|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Once a month
or less | Once a week | 2-3 times a
week | 4-6 times a
week | Every day |

4. **Outside school hours:** How many hours do you usually exercise in your free time, so much that you get out of breath or sweat?

- | | | | | | |
|-----------------------|-----------------------------------|-------------------------------|--------------------------------|--------------------------------|------------------------------|
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| None | About half
an hour per
week | About one
hour per
week | About 2-3
hours per
week | About 4-6
hours per
week | About 7
hours per
week |

The following two questions correspond to physical activity during school hours:

5. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Check one only)

- I don't do PE..... ☐
Hardly ever..... ☐
Sometimes..... ☐
Quite Often..... ☐
Always..... ☐

6. In the last week, please indicate how often you were **moderately or very active** (**active enough to get out of breath or sweaty**) during PE lessons (if you did not have PE please just indicate 'none').

	None	Little Bit	Medium	Often	Very Often
Monday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tuesday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wednesday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thursday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Friday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saturday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sunday.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Check one.)

- Yes..... ☐
No..... ☐

If yes, what prevented you?

Appendix E – Previous Day Physical Activity Recall Diary

Activities Scale

The purpose of this questionnaire is to estimate the amount of physical activity that you perform. The name of each day (**Wednesday, Thursday, Friday, Saturday, Sunday**) that you will be describing is located in the top right hand corner of each time sheet.

1. For **each** time period, write in the activity number (see the following page) that corresponds to the main activity you actually performed during that particular time period.
2. Then rate how physically hard each activity was. Place a ☒ in the timetable to indicate one of the following intensity levels for each activity.

Light – Slow breathing, little or no movement.



Moderate – Normal breathing and some movement.



Hard – Increased breathing and moderate movement.



Very Hard – Hard Breathing and quick movement.



Activity Numbers

Eating

- 1.) Eating a meal
- 2.) Snacking

Work

- 3.) Working (e.g., part time job, babysitting)
- 4.) Doing House chores (e.g., vacuuming, dusting, washing dishes, animal care etc.)
- 5.) Yard Work (e.g., mowing, gardening, raking)

After-School/Spare Time/Hobbies

- 6.) Church
- 7.) Hanging out with friends
- 8.) Homework
- 9.) Listening to music
- 10.) Music lesson/playing music
- 11.) Playing video games/Internet
- 12.) Reading
- 13.) Shopping
- 14.) Talking on the phone
- 15.) Watching TV/Movie

Transportation

- 16.) Riding in a car/bus
- 17.) Travel by walking
- 18.) Travel by bicycling

Sleep/Bathing

- 19.) Getting dressed
- 20.) Getting ready (hair, make-up etc.)
- 21.) Showering/Bathing
- 22.) Sleeping

School

- 23.) Club/Student Activity
- 24.) Lunch/Free Time
- 25.) PE Class
- 26.) Sitting in Class

Physical Activities/Sport

- 27.) Aerobics/Aerobics/Dance
- 28.) Badminton
- 29.) Basketball
- 30.) Bicycling
- 31.) Bowling
- 32.) Cheerleading
- 33.) Dancing (social/recreational)
- 34.) Dancing (jazz/tap etc.)
- 35.) Field Hockey
- 36.) Frisbee
- 37.) Golf
- 38.) Gymnastics
- 39.) Hockey
- 40.) Ice/Roller Skating
- 41.) Jogging/Running
- 42.) Karate/Judo/Martial Arts/Self-Defense
- 43.) Rollerblading
- 44.) Skateboarding
- 45.) Soccer
- 46.) Softball/Baseball
- 47.) Stationary Exercises (e.g., treadmill, bike)
- 48.) Street Hockey
- 49.) Swimming/Water Exercises
- 50.) Tennis
- 51.) Track and Field
- 52.) Trampoline
- 53.) Volleyball
- 54.) Walking (briskly)
- 55.) Weight/Circuit Training
- 54.) Other _____

Sample activity time sheet

This shows the correct way to fill the time sheets:

Time Period	Activity Number	Light	Moderate	Hard	Very Hard
7.00-7.30am	21	✓			
7.30-8.00am	1	✓			
8.00-8.30am	18			✓	
8.30-9.00am	25		✓		
9.00-9.30am	25			✓	

Wednesday

Write Activity
Numbers
Here

Put a ✓ to rate the
intensity of each activity



		Activity Number	Light	Moderate	Hard	Very Hard
Before school	7:00-7:30					
	7:30-8:00					
	8:00-8:30					
During school	8:30-9:00					
	9:00-9:30					
	9:30-10:00					
	10:00-10:30					
Lunchtime	10:30-11:00					
	11:00-11:30					
	11:30-12:00					
	12:00-12:30					
	12:30-1:00					
During school	1:00-1:30					
	1:30-2:00					
	2:00-2:30					
	2:30-3:00					
After School	3:00-3:30					
	3:30-4:00					
	4:00-4:30					
	4:30-5:00					
Dinner Time	5:00-5:30					
	5:30-6:00					
	6:00-6:30					
	6:30-7:00					
Evening	7:00-7:30					
	7:30-8:00					
	8:00-8:30					
	8:30-9:00					
	9:00-9:30					
	9:30-10:00					
	10:00-10:30					
	10:30-11:00					
	11:00-11:30					
	11:30-12:00					

Thursday

Write Activity
Numbers
Here

Put a ✓ to rate the
intensity of each activity



		Activity Number	Light	Moderate	Hard	Very Hard
Before school	7:00-7:30					
	7:30-8:00					
	8:00-8:30					
During school	8:30-9:00					
	9:00-9:30					
	9:30-10:00					
	10:00-10:30					
	10:30-11:00					
Lunchtime	11:00-11:30					
	11:30-12:00					
	12:00-12:30					
	12:30-1:00					
	1:00-1:30					
During school	1:30-2:00					
	2:00-2:30					
	2:30-3:00					
	3:00-3:30					
After School	3:30-4:00					
	4:00-4:30					
	4:30-5:00					
	5:00-5:30					
Dinner Time	5:30-6:00					
	6:00-6:30					
	6:30-7:00					
	7:00-7:30					
	7:30-8:00					
Evening	8:00-8:30					
	8:30-9:00					
	9:00-9:30					
	9:30-10:00					
	10:00-10:30					
	10:30-11:00					
	11:00-11:30					
	11:30-12:00					

Friday

Write Activity
Numbers
Here

Put a ✓ to rate the
intensity of each activity



		Activity Number	Light	Moderate	Hard	Very Hard
Before school	7:00-7:30					
	7:30-8:00					
	8:00-8:30					
During school	8:30-9:00					
	9:00-9:30					
	9:30-10:00					
	10:00-10:30					
	10:30-11:00					
	11:00-11:30					
Lunchtime	11:30-12:00					
	12:00-12:30					
	12:30-1:00					
	1:00-1:30					
	1:30-2:00					
	2:00-2:30					
During school	2:30-3:00					
	3:00-3:30					
	3:30-4:00					
After School	4:00-4:30					
	4:30-5:00					
	5:00-5:30					
	5:30-6:00					
	6:00-6:30					
	6:30-7:00					
Dinner Time	7:00-7:30					
	7:30-8:00					
	8:00-8:30					
	8:30-9:00					
	9:00-9:30					
	9:30-10:00					
Evening	10:00-10:30					
	10:30-11:00					
	11:00-11:30					
	11:30-12:00					

Write Activity
Numbers
Here

Put a ✓ to rate the
intensity of each activity

Saturday



		Activity Number	Light	Moderate	Hard	Very Hard
	7:00-7:30					
	7:30-8:00					
	8:00-8:30					
	8:30-9:00					
	9:00-9:30					
	9:30-10:00					
	10:00-10:30					
	10:30-11:00					
	11:00-11:30					
	11:30-12:00					
	12:00-12:30					
	12:30-1:00					
	1:00-1:30					
	1:30-2:00					
	2:00-2:30					
	2:30-3:00					
	3:00-3:30					
	3:30-4:00					
	4:00-4:30					
	4:30-5:00					
	5:00-5:30					
	5:30-6:00					
Dinner Time	6:00-6:30					
	6:30-7:00					
	7:00-7:30					
	7:30-8:00					
	8:00-8:30					
Evening	8:30-9:00					
	9:00-9:30					
	9:30-10:00					
	10:00-10:30					
	10:30-11:00					
	11:00-11:30					
	11:30-12:00					

Write Activity
Numbers
Here

Put a ✓ to rate the
intensity of each activity

Sunday



		Activity Number	Light	Moderate	Hard	Very Hard
	7:00-7:30					
	7:30-8:00					
	8:00-8:30					
	8:30-9:00					
	9:00-9:30					
	9:30-10:00					
	10:00-10:30					
	10:30-11:00					
	11:00-11:30					
	11:30-12:00					
	12:00-12:30					
	12:30-1:00					
	1:00-1:30					
	1:30-2:00					
	2:00-2:30					
	2:30-3:00					
	3:00-3:30					
	3:30-4:00					
	4:00-4:30					
	4:30-5:00					
	5:00-5:30					
	5:30-6:00					
Dinner Time	6:00-6:30					
	6:30-7:00					
	7:00-7:30					
	7:30-8:00					
	8:00-8:30					
Evening	8:30-9:00					
	9:00-9:30					
	9:30-10:00					
	10:00-10:30					
	10:30-11:00					
	11:00-11:30					
	11:30-12:00					