# THE ROLE OF RELATIONAL EFFICACY BELIEFS ON ADOLESCENT'S LEISURE TIME PHYSICAL ACTIVITY

by

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## Abstract

Parents are critical social determinants of the health-related behaviours of adolescents. The foundation that parents provide for a healthy lifestyle is particularly important as those lifestyle choices (e.g., physical activity) become under self-regulatory control during adolescence. The overall purpose of this study was to apply the tripartite model of relational efficacy (Lent & Lopez, 2002) to better understand the extent to which adolescents' (aged 11-13) perceptions of the family environment predict adolescent leisure time physical activity. Specifically, this study examined how adolescents' confidence in their parents' (other-efficacy), adolescents estimation of their parents' confidence in them (relation-inferred self-efficacy), and adolescents outcome expectations associated with physical activity involvement predict their subsequent involvement in physical activity during their leisure time. Four hundred and two grade 7 students from the Lower Mainland of British Columbia completed a questionnaire at two time points (April and June 2012) to assess the above variables. It was hypothesized that there would be a positive relationship between adolescents' relational efficacy beliefs towards their parents with leisure time physical activity among adolescents. Structural equation modeling was used to examine model fit to test the different study hypotheses. Results revealed a just identified model that demonstrated that adolescents' confidence in their fathers' ability to help them be active was predictive of leisure time physical activity. The results from this research provide greater insights into the predictive effects of parents in relation to young adolescents at a time when physical activity becomes increasingly under voluntary control.

## Preface

The University of British Columbia Behavioural Research Ethics Board provided approval for this research, certificate H12-00197. In addition, approval from the Vancouver School Board was obtained prior to research being conducted in schools.

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## Acknowledgements

At the end of my undergrad I took a chance and headed west to embark upon a two year journey towards this academic milestone. Over these years I have grown as an individual, a researcher and writer and will be forever thankful for those who have helped me get here.

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# 1 Chapter: Introduction

There is compelling evidence that physical inactivity is the norm among Canadian youth (Active Healthy Kids Canada, 2010; Colley et al., 2011). Twelve-year-old Canadian boys and girls are taller, heavier and less healthy than their counterparts three decades ago (Tremblay et al., 2010). Across all age groups, declines in fitness (as measured by flexibility and muscular strength) were seen alongside increases in body mass index and skinfold scores in children and youth from 1981 to 2009 (Tremblay et al., 2010). The suboptimal fitness and health of Canadian youth has been further emphasized by a recent report that revealed only 9 percent of boys and 4 percent of girls meet Canada's physical activity guidelines (Colley et al., 2011). Poor levels of physical activity can lead to health complications later in life such as cardiovascular disease, osteoporosis and high blood pressure (Bouchard, Shephard, & Stephens, 1994); therefore, it is essential to understand the predictors of physical activity in order to provide appropriate strategies that promote and maintain physical activity across the lifespan.

Canada's physical activity guidelines recommend that to achieve health benefits youth should accumulate at least 60 minutes of moderate to vigorous physical activity per day (Janssen & LeBlanc, 2010; Tremblay et al., 2011). This is consistent with the physical activity guidelines set by the United States of America and the World Health Organization (Physical Activity Guidelines Advisory Committee, 2008; World Health Organization, 2010). Different activities of daily living can be classified based on intensity, ranging from sedentary to vigorous depending on their calculated metabolic equivalents (MET; Ainsworth et al., 2011). MET values are a ratio of the work (or activity) metabolic rate to a standard resting metabolic rate, where one MET represents the energy expense at rest (Ainsworth et al., 2011). Activities that make you "sweat a little" and "breathe harder" are considered

moderate and have a MET value of 3 to 5.9 (Ainsworth et al., 2011; Tremblay et al., 2011). Examples of moderate activities are skating, bike riding and canoeing. Vigorous activities achieve a MET of 6 or greater and will cause you to "sweat" and "be out of breath" (Ainsworth et al., 2011; Tremblay et al., 2011). Examples of vigorous activities are running, rollerblading, and hockey.

There are numerous physical and psychosocial benefits to leading a physically active lifestyle. Janssen and LeBlanc (2010) completed a systematic review of physical activity in relation to seven key health indicators for youth (i.e., high blood cholesterol, high blood pressure, metabolic syndrome, obesity, low bone density, depression, and injuries). A dose-response relationship was observed between physical activity and blood pressure, obesity, bone density, and depression (Janssen & LeBlanc, 2010). Therefore, even minimal amounts of moderate to vigorous physical activity can induce important health benefits for youth (Janssen & LeBlanc, 2010). In addition to the physical benefits, youth who participate in regular physical activity also tend to demonstrate greater academic success (Trudeau & Shephard, 2008), improved ratings of well-being (Gilman, 2001), and greater self-esteem than their inactive counterparts (Strauss, Rodzilsky, Burack, & Colin, 2001). In sum, involvement in continual and regular physical activity has the capacity to improve current and future physical and psychological health (Caspersen, Pereira, & Curran, 2000).

## 1.1 Physical Activity Patterns in Early Adolescence

A critical period for the development of healthy lifestyle practices is adolescence. Adolescence ranges from the onset of physiologically normal puberty (roughly age 10) and ends when an adult identity is accepted around the age of 18 (American Psychological Association, 2002; Canadian Paediatric Society, 2003). Specifically, early adolescence (ages

10 to 13) is when health-enhancing and health-compromising behaviours are often consolidated, setting out patterns of behaviour that persist into adulthood (Sallis et al., 1992). Early adolescence is also the time when the greatest declines in physical activity are observed across the lifespan (Caspersen et al., 2000; Kimm et al., 2002; Telama & Yang, 2000; van Mechelen, Twisk, Post, Snel, & Kemper, 2000). Typically, physical activity begins to decline around the age of 12 years old for both males and females (Kimm et al., 2002; Telama & Yang, 2000). The decline is related to less participation in organized sport, an increased number of tasks competing for an adolescent's time, and lifestyle behaviours becoming under self-regulatory control (Telama & Yang, 2000). This means that adolescents have more choice in when and what activities they participate in during their leisure time than during childhood.

### 1.2 Parenting and Adolescent Physical Activity

There is evidence to suggest that physical activity participation aggregates in families, with active parents having active offspring (Nikolaidis, 2011; Simonen et al., 2002). The Framingham Children's Study found that active parents were two to three times more likely to have an active child than inactive parents (Moore et al., 1991). In addition, active children were six times more likely to have active parents than inactive parents (Moore et al., 1991). These results indicate that parents create an environment that is conducive to and supportive of regular physical activity. Parents are role models for their offspring to gain knowledge, experience and guidance (Galbraith & Schvaneveldt, 2009).

Within families parental beliefs, attitudes, and behaviours affect children's health behaviours (Pugliese &Tinsley, 2007; Tinsley, 2003). Cross sectional research has demonstrated that adolescent physical activity has a positive relationship with parental

modeling, attitudes and support (Edwardson & Gorely, 2010). This research has identified parents as an important agent for adolescents' decisions about leisure time physical activity (LTPA) participation across childhood and into adolescence. Parents influence their children's LTPA through direct modeling, providing resources, establishing or eliminating barriers, and giving positive encouragement (Trost & Loprinzi, 2011).

Nevertheless, it should be noted that the type of influence that parents have on their children's LTPA tends to change over the course of childhood and adolescence. Throughout childhood (ages 0 to 10), parents act as models for behaviour and initiate their children's involvement in different sports and activities. This early exposure to a variety of physical activity pursuits helps enhance attraction to, and perceived competence in, physical activity later in life (Welk, Wood, & Morss, 2003). As children move into early adolescence, the parental role shifts from modeling to providing encouragement and instrumental behaviours for their children to continue being involved in physical activity. Examples of these types of support include the coordination of transportation to and from a sport practice, payment of registration fees and attendance at sporting events (e.g., games, matches). There is strong, consistent evidence for the relationship between parental support and adolescent LTPA (Ferreira et al., 2007; Pugliese & Tinsley, 2007; Trost & Loprinzi, 2011). Although the types of influence on LTPA change over the course of childhood, parents appear to have a significant impact on the physical activity behaviours of their offspring. Therefore, it is particularly important to understand how parents can best support the LTPA behaviours of early adolescents. The overall purpose of this Master's thesis research is to explore the extent to which the relational efficacy beliefs held by adolescents in the context of parent-child dynamics are related to adolescents' own involvement in LTPA pursuits.

## 1.3 Social Cognitive Theory (SCT)

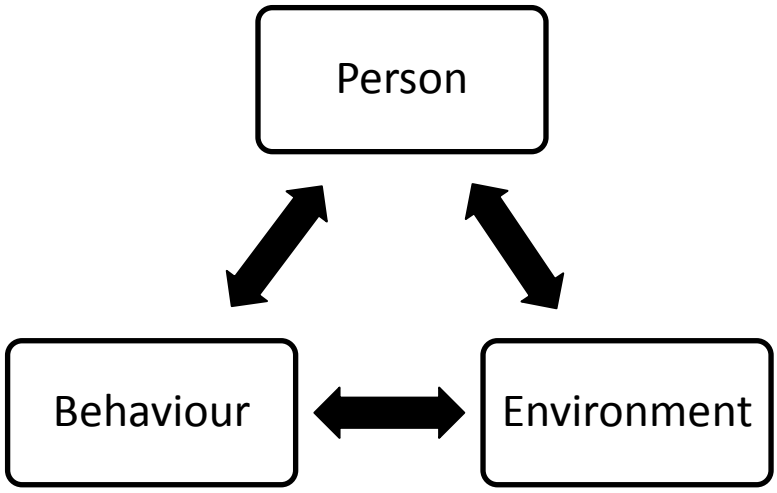


*Figure 1.1* Triadic reciprocal causation in SCT. From Bandura (1997, p. 6).

Humans are inherently social and, as a result, are influenced by the people around them. Bandura (1986) proposed Social Cognitive Theory (SCT) as a way to explain the interrelationships between a person, the environment and his or her behaviour. Bandura posited that individuals are active agents in the environment with the ability to choose the behaviours in which they wish to engage (Bandura, 1997). SCT suggests that personal factors (expectations, attitudes and beliefs), environmental factors (social, climate, and space) and behavioural factors (choices, effort, and persistence) operate through a process of triadic reciprocal causation (see Figure 1.1) whereby each set of factors can both influence or be influenced by the others (Bandura, 1997). For example, an adolescent may become motivated (i.e., a personal factor) to play ice-hockey as a result of a parent constructing a backyard rink (i.e., an environmental factor), which in turn might translate into increased physical activity involvement (i.e., a behaviour). Conversely, if an adolescent takes part in

increased physical activity (i.e., a behavior), that might foster feelings of competence and personal mastery (i.e., personal factors), that in turn shape the quality of interactions with his/her peers in other social settings (i.e., an environmental factor).

### 1.3.1 Self-Efficacy Theory

In physical activity research, self-efficacy theory has been used extensively to explain the cognitive processes underlying behaviour. Self-efficacy theory is a sub theory of SCT that explains the antecedents and consequences of self-efficacy beliefs and outcome expectations (Figure 1.2; Bandura, 1997). Self-efficacy is defined as "the belief in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). In contrast, outcome expectations are defined as an expectation that a specific outcome will follow a given behaviour (Bandura, 1997). Both play an integral role in adolescents' decisions to be physically active on a regular basis.

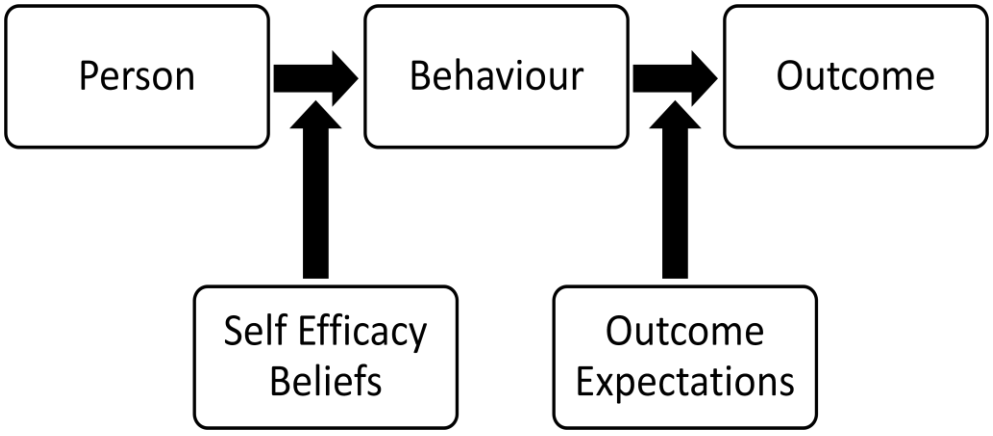


*Figure 1.2* The influence of self-efficacy beliefs and outcome expectancies. From Bandura (1997, p. 22).

Self-efficacy consistently predicts human performance in sport (Beauchamp, Bray, & Albinson, 2002) and education settings (Zimmerman, 2000), which makes it an essential component for success (Bandura, 1997). Self-efficacy beliefs can vary in terms of level,

strength and generality (Bandura, 1997). First, 'level' refers to the varying degree of task demands that are considered when a person rates his or her capabilities (Bandura, 1997). For example, when performing at national or international competitions, the nature of the task demands placed on a young athlete would be considerably higher when compared to those placed on a similar athlete at a club or recreational level. Indeed, efficacy beliefs can be rated in relation to very straightforward (i.e., low level) and more taxing (i.e., high level) task demands. Second, 'strength' represents how firm or definite the convictions about confidence are for a behaviour (Bandura, 1997). For example, a person might be very confident in his or her capabilities to pass a swimming level examination, whereas another might only be moderately confident to pass the same exam. Both might have the same knowledge and skills to swim, but differ considerably in their strength of convictions to pass the same exam. Finally, 'generality' refers to whether people judge themselves as efficacious across a wide range of activities or only in certain domains (Bandura, 1997). For example, one adolescent may be confident in their ability to participate in all alpine snow sports including skiing and snowboarding (i.e., high generality), while another adolescent may only be confident in one specific activity such as snowboarding (i.e., low generality).

Research has provided strong support for targeting specific sources of self-efficacy to improve LTPA across a variety of populations, including older adults (McAuley et al., 2006), children (Sallis, Prochaska, & Taylor, 2000), adolescents (Strauss et al., 2001) and special populations (Martin Ginis et al., 2011). There are six primary sources of self-efficacy, listed in order of influence from highest to lowest: mastery experiences, vicarious experiences, verbal persuasion, imaginal experiences, physiological states and emotional states (Bandura, 1997; Maddux, 1995).

Mastery experiences provide the strongest form of efficacy information because they represent authentic evidence of success (Bandura, 1997). Specifically, personal mastery accomplishments contribute to the development of personal knowledge about one's capabilities by providing authentic evidence of whether one has what is needed to succeed (Bandura, 1997). In addition to providing confidence in a single situation, the accumulation of multiple mastery experiences can buffer against failures. An individual is able to recognize that despite a setback they are still capable of success. For example, the accumulation of positive experiences for an adolescent in a weight room will improve his/her confidence to do strength training, even if he/she has a bad experience one day lifting weights. The establishment of mastery experiences for LTPA in early adolescents enhances self-efficacy and encourages an active lifestyle (Sallis et al., 2000).

A second source of self-efficacy corresponds to vicarious experiences, where observing others performing a behaviour acts as a referent for one's own perceived capabilities. An individual can assess the possibility of performing a task after watching a significant other (peer or parent) complete the task, which can lead to an increase in that individual's self-efficacy beliefs (Bandura, 1997). Weiss and colleagues (1998) demonstrated the benefits of vicarious experience in an experiment where non-swimmer children were placed in either a group (with peers) or individual beginner swimming lesson. The children in the group lesson had less fear, greater self-efficacy and more successful skill acquisition than the children in the individual lesson (Weiss et al., 1998). Vicarious experiences are especially important in the parent-child relationship because effective adult role models demonstrate successful strategies and actions to be physically active on a regular

basis. Parents are visible role models for their adolescents and play an important role in developing self-efficacy beliefs about living a healthy lifestyle (Bandura, 1997).

Self-efficacy is also influenced by the verbal and non-verbal feedback received from significant others. Early adolescents receive feedback about their physical activity behaviours in the form of praise, encouragement, and support from significant others (Magyar & Feltz, 2003). For example, a parent may congratulate their child on improvements in his/her free kick after watching him/her practice soccer in the backyard. Significant others can convey the importance of physical activity and enhance self-efficacy through verbal cues (MacDonald, Côté, Eys, & Deakin, 2011). The feedback early adolescents receive from parents about physical activity is particularly important for increasing self-efficacy (Gustafson & Rhodes, 2006).

Another source of self-efficacy comes from imaginal experiences. Imagery might involve an adolescent envisioning himself/herself being successful at a given behaviour (Bandura, 1997). For example, an early adolescent can imagine going for a run by using information from past run experiences to visualize the sense of accomplishment and mastery derived from completing the run. Visualizing a successful physical activity experience is related to increases in self-efficacy before actually doing the behaviour (Beauchamp et al., 2002).

The final two sources of self-efficacy are the somatic indicators of physiological and emotional states. Somatic indicators are particularly important indicators of self-efficacy for activities relating to health (Bandura, 1997). Physiological sources involve how the body feels (e.g., fatigue, pain, or fitness) for an individual before, during or after a behaviour (Feltz & Magyar, 2006). Physiological feedback provides the basis for a number of key barriers to

physical activity. For example, feelings of fatigue or pain may act as indicators of physical inability and thereby reduce a person's self-efficacy beliefs (Bandura, 1997). In addition, emotional sources of how an individual feels (e.g., happy, disappointed or stressed) can impact self-efficacy. A feeling of fear when attempting a new activity (e.g., fear of not being flexible when in a yoga class at a community centre) can decrease self-efficacy for the given behaviour. These somatic sources influence self-efficacy directly through the feelings felt when experiencing the target behaviour (e.g., physically activity).

Self-efficacy is the strongest psychological correlate of physical activity in Canadians (Pan et al., 2009). Self-efficacy is positively correlated with higher levels of moderate-to-vigorous physical activity and intentions to be physically active (McAuley & Blissmer, 2000; Motl et al., 2002). There is experimental evidence that demonstrates how improving self-efficacy can lead to increases in physical activity among adolescents (Dishman et al., 2004). In summary, the strong relationship between self-efficacy and physical activity makes self-efficacy an important psychological variables to examine when assessing physical activity behaviour.

### 1.3.2 Self-Regulatory Efficacy

Self-efficacy includes both task and self-regulatory components (Bandura, 1997; Brawley, Rejeski, & King, 2003). Task self-efficacy encompasses beliefs about actually engaging in a specific behaviour (e.g., "I am confident I can ride my bike around the block without falling off;" Dishman et al., 2004; Ryan & Dzewaltowski, 2002). Self-regulatory efficacy, on the other hand, encompasses beliefs about one's ability to regulate, schedule and manage behaviours (e.g., "I am confident I can participate in 90 minutes of vigorous physical activity this week") and, of direct relevance to the current research, has consistently been

found to predict physical activity behaviour (McAuley & Mihalko, 1998). Of specific note, Bandura (2004) states that self-regulatory efficacy beliefs are more important than task self-efficacy when trying to change complex health behaviours such as physical activity.

Research on self-regulatory efficacy has demonstrated the importance of learning and using self-regulatory skills to engage in regular physical activity. In a study with high school students, self-regulatory efficacy was found to be especially important for adolescents to remain active when faced with high scheduling demands (e.g., exam periods; Spink et al., 2006; Spink & Nickel, 2010). With increased demands for an individual's time as they move through adolescence, there is a greater need for self-regulatory efficacy to maintain physical activity on a daily basis. Therefore, early adolescents who are able to utilize self-regulatory skills would be expected to participate in greater amounts of LTPA.

Parents have been found to act as important social agents in developing self-regulatory skills among adolescents. In a recent study, Morton et al. (2011) found that adolescents' perceptions of their parents' behaviours predicted their own self-regulatory efficacy beliefs to be physically active. Self-regulatory efficacy was also found to be a mediator of family influence on physical activity participation in adolescents who had recently lapsed in their physical activity participation (Shields et al., 2008). Collectively these studies suggest that self-regulatory efficacy for physical activity plays an important role in adolescent development.

***Hypothesis 1****: There will be a positive relationship between adolescents' self-regulatory efficacy beliefs for physical activity and leisure time physical activity behaviour.*

### 1.3.3 Outcome Expectations

In most motivational theories of health behaviour, a variation of the outcome expectation construct is used (Rhodes, Fiala, & Conner, 2009). In SCT, it is theorized that outcome expectations influence behaviour indirectly through intentions (Bandura, 1997). In addition, it is important to note that there is growing evidence that outcome expectations may also act as a source of self-efficacy (Williams, 2010; Williams, Anderson, & Winett, 2005). The similarity of outcome expectancy constructs across motivational theories comes from the understanding that engagement in a behaviour is related to how enjoyable and useful an individual *expects* a behaviour to be (Rhodes et al., 2009). Therefore, it is assumed that people will perform behaviours that have positive expectations and avoid behaviours where the outcome is judged to be negative (Gellert, Ziegelmann, & Schwarzer, 2011; Rhodes et al., 2009).

A growing body of research has highlighted the importance of making a distinction between different components of outcome expectations beyond the traditional classifications of physical, social and self-evaluation (Gellert et al., 2011; Lawton, Conner, & McEachan, 2009; Rhodes et al., 2009). Recent work in health and social psychology has emphasized the importance of distinguishing between *affective* and *health-related* outcome expectations (Gellert et al., 2011; Rhodes & Conner, 2010). Affective outcome expectations relate to the anticipated emotions surrounding the consequences of a behaviour (e.g., how enjoyable or unpleasant a behaviour is expected to feel). Health-related outcome expectations (also referred to instrumental or cognitive outcome expectations) relate to the anticipated costs and benefits of a given behaviour in relation to one's health (e.g., how beneficial or harmful a behaviour is expected to be; Rhodes & Conner, 2010; Rhodes et al., 2009). The explanatory power of outcome expectations increases by considering and operationalizing different

dimensions of the construct (Gellert et al., 2011). Trafimow and colleagues (2004) demonstrated the capacity of affective and health-related outcome expectancies to predict a wide range of behaviours including exercise, fruit consumption, recycling, and blood donation. Further support for the distinction between affective and health-related outcome expectations comes from studies with evidence of their predictive (Rhodes et al., 2009) and discriminant validity (French et al., 2005; Rhodes & Courneya, 2003). As a result, it has been recommended that SCT should integrate the distinction between affective and health-related outcome expectations into its model (Rhodes et al., 2009).

The distinction of affective and health-related components of outcome expectations is particularly salient with regards to physical activity. A recent meta-analysis by Rhodes and colleagues (2009) found that affective judgments had a non-trivial stronger relationship ($r$=.42) with physical activity behaviours than health-related outcome expectancies ($r$=.25). Affective outcome expectations play an important role in guiding judgments, largely because greater positive affect experienced in a situation increases the tendency of an individual to seek out similar situations in the future (Diener, Suh, Lucas, & Smith, 1999). Overall, it has been suggested that affective outcome expectations are more important than health-related outcome expectations with regard to behavioural engagement (Trafimow, et al., 2004). This may be because affective outcome expectations are more proximal to a behaviour (i.e., immediate feelings of enjoyment), whereas health-related outcome expectations have more distal outcomes (e.g., exercise is good for long term heart health). Furthermore, the perceived long term benefits of physical activity may not be as important as motivators for adolescents as they are for adults (Gellert, Ziegelmann, & Schwarzer, 2011; Lubans et al., 2012).

Research on physical activity health messages suggests that affective messages consistently produce greater increases in physical activity than health-related messages (Conner, Rhodes, Morris, McEachan, & Lawton, 2011). In a study by Conner et al. (2011), participants were presented with a description of either affective or health-related outcomes of physical activity; at the post-intervention follow-up, those who had received the affective outcome expectation messages reported greater amounts of daily physical activity. The salience of affective outcome expectations for adolescents was emphasized in a recent health promotion campaign whereby adolescents were sent daily text messages about the affective, health-related and general outcome expectations for physical activity (Sirriyeh, Lawton, & Ward, 2010). Those who received the affective messages were found to engage in a greater MET output per day than those who received any of the other messages (Sirriyeh et al., 2010). This suggests that targeting specific affective beliefs related to physical activity can result in changes in the LTPA behaviour of early adolescents.

***Hypothesis 2****: Adolescents' affective outcome expectations will be positively related to leisure time physical activity.*

***Hypothesis 3****: Adolescents' health-related outcome expectations will not be related to leisure time physical activity.*

Self-efficacy beliefs help to foster the outcomes that come to be expected from a behaviour and act as a self-fulfilling prophecy for physical activity behaviour (Pajares, 2006). Adolescents tend to engage in activities where there are positive expected outcomes and will actively avoid activities where the expected outcomes are viewed as negative (Bandura,

1997). When an adolescent has high self-efficacy for physical activity he/she will be more inclined to envision the positive outcomes. For example, adolescents who are confident in their soccer skills expect to succeed in games and will enjoy and seek out opportunities to play on a regular basis. Conversely, adolescents who lack confidence in their ability to play soccer and perceive the outcomes of participating to be negative (i.e., an unfavourable score, sore muscles) will likely result in them avoiding soccer and the accompanying physical activity.

***Hypothesis 4****: There will be a positive relationship between adolescents' self-regulatory efficacy for physical activity and affective outcome expectancies.*

***Hypothesis 5****: There will be a positive relationship between adolescents' self-regulatory efficacy for physical activity and health-related outcome expectancies.*

### 1.4 Relational Efficacy

In close relationships, people not only develop beliefs about their own capabilities (self-efficacy), they also develop beliefs about the capabilities of the people with whom they interact. Lent and Lopez (2002) proposed a tripartite model (see Figure 1.3) that explicates

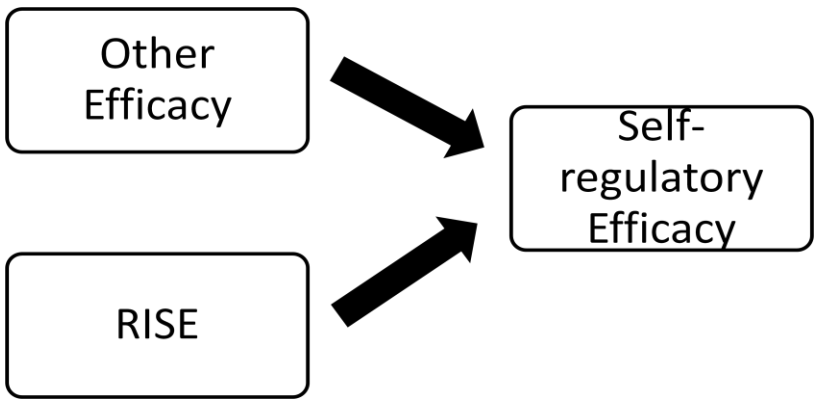


*Figure 1.3* Lent and Lopez's (2002) tripartite model of relational efficacy.

the extent to which these relational efficacy beliefs exist alongside, and interact with, self-efficacy beliefs in the context of close relationships. The three focal constructs embedded within the tripartite model are other-efficacy, relation-inferred self-efficacy (RISE) and self-efficacy. Other efficacy corresponds to "person A's appraisal of person B's capabilities to perform a given behaviour" (Lent & Lopez, 2002). Comparatively, RISE is "person A's appraisal of how person B views person A's capabilities" (Lent & Lopez, 2002). Lent and Lopez propose that other-efficacy and RISE act as interpersonal sources of self-efficacy and explain how self-efficacy is affected in relational contexts.

Relational efficacy cognitions about a significant other's capabilities can exist in different close relationships (e.g. athlete-coach, student-teacher and child-parent). Bandura (1997) discussed the importance of considering how a significant other (spouse, parent or exercise leader) can influence self-efficacy beliefs through a form of proxy agency. Specifically, Bandura (1997) suggested that when an individual is confident in a significant other's capabilities to support one's own goals to be physically active, this can bolster the development of one's own self-efficacy beliefs for a given behaviour (i.e., physical activity; Bray et al., 2001). This may be particularly relevant in parent-child relationships where there is a high degree of interdependence between parents and their children. The parent-child relationship is characterized as occurring within a 'distinguishable dyad', where members of the dyad have (different) predetermined roles and responsibilities (Cook & Kenny, 2005). Specifically, the parent is in a superordinate role where they can influence, encourage and teach their children about various physical activity behaviours. As a result, parents have greater influence over their children than the other way around. Over time, parental beliefs

about their child's abilities can lead to a self-fulfilling prophecy as children start to take on the beliefs that their parents hold of them (Snyder & Stukas, 1999).

Relational efficacy beliefs may be related to changes in early adolescents' confidence in their own capabilities to engage in a behaviour. Research has shown that relational efficacy beliefs can explain differences in self-efficacy from within sport (Beauchamp & Whinton, 2005; Jackson et al., 2007) and educational (Jackson, Whipp, Chua, Pengelley, & Beauchamp, 2011) contexts. Despite the utility of Lent and Lopez's framework and the importance of family for promoting a physically active lifestyle, researchers have yet to examine this model in family settings.

### 1.4.1 Other Efficacy

In the context of families, parents are influential agents on their children's academic and sport choices (Lent & Lopez, 2002). Other efficacy exists in the parent-child relationship as an adolescent's confidence in their parent's capabilities to help him/her achieve a desired goal. The strength of an adolescent's other efficacy beliefs may support personal performance and participation in LTPA, with high other efficacy beliefs leading to enhanced individual achievement (Dunlop, Beatty & Beauchamp, 2011). When an adolescent believes in the capabilities of a significant other (i.e. coach or, in the case of the current study, a parent) it can reinforce their own individual confidence in physical activity participation can increase in addition to improvements in effort, enjoyment and achievement (Jackson, Taylor, Myers & Beauchamp, 2012).

Other efficacy beliefs develop gradually over the course of a relationship and are particularly relevant in family settings because it is suggested that health habits are rooted in familial practices where parents encourage their children to be involved in physical activity (Bandura, 2006). In the parent-child relationship, adolescents develop beliefs about their

parents' ability to parent while parents develop beliefs about their children's capabilities in sport, academic and recreational pursuits. Adolescent physical activity participation can increase or decrease based on the other efficacy beliefs held by an adolescent. In sum, adolescents make appraisals about their own capabilities based on the perceived capabilities of their parents to support them in these pursuits (Lent & Lopez, 2002).

Other efficacy is able to explain unique variance in personal performance beyond self-efficacy beliefs (Beauchamp & Whinton, 2005) and may explain additional variation in early adolescents' LTPA. There is evidence from exercise settings to suggest that other efficacy can predict improvements in an individuals' self-efficacy (Bray & Cowan, 2004; Bray et al., 2001). In the context of standard physical activity classes, Bray and colleagues (2001) found that when class members displayed confidence in the abilities of the exercise leader, this was related to participants being more confident in their own capabilities, and also displaying improved adherence to the class. Similarly, in a cardiac rehabilitation program, patients with greater ratings of confidence in the program consultant had greater exercise self-efficacy (Bray & Cowan, 2004). In education research, other efficacy has been associated with a number of adaptive outcomes. Students who reported high other efficacy with regards to their instructor in a physical education class prospectively reported more LTPA one week later than their peers with lower other efficacy beliefs (Jackson et al., 2012). In addition, high other efficacy scores were positively correlated with increased effort, task execution and affective responses in students (Jackson et al., 2012).

Other efficacy can complement the effects of self-efficacy in supporting personal performance and participation (Lent & Lopez, 2002). There is evidence to suggest that irrespective of self-efficacy scores, in a relationship setting greater accomplishment is

observed in people who believe strongly in the capabilities of those significant others with whom one interacts (Dunlop et al., 2011). These finding may be salient in parent-child relationships where other efficacy beliefs may serve as a cognitive mechanism that promotes adolescents' self-efficacy beliefs. Thus, an adolescent who is highly confident in their parents' capabilities (other efficacy) to effectively parent may display greater engagement in LTPA.

***Hypothesis 6****: There will be a positive relationship between adolescents' other-efficacy beliefs towards their parents and adolescents' self-regulatory self-efficacy to be physically active.*

***Hypothesis 7****: There will be a positive relationship between adolescents' other-efficacy beliefs towards their parents and adolescents' own leisure time physical activity.*

### 1.4.2 Relation-Inferred Self-efficacy (RISE)

In the context of parent-child interactions, adolescent RISE beliefs correspond to an adolescent's estimation of his/her parents' confidence in his/her abilities. Such RISE beliefs are based upon performance-related feedback, goals set, and support provided by the parent (Jackson, Knapp, & Beauchamp, 2008). RISE appraisals can be accurate or inaccurate depending on the interpretation made by the child (i.e., the extent to which the child's appraisal of his/her parent's confidence in the child aligns with the parent's actual confidence in the child). RISE appraisals are able to act as an inter-personal source of self-efficacy beliefs. For example, a child who believes that his/her parents have confidence in his/her ability to play soccer might respond with an increased sense of self-efficacy. Bandura (1997) suggested it is easier "to sustain a sense of efficacy if significant others express faith instead

of doubt" (p.101). Lent and Lopez (2002) postulated that RISE beliefs augment the six primary sources of self-efficacy.

Adolescents receive constant feedback from their parents about their personal capabilities and deficits. This is echoed in research that shows children take on views of themselves that tend to mirror how their parents see them (Gecas, Calonico, & Thomas, 1974; Lent & Lopez, 2002). Adolescents are at an influential stage in their development where perceptions of their parents' confidence in their abilities may be instrumental for LTPA participation.

Research, to date, has yet to examine RISE beliefs within parent-child contexts. In coach-athlete relationships RISE beliefs have been shown to be positively related to self-efficacy beliefs (Jackson et al., 2007). Similar effects are seen within teacher-student relationships where students who perceive their teachers to have high confidence in their abilities report greater confidence in their own abilities (Jackson et al., 2010). Given that parents play an active role in the development of health enhancing behaviours among adolescents, favourable RISE perceptions may act as a source of self-efficacy for physical activity behaviours (Jackson et al., 2012). When an adolescent believes that his/her parents favourably rate his/her ability to participate in LTPA, this may reinforce and validate his/her effort and enjoyment of physical activity (Jackson et al., 2012).

***Hypothesis 8****: There will be a positive relationship between adolescents' estimations of their parents' beliefs in them (high RISE) and adolescent's self-regulatory efficacy to be physically active.*

***Hypothesis 9****: There will be a positive relationship between adolescents' estimations of their parents' beliefs in them (high RISE) and the adolescents' leisure time physical activity.*

## 1.5 Summary

The overall purpose of this study was to examine how adolescents' perceptions of their parent's other efficacy and RISE relates to LTPA among adolescents and the extent to which self-regulatory efficacy and outcome expectations mediate the relationship (Figure 1.4). This study will help expand our knowledge of how psychosocial mediators interact in parent-adolescent relationships and potentially enable us to use this information in adolescent LTPA interventions in the future.

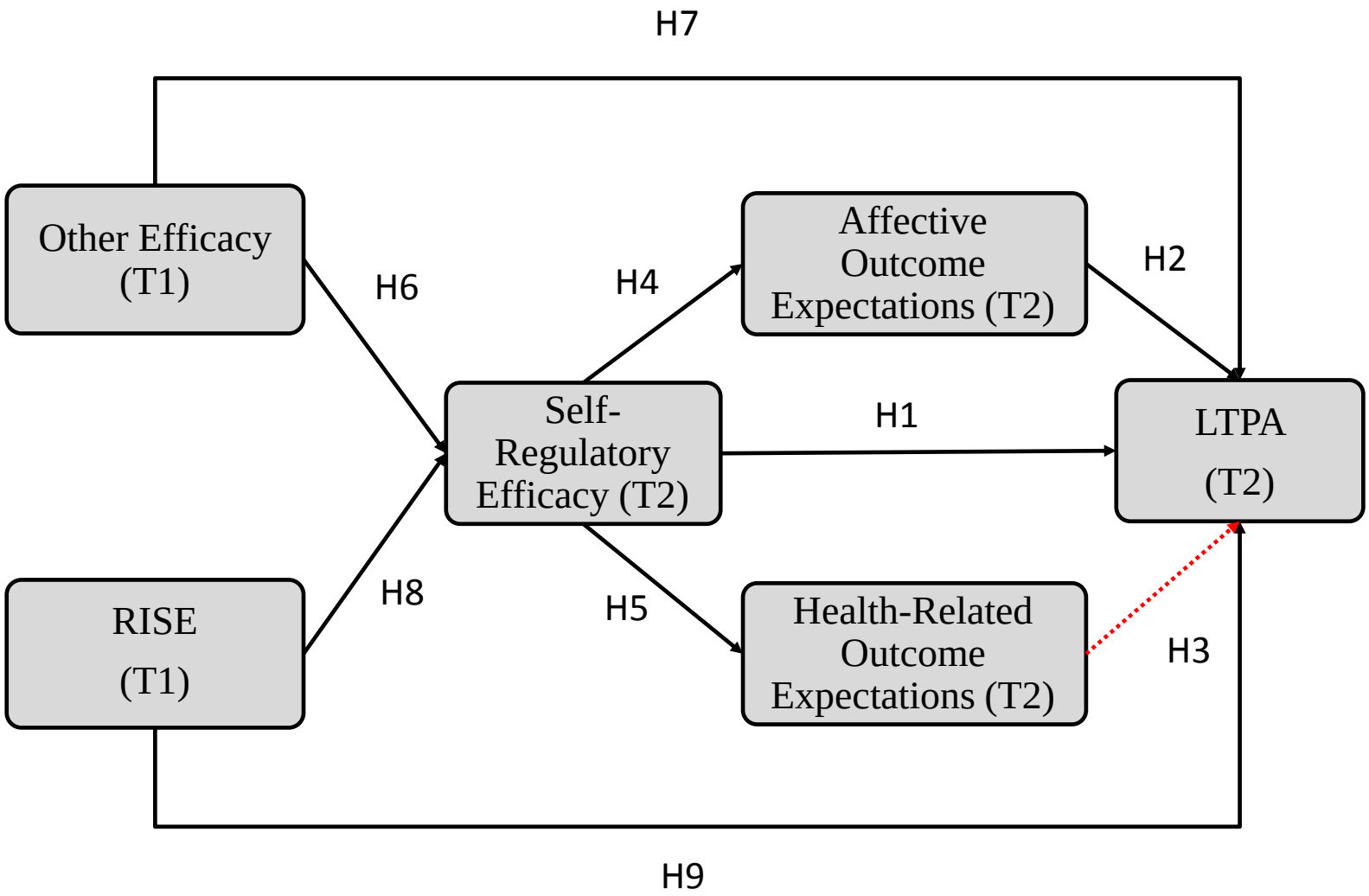


*Figure 1.4* Proposed model linking mothers' and fathers' relational efficacy beliefs to LTPA.

*Note:* T1 = Time 1, T2 = Time 2, LTPA = leisure time physical activity, RISE = relation-inferred self-efficacy.

# 2 Chapter: Methods

## 2.1 Participants

### 2.1.1 Determining Sample Size

A large sample size is required to conduct structural equation modeling (SEM) and an even larger sample size is required when complex analyses with multiple parameters are included (Kline, 2011). For studies using SEM, a typical sample size is 200 cases (Iacobucci, 2009; Kline, 2011; Tabachnick & Fidell, 2007). The *N:q* rule has also been suggested as a guideline to estimate the minimum sample size based on the ratio between the number of cases (*N*) to the number of parameters (*q*), with an ideal ratio of 20:1 (Jackson, 2003; Kline, 2011). In this study, eight (*q*) parameters require statistical estimates, therefore a minimum sample size of $N = 160$ was required to maintain a 20:1 ratio. Also taken into consideration was the average attrition rate of 12.72 percent observed in recent adolescent research within schools (Bourne, 2011; Keith, 2009). As this study involved data collection at two time points (Time 1 (T1) in April and Time 2 (T2) in June), a conservative initial sample size of 400 was targeted to ensure a minimum of 200 participants completed measures at both time points in order to accommodate different estimation methods in SEM, potential attrition rates and the number of parameters to be tested.

### 2.1.2 Description of Participants

Four hundred and two participants from 21 grade 7 classes in ten elementary schools from the Lower Mainland of British Columbia completed the questionnaire at T1. Three hundred and seventy three participants ($M_{age} = 12.34$, $SD = 0.48$, $N_{female} = 203$, 54.4 percent) completed the questionnaire at both time points (7.21 percent attrition over time). Adolescents between the ages of 11 to 13 years were recruited for this research because the most drastic decline in physical activity behaviour typically occurs at these ages (Caspersen

et al., 2000). Consistent with procedures used by Statistics Canada in the 2011 Census, participants were asked to report any and all ethnic and racial groups with which they self-identify. The most commonly reported ethnic and racial groups were White (44%), Chinese (33.2%), Filipino (8.0%), South Asian (7.8%) and fourteen other groups with frequencies less than 5 percent. The composition of this sample is reflective of the ethnocultural portrait in the Lower Mainland of British Columbia as reported by the 2006 Census (Statistics Canada, 2010). All adolescents had a working knowledge of English, which allowed them to complete the questionnaires independently.

## 2.2 Procedure

Ethical approval was obtained from the institutional review board at The University of British Columbia and agency approval obtained from the Vancouver School Board. Initial contact with schools was made through the respective school principals and grade 7 classroom teachers. Data collection took place between April and June 2012. Two weeks prior to the first time point, an initial visit to each school was made to make a verbal announcement and distribute information letters to students (Appendix A) and parents (Appendix B) explaining the purpose of the study. The information letter for students outlined the voluntary nature of the study, emphasized the confidentiality of their responses, and informed them that they may withdraw at any time without consequences. In addition, parents were able to withdraw their child from participation in the study through a letter sent home that explained the nature of the research (i.e., passive parental consent). This letter was available for parents in English, Chinese and Spanish, based on the common languages of the Lower Mainland of British Columbia as reported by the Canadian census (Statistics Canada, 2010) and languages requested by teachers. In addition, teachers were provided with a brief summary/reminder of the study to insert into a class newsletter (distributed within a week of

the original information letter being sent home to parents). This information included a link to a website whereby parents could download an additional copy of the parent letter, in case the original parent letter did not make it home. Active adolescent consent was denoted by the adolescent's choice to complete the questionnaire. Ten parents asked for their children to not participate and three adolescents chose not to participate.

The use of passive consent with parents ensured that a representative sample of students was obtained and is consistent with recommendations from the Society of Adolescent Medicine (SAM; Santelli et al., 1995). The SAM recommends that research involving minimal risk may occur without direct parental consent (Santelli et al., 1995). Further support for the use of passive parental consent is provided by research that suggests participation rates decrease when active parental consent is required (Dent, Sussman, & Stacy, 1997). As many as 50 percent of parents or students fail to return parental consent forms when sent out by mail or delivered by students (Dent et al., 1997). In addition, active parental consent is more likely to be obtained from students living in well-functioning environments with privileged educational and economic backgrounds (Dent et al., 1997; Fletcher, Darling, Steinberg, & Dornbusch, 1995). The combination of these problems emphasizes the importance of passive parental consent as a means to obtain a representative sample for research. Another benefit of passive parental consent is that it adds minimal additional responsibilities to the teacher for being a part of the research initiative.

This study used a prospective observational design with data collection occurring at two time points (T1 in April 2012 and T2 in June 2012). At each time point, students independently completed the questionnaire (Appendix C) during 25 minutes of their class time while supervised by the researcher. Students were reminded of the voluntary nature of

the study, the confidentiality of their responses and their right to withdraw at any time without experiencing any negative consequences.

## 2.3 Measures

### 2.3.1 Demographics

The demographic information collected from the adolescents included: age, date of birth, country of birth, gender, ethnicity, school, class name, mother's occupation, father's occupation, family structure, and the first three characters of their home postal code.

### 2.3.2 Tripartite Efficacy Beliefs

Three separate measures appraised adolescents' tripartite efficacy beliefs. Self-regulatory efficacy and RISE were assessed with the same six item measure developed by Shields and colleagues (2008). Changes were made to the referent in the stem for the RISE items to reflect adolescents' estimations of their parent's confidence in their abilities (Jackson, et al., 2007). The modification of the referent allows for direct concordance between efficacy measures as only the stem of the questionnaire is altered (Jackson, et al., 2007; Lopez & Lent, 1991). A six-item measure developed by Dzewaltowski and colleagues assessed other efficacy through adolescents' perceptions of their parents' capabilities in relation to supporting adolescent physical activity involvement (Dzewaltowski, Geller, Rosenkranz, & Karteroliotis, 2010).

#### 2.3.2.1 Self-regulatory Efficacy

Self-regulatory efficacy was assessed using the measure developed by Shields et al. (2008) to determine adolescents' ability to manage physical activity in the upcoming month. In recognition of recommendations provided by Rhodes and Blanchard (2007), the stem was adjusted to control for motivation. Items were prefixed by the stem *"If you really wanted to, how confident are you that you can..."* and was scored on a 0 percent (*not at all confident*) to

100 percent (*completely confident*) standard self-efficacy scale (McAuley & Mihalko, 1998). An example item is "…*be physically active even if you don't have the time.*" Item scores were summed and averaged to provide a mean self-regulatory efficacy score out of 100 percent. The internal consistency was .88 and .90 at T1 and T2 respectively. These alpha values are consistent with previous research that found this measure to have a satisfactory internal consistency ($0.65 \leq \alpha \leq 0.85$) for use with adolescents (Shields, Spink, Chad & Odnokon, 2010; Shields et al., 2008). The items exhibited a Flesch reading score of 64.9 and a Flesch-Kincaid Grade Level of 6.6.

#### 2.3.2.2 Relation-Inferred Self-efficacy (RISE)

Adolescent RISE beliefs were assessed using the same six-item measure by Shields et al. (2008); however, the stem was amended to "*Estimate your mother's/female guardian's [or father's/male guardian's] confidence in your ability to...*" (cf. Lopez & Lent, 1991). Adolescents completed either one (single parent) or two separate (dual parent) RISE measures for their mother/female guardian and father/male guardian. Items were scored on a 0 percent (*not at all confident*) to 100 percent (*completely confident*) scale and scores were summed and averaged to obtain a separate mean RISE score for mothers and fathers. Cronbach alpha for this measure was acceptable for mothers and fathers at both time points ($.93 \leq \alpha \leq .94$). The items exhibited a Flesch-Kincaid Grade Level of 7.8 and Flesch reading ease score of 56.4, which is considered acceptable for the population based on previous use of the questionnaire with adolescents (Shields et al., 2008).

#### 2.3.2.3 Other Efficacy

Other efficacy was assessed using a six-item measure developed by Dzewaltowski and colleagues (Dzewaltowski et al., 2010; Dzewaltowski et al., 2007). This measure

assessed adolescents' beliefs in their parents' capabilities to help them be physically active. Items were prefixed by the stem *"How confident are you that you can get your mother/female guardian [or father/male guardian] to…"* (Dzewaltowski et al., 2007). Example items are *"…give you a ride do your favourite physical activities"* and *"…help you find different types of physical activities to do."* Items were scored on a 0 percent (*not at all confident*) to 100 percent (*completely confident*) scale. Adolescents' completed either one (single parent) or two separate (dual parent) other efficacy measures for their mother/female guardian and father/male guardian. Items scores were summed and then a mean other efficacy score was calculated for each mother/female guardian and father/male guardian. This study found the measure of have good reliability (α = .85 - .91) for mothers and fathers at both T1 and T2. Evidence of the criterion (Dzewaltowski et al., 2007; Dzewaltowski et al., 2010) and concurrent (Dzewaltowski et al., 2007) validity for this measure has been found and the measure has also demonstrated acceptable reliability in other research (α = .78; Dzewaltowski et al., 2010). The items exhibited a Flesch-Kincaid Grade Level of 7.0 and Flesch reading ease score of 61.9.

### 2.3.3 Outcome Expectations

Adolescent's outcome expectations for physical activity were assessed using an eleven-item instrument adapted from Gellert, Ziegelmann and Schwarzer (2011). Items were adapted to meet the reading comprehension level of grade 7 students. This instrument included five health-related outcome expectation items and six affective outcome expectation items, scored on a six-point scale (*1=strongly disagree to 6=strongly agree*). Items were prefaced with "*If I were physically active on a regular basis...*" Exemplar affective outcome expectation items include *"...then I would feel alive"* and "*...then I would feel happier*." Health-related outcome expectation items included "*...then it would be good for my future*

*health*" and *"...then it would be good for my current health.*" Exploratory and confirmatory factor analyses were conducted to determine if a two-factor solution was appropriate for the operationalization of outcome expectations (see Results section). The internal consistency for affective outcome expectations was .85 at both time points. Health-related outcome expectations had an internal consistency of .86 and .82 at T1 and T2 respectively. This is consistent with a study of an older adult populations that used a similar conceptualization for outcome expectations and showed acceptable reliability for affective (α=.75) and instrumental (α=.74) outcome expectations (Gellert et al., 2011). The items exhibited a Flesch-Kincaid Grade Level of 3.4 and Flesch reading ease score of 86.6.

### 2.3.4 Leisure Time Physical Activity (LTPA)

The Godin Leisure Time Exercise Questionnaire (LTEQ; Godin & Shephard, 1985) was used to assess physical activity behaviour. The LTEQ is one of the most commonly used measures of physical activity behaviour (Rhodes et al., 2009). Previous research has provided evidence of construct validity and supported the reliability of measures derived from this instrument with adolescent populations (Godin & Shephard, 1985; Sallis, Buono, Roby, Micale, & Nelson, 1993). Self-reported typical weekly frequencies of participation in mild, moderate and vigorous LTPA behaviour were reported by participants. A total metabolic equivalents (MET) score was computed based on the reported weekly frequencies for each type of physical activity multiplied by the MET value categories of the activities listed. The resultant totals were summed to provide a weighted score of total LTPA determined by intensity ([vigorous x 9 METs] + [moderate x 5 METs] + [mild x 3 METs] = Total Weighted Leisure Time Activity Score; Godin, 2011).

## 2.4 Data Analysis

Completed questionnaires were scanned into the computer using Remark Office 8.1 software as separate T1 and T2 data sets. The data was manually checked for multiple responses, imputation errors and unreadable information. The data was then exported to SPSS (Version 20) where it was merged and matched across time points before being screened for missing values and outliers. A Missing Value Analysis was completed to determine whether any pattern of missingness existed for the data (e.g., missing at random, missing completely at random, etc.). Univariate and multivariate outliers were identified and removed if participants had a Z-score greater than ±3.29 and/or a Mahalanobis distance greater than $\chi$ (8) = 26.13 ($p < .001$). Descriptive statistics, correlations and internal consistency reliability estimates of subscales were conducted. The assumptions for normality, linearity, homoscedasticity and multicollinearity were assessed through residual plots, bivariate plots and correlation matrices (Tabachnick &Fidell, 2007).

Mplus (Version 6.1; Muthén & Muthén, 2010) was used for exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and structural equation modeling (SEM). An EFA was conducted to examine the factor structure of the outcome expectations measure with data from T1. Three approaches were used to come to a sound decision about the dimensionality of the outcome expectations measure: K-G rule, parallel analysis and Pratt's measure matrix. The most commonly known and used method to determine the number of factors is the K-G rule (Ledesma & Valero-Mora, 2007), whereby factors with eigenvalues greater than one are retained (Guttman, 1954; Kaiser, 1960). Next a parallel analysis with a scree plot was used to compare eigenvalues from real and random data to decide the number of factors. Finally, Pratt's measure matrix (Wu, 2008) was used to determine whether the factor structure was appropriate to retain based on the decision made via the K-G rule and

parallel analysis. The Pratt's importance measure was calculated for each item by taking the product of the pattern and structure coefficients and then dividing it by the communality (Wu, 2008). Items with similar Pratt's importance measure values were grouped together as factors. Taken together, the most consistently supported factorial structure was proposed for future testing through CFA.

A CFA was subsequently conducted on the T2 data to verify the factor structure identified through the EFA with T1 data. A two-factor model was tested for distinguishing between affective and health-related outcome expectations. Model fit was assessed to determine if a two-factor structure was suitable for the outcome expectations measures. A two-factor model did not fit the data and therefore, in light of concerns regarding the measurement model for affective and health-related outcome expectations (see Results section for detailed explanation/analysis), these variables were removed from the subsequent SEM analysis.

Research in the parenting domain highlights the importance of completing separate analyses of mothers and fathers to account for the distinct contribution each parent makes to their child's development (Milevsky, Schlechter, Netter, & Keehn, 2007; Morton et al., 2011). Inconsistencies in parenting behaviours between mothers and fathers are often hidden when reports of parenting behaviours are combined (Milevsky et al., 2007; Simons & Conger, 2007). With this in mind, separate indices of mothers' and fathers' other efficacy and RISE were included within the model. To examine the hypotheses presented above a mediational analysis based on a SEM framework was conducted. The prospective design of the study allowed these analyses to avoid common method bias with the independent variables assessed ahead of the dependent variables in time (Munro, 2005). With this in

mind, RISE and other efficacy were operationalized through T1 measures, and self-regulatory efficacy and LTPA were operationalized through T2 measures.

All of the hypotheses were tested simultaneously through SEM to reduce the likelihood of type 1 error (Figure 2.1). Model fit was assessed using the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). Traditionally CFI and TLI scores indicate good model fit when values greater than .90 are observed (Bentler, 1990), however a more conservative cut off of .95 was used in this study because it can provide better evidence of good model fit (Hu & Bentler, 1999). RMSEA values of .06 indicate good model fit, values between .08 to .10 indicate mediocre fit, and values greater than .10 indicate poor model fit (MacCallum, Browne, & Sugawara, 1996). The hypothesized model was accepted or rejected based on the results of the SEM for model fit and the significance of the path analysis.

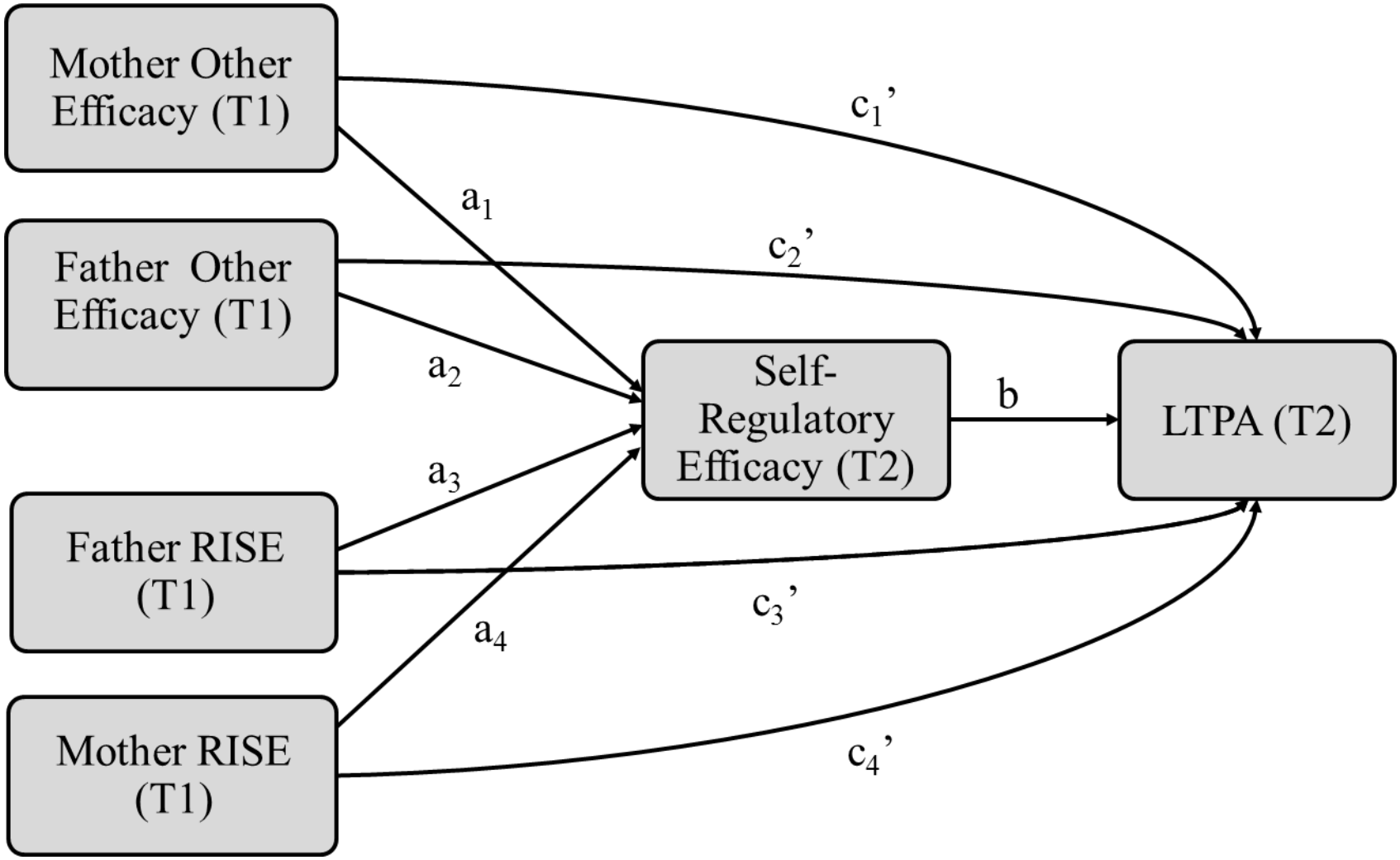


*Figure 2.1* Proposed path diagram of the relationship between mothers' and fathers' relational efficacy beliefs to LTPA.

*Note:* T1 = Time 1, T2 = Time 2, LTPA = leisure time physical activity, RISE = relation-inferred self-efficacy.

# 3 Chapter: Results

## 3.1 Preliminary Data Analysis

Data were screened to address entry errors, missing values and outliers using SPSS (Version 20). At T1, 402 participants completed the questionnaires, of which 29 did not complete the T2 assessment (7.21 percent attrition). A Missing Value Analysis was conducted and the $\chi^2$ test was not significant (Little's chi-square, $\chi$ (384) = 416.06, $p$ = .125), which indicated that the data were missing completely at random. That is, there was no obvious pattern of missingness in the data (i.e., gender, family structure, dropout, age, and ethnicity). Participants who completed the questionnaire at both T1 and T2 had less than 5 percent of data missing for each variable and missing values were handled by the Full Information Maximum Likelihood (FIML) estimation algorithm in MPlus.

Next, univariate and multivariate outliers were examined. For univariate outliers, Z-scores were used to identify participants who scored beyond ±3.29 standard deviations ($n$ = 25). Of these 25 participants, 23 were removed as their scores were extremely high and were considered as implausible values for LTPA. The other two participants were retained in the analyses because their responses did not appear atypical and with a large sample size, it is expected that a few participants will have Z-scores greater than 3.29 (Tabachnick & Fidell, 2007). Mahalanobis distances were calculated to identify multivariate outliers based on the variables used in the SEM. Three participants had Mahalanobis distances greater than $\chi$ (8) = 26.13 ($p$ < .001), and were removed from subsequent analyses because the values were atypical for the population sampled (Tabachnick & Fidell, 2007). A final sample of 376 was used for the remaining analyses. Descriptive statistics of all study variables at T1 and T2 are reported in Table 3.1.

Table 3.1

*Summary of descriptive statistics*

| | Range | *M (SD)* | *Kurtosis* | *Std Error* | *Skewedness* | *Std Error* | *Alpha* |
|---|---|---|---|---|---|---|---|
| Time 1 | | | | | | | |
| 1. Self-regulatory Efficacy | 0-100 | 66.76 (22.57) | -0.21 | 0.25 | -0.59 | 0.12 | 0.85 |
| 2. Mother Other Efficacy | 0-100 | 68.34 (26.39) | 0.02 | 0.26 | -0.89 | 0.13 | 0.91 |
| 3. Father Other Efficacy | 0-100 | 53.72 (27.31) | -0.95 | 0.25 | -0.19 | 0.12 | 0.93 |
| 4. Mother RISE | 0-100 | 55.78 (28.72) | -0.93 | 0.26 | -0.28 | 0.13 | 0.94 |
| 5. Father RISE | 0-100 | 60.85 (22.91) | -0.63 | 0.25 | -0.35 | 0.12 | 0.88 |
| 6. Affective Outcome Expectations | 1-7 | 4.72 (0.96) | 1.40 | 0.26 | -1.03 | 0.12 | 0.85 |
| 7. Health-related Outcome Expectations | 1-7 | 4.58 (0.57) | 18.13 | 0.26 | -3.41 | 0.12 | 0.86 |
| 8. LTPA | 0-144 | 81.53 (72.88) | 19.97 | 0.26 | 4.01 | 0.13 | |
| Time 2 | | | | | | | |
| 9. Self-regulatory Efficacy | 0-100 | 66.79 (22.67) | 0.12 | 0.25 | -0.75 | 0.13 | 0.86 |
| 10. Mother Other Efficacy | 0-100 | 69.05 (25.15) | 0.14 | 0.26 | -0.90 | 0.13 | 0.91 |
| 11. Father Other Efficacy | 0-100 | 55.66 (27.79) | -0.89 | 0.26 | -0.25 | 0.13 | 0.93 |
| 12. Mother RISE | 0-100 | 58.79 (28.39) | -0.92 | 0.26 | -0.33 | 0.13 | 0.94 |
| 13. Father RISE | 0-100 | 61.88 (24.05) | -0.69 | 0.25 | -0.41 | 0.13 | 0.90 |
| 14. Affective Outcome Expectations | 1-7 | 4.92 (0.90) | 0.44 | 0.26 | -0.81 | 0.13 | 0.85 |
| 15. Health-related Outcome Expectations | 1-7 | 4.65 (0.46) | 5.41 | 0.26 | -1.97 | 0.13 | 0.82 |
| 16. LTPA | 0-144 | 80.78 (65.22) | 23.29 | 0.26 | 4.20 | 0.13 | |

*Note:* T1 = Time 1, T2 = Time 2, LTPA = leisure time physical activity, RISE = relation-inferred self-efficacy.

### 3.1.1 Exploratory Factor Analysis (EFA)

An EFA was used to examine the factor structure of the T1 outcome expectations measure through the weighted least squares extraction method. Three strategies were used to determine the number of observed factors. The K-G rule to retain eigenvalues greater than one yielded a clear two factor structure from the eigenvalues (Guttman, 1954; Kaiser, 1960). A two factor structure was also supported through parallel analysis that compared eigenvalues from real and random data (Figure 3.1). Finally, vertical interpretation of Pratt's measure matrix (Wu, 2008) identified the presence of two distinct subscales (Table 3.3).

Results suggested a two-factor solution in which Factor 1 was comprised of the five affective outcome expectations items and Factor 2 was comprised of the five health-related outcome expectations items. One item, "*would provide short term benefits to my health*" was dropped as it had a very low and inconsistent communality value (.118; Wu, 2008). Factor loadings for the affective outcome expectations items ranged from .61 to .72 and for health-related outcome expectations ranged from .50 to .67. In addition, none of the factors showed cross-loadings. Alpha values for the affective and health-related outcome expectations were 0.85 and 0.86 respectively.

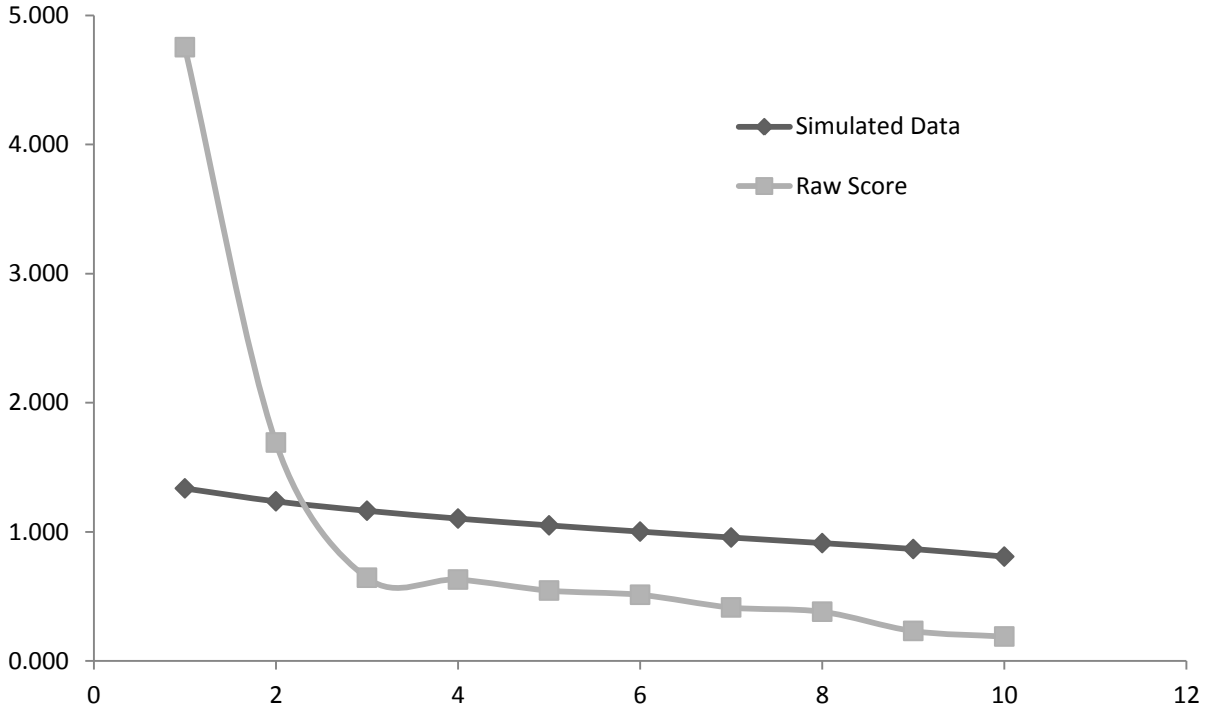


*Figure 3.1* Parallel analysis comparison of eigenvalues for simulated and raw data.

Table 3.2

*Pratt's Measure Matrix*

| | Pattern Coefficient | | Structure Coefficient | | Communality Score | Pratt's Importance Measure | |
|---|---|---|---|---|---|---|---|
| Item\Factor | 1 | 2 | 1 | 2 | | 1 | 2 |
| 1 | 0.24 | 0.52 | 0.51 | 0.64 | 0.46 | 0.27 | 0.73 |
| 2 | 0.15 | 0.68 | 0.50 | 0.76 | 0.59 | 0.13 | 0.87 |
| 3 | 0.13 | 0.53 | 0.41 | 0.60 | 0.37 | 0.15 | 0.85 |
| 4 | 0.84 | -0.02 | 0.84 | 0.42 | 0.70 | 1.01 | -0.01 |
| 5 | 0.90 | -0.16 | 0.82 | 0.31 | 0.69 | 1.07 | -0.07 |
| 6 | 0.61 | 0.11 | 0.67 | 0.42 | 0.45 | 0.90 | 0.10 |
| 8 | 0.65 | 0.05 | 0.68 | 0.39 | 0.46 | 0.96 | 0.04 |
| 9 | 0.64 | 0.18 | 0.74 | 0.52 | 0.57 | 0.83 | 0.17 |
| 10 | -0.09 | 0.93 | 0.39 | 0.88 | 0.78 | -0.05 | 1.05 |
| 11 | -0.14 | 0.91 | 0.33 | 0.84 | 0.72 | -0.07 | 1.07 |

*Note:* Pratt's importance measure=pattern coefficient*structure coefficient/commonality score

### 3.1.2 Confirmatory Factor Analysis (CFA)

Subsequently, a CFA was conducted on the outcome expectation items from T2 data to determine if a two-factor structure was suitable for the affective and health-related outcome expectation measures. The two-factor model demonstrated poor model fit ($\chi^2$ (34) = 160.77, $p < .001$, *CFI* = .968, *TLI* = .958, *RMSEA* = .101, *WRMR* = 1.434). Although the CFI and TLI values indicated good model fit, the RMSEA value was much higher than the recommended .06 to indicate good model fit (MacCallum, Browne, & Sugawara, 1996), and therefore both affective and health-related outcome expectations were not included in the remainder of the analyses. The estimated factor loadings, standard error, and factor intercorrelations for the outcome expectations items are displayed in Figure 3.2.

### 3.1.3 Bivariate Correlations

Bivariate correlations were calculated to examine the relationship between the key study variables and to check for multicollinearity (Table 3.3). T1 mothers' ($r = .36$, $p < .05$) and fathers' ($r = .32$, $p < .05$) other efficacy beliefs were associated with higher self-regulatory efficacy at T2. In addition, T1 mothers' and fathers' RISE beliefs were also associated with higher self-regulatory efficacy at T2 ($r = .54$, $p < .01$). Interestingly, the correlation between mothers' T1 other efficacy, fathers' T1 other efficacy and fathers' T1 RISE demonstrated no association with T2 LTPA ($r = .076$-$.083$, $p > .05$). A weak, positive correlation was observed between mothers' T1 RISE with adolescents' T2 LTPA ($r = .109$, $p < .05$). Self-regulatory efficacy and LTPA at T2 also had a weak, positive correlation ($r = .17$, $p < .01$).

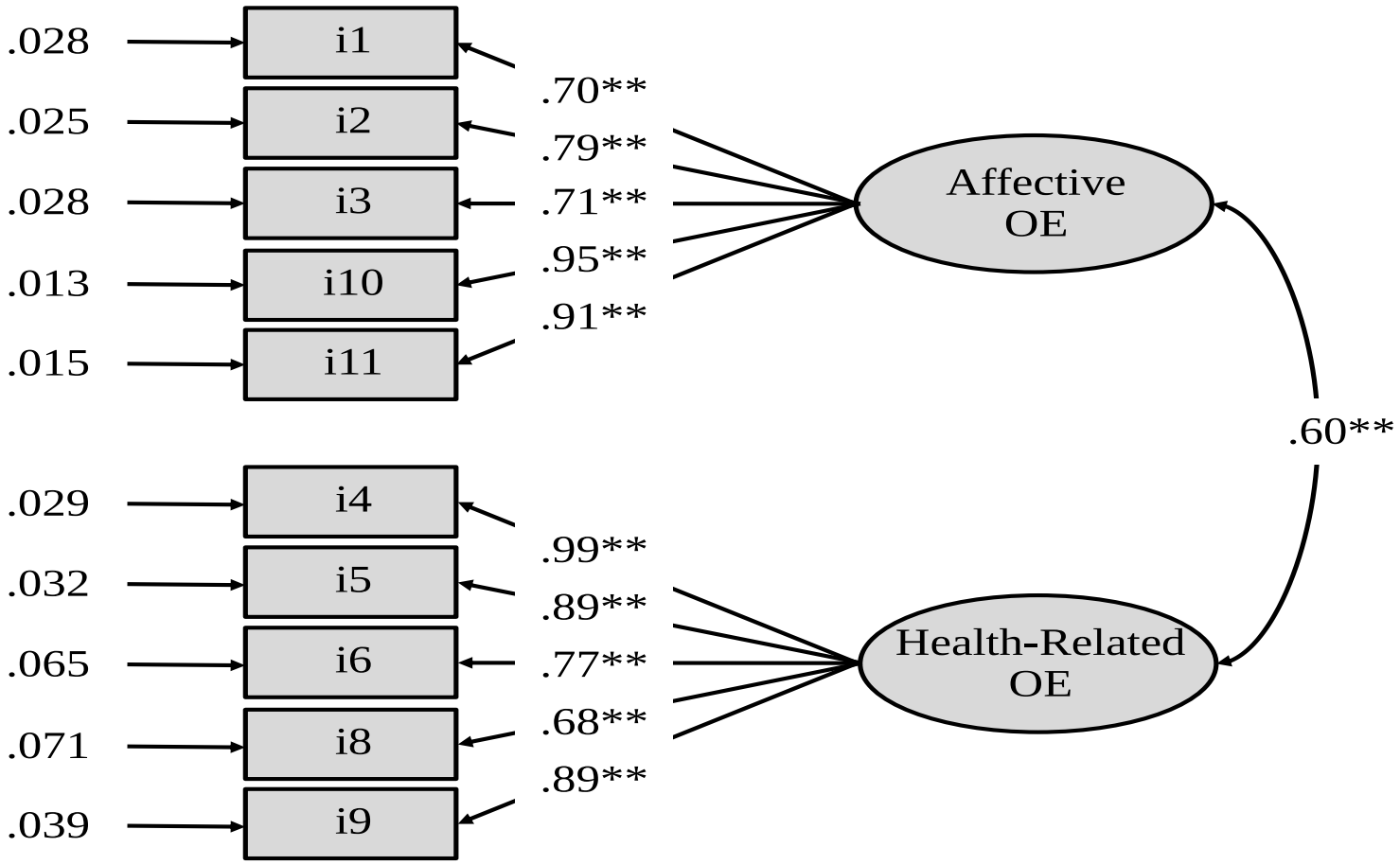


*Figure 3.2* Factor loadings, intercorrelations and standard error for outcome expectations measure.** $p < 0.01$

Table 3.3

*Bivariate correlations for all study variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time 1 | | | | | | | | | | | | |
| 1. Self-regulatory Efficacy | - | | | | | | | | | | | |
| 2. Mother Other Efficacy | .42** | - | | | | | | | | | | |
| 3. Father Other Efficacy | .36** | .49** | - | | | | | | | | | |
| 4. Mother RISE | .62** | .58** | .37** | - | | | | | | | | |
| 5. Father RISE | .56** | .44** | .63** | .70** | - | | | | | | | |
| 6. LTPA | .21** | .08 | .13* | .13* | .16** | - | | | | | | |
| Time 2 | | | | | | | | | | | | |
| 7. Self-regulatory Efficacy | .75** | .36** | .32** | .54** | .54** | .16** | - | | | | | |
| 8. Mother Other Efficacy | .33** | .70** | .34** | .54** | .37** | .04 | .44** | - | | | | |
| 9. Father Other Efficacy | .31** | .41** | .76** | .37** | .55** | .12* | .42** | .43** | - | | | |
| 10. Mother RISE | .49** | .48** | .30** | .73** | .61** | .06 | .61** | .60** | .38** | - | | |
| 11. Father RISE | .46** | .39** | .44** | .60** | .73** | .09 | .64** | .46** | .57** | .75** | - | |
| 12. T2 LTPA | .19** | .08 | .08 | .11* | .08 | .56** | .17** | .02 | .05 | .11* | .09 | - |

*Note:* T1 = Time 1, T2 = Time 2, LTPA = leisure time physical activity, RISE = relation-inferred self-efficacy.
** $p < 0.01$, * $p < 0.05$

## 3.2 Main Analysis

### 3.2.1 Structural Equation Modelling (SEM)

To examine the relationships between other efficacy, RISE, and self-regulatory efficacy with LTPA, a SEM approach was used. A mediational analysis based on a SEM framework was conducted using MPlus. Gender was entered as a covariate to determine whether adolescent gender differences existed for self-regulatory efficacy and LTPA in the model. The mediational model adopted in the present study was just-identified and, as is the case with a fully saturated model (as all degrees of freedom are used up) perfect fit was observed ($\chi^2 = 0.00$, $CFI = 1.00$, $TLI = 1.00$, $RMSEA = 0.00$). When testing mediation effects with path analysis through SEM it is not uncommon to obtain a just-identified model. Although indices of model fit cannot be applied to just-identified models (as model fit is always perfect), several researchers have argued that just-identified models are superior to over-identified ones (which have more omitted paths and are more likely to result in biased coefficient estimates; for an extensive discussion see Reichard, 2002; Tomarken & Waller, 2003). In spite of the fact that just-identified models cannot provide indices of model fit, they do allow researchers to analyze hypothesized relationships among variables of interest (Preacher, Zyphur & Zhang, 2010).

Table 3.4 presents the results of the SEM with pathways estimated simultaneously. Path analysis revealed a direct effect between father's other efficacy and LTPA ($\beta = .003$, $SE = .001$, $p = .024$). Figure 3.2 shows the standardized beta coefficients for all pathways tested in the structural model. A significant effect for gender was observed in relation to self-regulatory efficacy ($\beta = -7.237$, $p = .003$) with males demonstrating higher self-regulatory efficacy for LTPA than females. No other significant direct or indirect effects ($p > .05$) were found within the model.

Table 3.4

*Structural Equation Modeling of Mediation Analysis of Relational Efficacy on Adolescents LTPA*

| Variable | Estimate | SE | *p*-value | 95% CI |
|---|---|---|---|---|
| Path a (Outcome: Self-regulatory Efficacy) | | | | |
| Predictor: Mother Other Efficacy (a1) | 0.060 | 0.070 | 0.393 | -0.121 |
| Predictor: Father Other Efficacy (a2) | 0.029 | 0.062 | 0.636 | -0.131 |
| Predictor: Mother RISE (a3) | -0.059 | 0.071 | 0.402 | -0.242 |
| Predictor: Father RISE (a4) | 0.063 | 0.071 | 0.377 | -0.120 |
| Covariate: Gender | -7.237 | 2.464 | 0.003 | -13.584 |
| Path b and c' (Outcome: LTPA) | | | | |
| Predictor: Mother Other Efficacy (c1') | 0.001 | 0.001 | 0.499 | -0.003 |
| Predictor: Father Other Efficacy (c2') | 0.003 | 0.001 | 0.024 | -0.004 |
| Predictor: Mother RISE (c3') | 0.003 | 0.001 | 0.959 | 0.000 |
| Predictor: Father RISE (c4') | 0.002 | 0.001 | 0.113 | -0.001 |
| Predictor: Self-regulatory Efficacy (b) | 0.000 | 0.001 | 0.841 | -0.002 |
| Covariate: Gender | 0.058 | 0.050 | 0.248 | -0.071 |
| *Indirect Effects* | | | | |
| a1*b | 0.000 | 0.000 | 0.845 | 0.000 |
| a2*b | 0.000 | 0.000 | 0.854 | 0.000 |
| a3*b | 0.000 | 0.000 | 0.846 | 0.000 |
| a4*b | 0.000 | 0.000 | 0.845 | 0.000 |
| Total Indirect | 0.000 | 0.000 | 0.842 | 0.000 |

*Note:* Unstandardized coefficients are reported. LTPA = leisure time physical activity, RISE = relation-inferred self-efficacy.

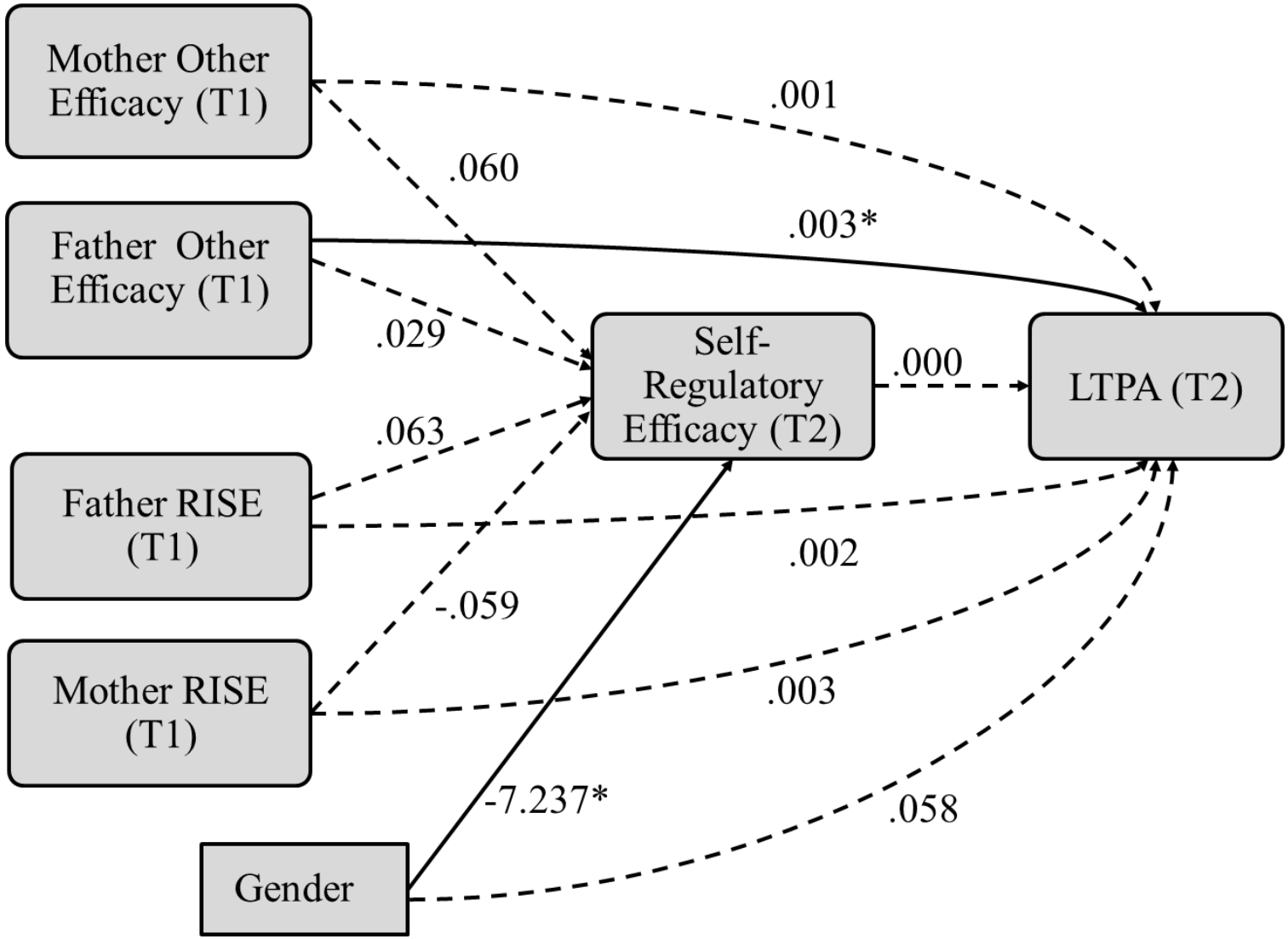


*Figure 3.3* A path diagram of the relationships between relational efficacy beliefs and adolescents' LTPA. Solid lines represent significant path coefficients (unstandardized beta coefficients) and dashed lines represent non-significant path coefficients. *Note:* T1 = Time 1, T2 = Time 2, LTPA = leisure time physical activity, RISE = relation-inferred self-efficacy. * $p < .05$.

# 4 Chapter: Discussion and Conclusion

## 4.1 General Overview of Findings

Parents and their children each contribute to the development of lifelong habits and behaviours in each other (Bandura, 2006). Parents have been identified as critical social determinants for physical activity behaviour in adolescents (Ackard, Neumark-Sztainer, Story, & Perry, 2006; Fletcher, Elder, & Mekos, 2000; Galbraith & Schvaneveldt, 2005). The purpose of this research was to apply Lent and Lopez's (2002) theory of relational efficacy to parent-child relationships by examining early adolescents and how relational efficacy beliefs relate to their LTPA behaviour. Furthermore, mediation effects of self-regulatory efficacy were assessed between two forms of relational efficacy (i.e., other-efficacy and RISE) and LTPA.

Results of the structural equation model revealed a weak positive relationship between adolescents' confidence in their fathers' capabilities to support their physical activity involvement (i.e., father other efficacy) and adolescents' LTPA behaviours. However, no support was found for the hypothesized relationship between adolescents' confidence in their mothers' capabilities (i.e., mother other efficacy) and adolescent physical activity behavior. In a similar regard, adolescents' appraisals of their parents' confidence in their own capabilities (i.e., RISE beliefs) were unrelated to adolescent LTPA behavior, and this was consistent when this meta-perception was directed towards both mothers and fathers. Although there are limitations to this study, it provides new information about the application of the tripartite model of relational efficacy within families.

## 4.2 Relational Efficacy

This study was the first to test Lent and Lopez's (2002) theory of relational efficacy in parent-child relationships. The success of the application of relational efficacy to teacher-student (Jackson et al., 2012) and coach-athlete (Jackson, Knapp & Beauchamp, 2008) relationships led to the idea that similar beliefs may exists within the parent-child relationship and have an effect on adolescent physical activity behaviour. Despite the crucial role parents play in the development of adolescents' health-related cognitions and behaviours, Lent and Lopez's tripartite model has not, to date, been examined within the context of parent-child relationships. Our results build on the relational efficacy literature with evidence of adolescents' other efficacy beliefs towards their fathers being positively (albeit very weakly) related to LTPA and the observation that there is no association between adolescents' other-efficacy beliefs towards their mothers and LTPA. These findings suggest that when an adolescent perceives their father to be highly capable of providing support and encouragement (i.e., high other efficacy) for physical activity, those adolescents report slightly greater participation in LTPA than adolescents who perceive their fathers to be less capable (i.e., low other efficacy) of providing such support and encouragement. The current findings are consistent with a recent review that found adolescents' positive perceptions of their fathers attitudes towards physical activity was related to greater amounts of moderate-to-vigorous physical activity (MVPA; Edwardson & Gorely, 2010). As such, the time given by fathers' to support and encourage their children to participate in physical activity may be implicated in the LTPA behaviour of adolescents. Although there was no association found between adolescents' perceptions of their mothers' supportive capabilities and LTPA, mothers have been found to be important for the promotion of other health behaviours (i.e., healthy eating; Patrick & Nicklas, 2005).

RISE beliefs represent a meta-perception influenced by the feedback an adolescent receives about their capabilities from parents, which can enhance or diminish self-efficacy (Lent & Lopez, 2002) for physical activity. In this study adolescent's parental RISE appraisals were found to have no association with LTPA among adolescents. Therefore, adolescents' appraisals of their parents' confidence in them may not be an important source of their own self-regulatory efficacy or LTPA. Recent research suggests that other agents such as teachers and peers become increasingly important influences of adolescent LTPA (Dishman, Sallis & Orenstein, 1985), and indeed it has been suggested that adolescents' relational efficacy beliefs concerning these other social agents might be salient in the prediction of adolescent LTPA (Jackson et al., 2012). Interestingly, a recent paper by Jackson, Whipp, Chua, Dimmock and Hagger (in press) found that when Grade 7-9 students ($M_{age}$ = 13 years) thought that their physical education teacher believed in their capabilities (high RISE) this was directly associated with their own LTPA behaviour. Thus, in the context of adolescent LTPA, RISE appraisals may have greater relevance when directed towards teachers rather than parents.

No association was observed between other efficacy and RISE with self-regulatory efficacy. While other efficacy and RISE beliefs have been found to predict self-regulatory efficacy in teacher-student relationships (Jackson et al., 2011), a more complicated relationship may exist between parents and their children. The role of a parent goes beyond being an advocate for physical activity, as they are responsible for the general upbringing of their child. As a result, there is potential for ambiguity about how the promotion of physical activity fits alongside the other responsibilities of being a parent. Furthermore, what adolescents perceive their parent's roles and responsibilities to encompass, may or may not

include the promotion of physical activity. Although a similar role differential exists in the teacher-student relationship, both individuals enter the relationship aware of the defined role each is to have. For example, a physical education teacher's primary purpose is to promote physical activity participation and students are provided with clear expectations of what is necessary to obtain a good grade in the physical education class. If a student fails to participate in physical activity or goes above the expected standards, it will be reflected in the grade they receive from the teacher at the end of the term. Parent-child relationships have no form of formal feedback, such as grades, to give adolescents a sense of their physical activity abilities. Instead, feedback tends to be informal through words spoken, support given or body language, which is interpreted alongside feedback about other behaviours from parents (i.e., school, eating, or chores). Lent and Lopez (2002) suggest that RISE beliefs supplement the six primary sources of self-efficacy and can be an interpersonal source of self-efficacy beliefs. Nevertheless, in the context of this study at least, RISE appraisals held by adolescents about their parents, had no predictive effect on their own self-regulatory efficacy beliefs or LTPA behavior, and as such adolescents' appraisals of parents' beliefs in them may not be a substantive social cognition implicated in influencing adolescent physical activity.

### 4.3 Social Cognitive Theory and Leisure Time Physical Activity

Social cognitive theory (SCT) has been used extensively to explore the relationship between self-efficacy and physical activity behaviours. Self-efficacy has consistently been identified as one of the strongest predictors of LTPA among adolescents (Dishman et al., 2004). Specifically, self-regulatory efficacy has been found to be particularly salient in the prediction of physical activity (Anderson, Wojcik, Winett & Williams, 2006). Therefore, it

is interesting to note that in this study, the structural model showed no significant relationship between self-regulatory efficacy and LTPA.

One explanation may be that early adolescents and adults have different requirements to be effective in enhancing LTPA. For example, adolescents may not need to *self*-regulate their LTPA as much as adults because most of their activities are structured and planned by *others* (i.e., parents, coaches, and teachers). During early adolescence, there is limited need for individuals to develop self-regulatory skills for LTPA, and as a result, early adolescents may not have the same amount of perceived autonomy when planning LTPA as older adults. If this were the case*, task self-efficacy* (i.e., beliefs about actually engaging in a physical activity) may be a more appropriate theoretical predictor of LTPA with early adolescents than *self-regulatory efficacy*.

A limited number of studies have used complex analytic techniques to assess the SCT pathways and mediation effects for adolescent physical activity (Lubans, Foster & Biddle, 2008; Salmon, Brown & Hume, 2009). Previous research examining SCT and adolescent physical activity has primarily relied on the use of bivariate correlations and regressions in their statistical analyses to explain relationships among the study variables of interest (Salmon, Brown & Hume, 2009). As a result, the present study adds to our understanding of LTPA through SCT as the relationships between the variables tested in this study, among adolescents, were not supported in the same way as they have been found in adult samples (Bandura, 2004).

A gender difference was observed for self-regulatory efficacy that indicated males have greater confidence in their ability to regulate physical activity than females. This is consistent with findings that males tend to have more favourable opinions and greater

confidence for LTPA than females (Garcia et al., 1995). Thus, it is not unusual for there to be gender differences in self-regulatory efficacy for LTPA (Garcia et al., 1995).

## 4.4 Outcome Expectations

### 4.4.1 Factor Analysis

Within our a priori conceptual model, outcome expectations were theorized to mediate the relationship between self-regulatory efficacy and LTPA. In light of the fact that the CFA failed to support the measurement model for affective and health-related outcome expectations, these variables could not be included in the structural model. Based on previous research with older adults, it was hypothesized that two factors, affective and health-related outcome expectations, would be supported within a measurement model among adolescents (Gellert et al., 2011). Although an EFA supported a two-factor structure through good model fit, and two of the fit indices from the CFA were adequate, the RMSEA score was markedly above the recommended cut-off value of .06 (MacCallum, Browne, & Sugawara, 1996). Therefore, outcome expectations were removed from the model for further analysis.

Even though SCT variables have been found to be related to increases in adolescent's physical activity behavior (Dishman et al., 2004), recent research by Ramirez, Kulinna & Cothran (2012) found that among children ages 9 to 13 were only able to explain a very limited amount of variance in physical activity behavior. One explanation for this finding corresponds to the (cognitive) developmental stage of this age group, which may result in self-report responses (especially in relation to outcome expectations) that are compromised from the perspective of construct validity. Specifically, it is conceivable that adolescents are unable to sufficiently gauge the anticipated outcomes (cf. Lubans et al., 2012) derived from being physically active. Based on Piaget's stages of cognitive development, the children

involved in this study (i.e., twelve years of age) would be at a developmental stage whereby they are only beginning to understand cause and effect relationships (i.e., physical activity is related to health benefits). Consequently, adolescents in this study may have been unable to adequately comprehend the causal relationships they were asked to make between behaviours and outcomes, in the assessment of both affective and health-related outcome expectations. As a result, the measurement model for health-related and affective outcome expectations was not supported in this study, with this population.

### 4.5 Strengths

This study provides a number of unique and valuable contributions to the existing literature about parent-child relationships, relational efficacy, self-regulatory efficacy, and outcome expectations. First and foremost, this research extended the tripartite model of relational efficacy to parent-child relationships. Based on these findings, adolescent's perceptions of their parents capabilities may not be as important as originally thought. Although beyond the scope of this study, peers, the built environment, and teachers may also contribute and/or combine to explain adolescent LTPA behaviour. An additional strength of this research was the use of passive consent procedures which led to high participant retention across time points. This ensured that a cross-section of adolescents participated and avoided over-sampling active individuals which could have been the case if active parental consent procedures had been used. Reviews have suggested that to assess the parental correlates of adolescent physical activity and to maximize the generalizability of results, participants should represent a broad spectrum of backgrounds, activity levels, and geographic areas (Pugliese & Tinsley, 2007). As a result of the sample used, this study adds to a growing body of literature that calls into question the strength of the relationship between parental behaviours and adolescent physical activity (Pugliese & Tinsley, 2007).

Finally, the use of two time points for data collection enabled temporal ordering to be used in the analyses and avoided common method bias. Therefore, the quality of the research was improved through the use of a prospective observational design.

### 4.6 Limitations

Despite the strengths of the study, limitations should also be noted and considered. This study did not use an objective measure of physical activity (e.g., accelerometers or direct observation) and relied on participant self-report. Consequently, the amount of physical activity reported by adolescents may have been inflated and without an objective measure it is difficult to accurately determine LTPA behaviour. Another consideration is how LTPA was calculated to provide a total physical activity score of mild, moderate, and vigorous activities with the Godin LTEQ. Although the LTEQ has been used extensively and been validated with adolescent populations (Sallis et al., 1993), it uses a composite score of physical activity. LTPA should be assessed with a measure that has been validated to examine specific physical activity intensities separately (i.e., MVPA) because most health benefits are derived from moderate and vigorous physical activity opposed to mild bouts of physical activity (Janssen & LeBlanc, 2010; Tremblay et al., 2011). In the future, researchers should consider using a measure specifically designed for the assessment of MVPA in adolescent populations. Beyond examining the total amount of physical activity engaged in by adolescents, future research is also necessary to disentangle the different *types* of physical activity pursued by adolescents, as well as the extent to which parenting behaviours might influence involvement in those activities. For example, it is entirely conceivable that parents' attitudes towards and involvement in active transportation, organized sport, and non-organized sport (e.g., free play) might differentially be related to their own children's participation in those same activities.

Other limitations of the study relate to the operationalization of the social cognitive variables (efficacy beliefs and outcome expectations) that were included in this thesis. Specifically, there was an absence of a time reference in the efficacy and outcome expectation measures (i.e., within the next two weeks). Research has suggested that it is useful to define a time frame for these measures to enhance the quality of results (Ajzen & Fishbein, 1980). An additional limitation is that the tripartite model of relational efficacy suggests that other efficacy, RISE, and self-regulatory efficacy can interact through reciprocal causation; hence, the importance of considering alternate directions of influence. For example, an adolescent may have greater confidence in his/her ability to be active which in turn improves how he/she perceives their parents' confidence in them to be active in his/her leisure time. Qualitative research in sport (Jackson et al., 2009) has demonstrated the bi-directional nature of these relationships and needs to be considered in future research with relational efficacy beliefs. Bi-directional relationships indicate that effects can occur not only from parent to child, but also from the child to the parent (i.e., an active child might involve their parents in more physical activity). A more in-depth examination of the interdependence that exists between parents and children is needed and unfortunately could not be assessed in this study since it only relied on adolescents' assessments of their parents without collecting any data from parents. Both members of the dyad, parent and child, need to provide data to analyze interdependence in the relationship. Actor-partner interdependence modeling is a form of analysis that takes into consideration the dyadic interaction that each individual in a relationship has on each other (Kenny et al., 2006). This approach allows for the estimation of individual and dyadic factors that predict a specific behaviour, in this case LTPA, through the analysis of actor and partner effects (Cook &

Kenny, 2005). Actor effects explore how an individual's own beliefs are related to personal outcomes for that same person (i.e., how an adolescent's self-regulatory efficacy predicts his or her subsequent LTPA). Partner effects measure how a person's beliefs are related to a salient outcome for his or her *significant other* (i.e., how much a mother's confidence in her child predicts the child's subsequent LTPA). Actor and partner effects enable the assessment at the individual and dyad level, and should be considered for future research.

Finally, the generalizability of the data is limited to the Lower Mainland of British Columbia. A broader geographic area should be assessed before extending these findings to a larger population because the current sample represents adolescents living in urban environments. Differences may exist in rural areas where homes are more spread out and there may be fewer LTPA opportunities as a result of living further from school, peers and recreation areas. The support needed from parents for rural adolescents to be active in their leisure time may be greater due to the logistics to organize rides to and from recreational activities than urban adolescents. In a rural area there may be fewer options for carpooling or transit and greater distances to be travelled. Therefore, adolescents in rural areas may be more aware of the support, and encouragement their parents provide for physical activity as a greater amount of planning goes into each activity. The differences between rural and urban adolescents should be further examined to assess the similarities and differences with regard to both parental and environmental contributions to LTPA behaviour.

### 4.7 Practical Implications and Future Directions

This research suggests that factors beyond adolescents' appraisals of their parent's support and capabilities should be considered in regards to early adolescent LTPA. A possible explanation is that more than one theoretical model, and set of influences, may be needed to account for the differences in determinants of physical activity participation (e.g.,

policy, environment, school, peers, family). Furthermore, some researchers suggest that young adolescents may not possess the necessary cognitive abilities to understand the constructs being measured in physical activity research (Lubans et al., 2012). Specifically, young adolescents may be unable to interpret the cause and effect relationship between physical activity and the anticipation of affective experiences (i.e., affective attitudes) or health-related benefits (health-related outcome expectations).

From the perspective of considering alternative theoretical models, it has been suggested that a social ecological model may be better suited to explain physical activity behaviours among adolescents (e.g., Sallis & Owen, 2002). A model than can encompass physical activity determinants at multiple levels (i.e., individual, family, environment, and policy) may provide a richer understanding of the various determinants of adolescent LTPA (Ramirez et al., 2012). Other approaches that might be useful include consideration of the built environment (Frank, 2009) as well as climatic factors (Bélanger, Gray-Donald, O'loughlin, Paradis, & Hanley, 2009). Research on the built environment suggests that physical space plays a substantive role in the adoption of leisure time physical activity behaviours among youth, and it seems likely that the extent to which parents are able to model health-enhancing physical activity (e.g., active commuting) might be moderated, to some extent, by the quality of physical resources (e.g., sidewalks for walking to school) surrounding the family home. It is also conceivable that climatic factors (e.g., rainfall, daily temperature) might buffer any influence that parents might have in relation to adolescent physical activity. Finally, theoretical models that take into account the role of social norms (e.g., Macdonald-Wallis, Jago, & Sterne, 2012) might be particularly worthwhile in

understanding the differential effects that parents and other social agents (e.g., peer-norms) play in supporting active lifestyles among adolescents.

### 4.8 Conclusion

Parents are in a unique position where they can help their children adopt and sustain healthy and active lifestyles. In the context of this study, in spite of the potential for parents to influence their children, no support was found for the a relationship between adolescents' confidence in their mothers' capabilities and adolescents' appraisals of their parents' confidence in their own capabilities with LTPA behavior. Only the relationship between adolescents' confidence in their fathers' (i.e, father other efficacy) and LTPA was observed to be significant, albeit not meaningful based on the strength of the effect. The results could be related to ambiguity surrounding the parental role for the promotion and support of physical activity and how it fits alongside other parental duties and responsibilities. Therefore, to gain a full appreciation of LTPA among adolescents, multiple levels of social influence should be considered in order to appropriately assess the complexity of physical activity determinants. Regular physical activity has the capacity to improve the current and future health of individuals across all ages (Caspersen, Pereira, & Curran, 2000), and as such, researchers must continue to explore how parents and other social influences can promote and support the adoption of an active lifestyle from a young age.

## References


Active Healthy Kids Canada. (2010). Healthy habits start earlier than you think – report card on physical activity for children and youth. Toronto, ON: Active Healthy Kids Canada.

Ainsworth, B. E., Haskell, W. L., Herrmann, S. D., Meckes, N., Bassett Jr, D. R., Tudor-Locke, C., . . . Leon, A. S. (2011). 2011 compendium of physical activities: A second update of codes and MET values. *Medicine & Science in Sports & Exercise, 43*(8), 1575.

Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour.* Englewood Cliffs, N. J.: Prentice-Hall Inc.

Anderson, E. S., Wojcik, J. R., Winett, R. A., & Williams, D. M. (2006). Social-cognitive determinants of physical-activity: The influence of social support, self-efficacy, outcome expectations, and self-regulation among participants in a church-based health promotion study. *Health Psychology, 25*(4), 510-520. doi: 10.1037/0278-6133.25.4.510

American Psychological Association (2002). Developing adolescents: A reference for professionals. Washington, DC. Retrieved from http://www.apa.org/pi/families/resources/develop.pdf

Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology, 4*(3), 359-373. doi: 10.1521/jscp.1986.4.3.359

Bandura, A. (1997). *Self-efficacy: the exercise of control*. New York: W. H. Freeman.

Bandura, A. (2004). Health promotion by social cognitive means. *Health education & behavior, 31*(2), 143.

Bandura, A. (2006). Adolescent development from an agentic perspective. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescence*. Greenwich, Conn: Information Age Publishing, Inc.

Barron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual strategic and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182. doi: 10.1037/0022-3514.51.6.1173

Beauchamp, M. R., Bray, S., R., & Albinson, J. G. (2002). Pre-competition imagery, self-efficacy and performance in collegiate golfers. *Journal of Sports Sciences, 20*(9), 697-705. doi: 10.1080/026404102320219400

Beauchamp, M. R., & Whinton, L. C. (2005). Self-efficacy and other-efficacy in dyadic performance: Riding as one in equestrian eventing. *Journal of Sport & Exercise Psychology, 27*(2), 245-252.

Bélanger, M., Gray-Donald, K., O'loughlin, J., Paradis, G., & Hanley, J., (2009). Influence of weather conditions and season on physical activity in adolescents. *Annals of Epidemiology*, 19(3), 180-186. 10.1016/j.annepidem.2008.12.008.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulleting, 107,* 238-246.

Bouchard, C. E., Shephard, R. J., & Stephens, T. E. (1994). *Physical activity, fitness, and health: International proceedings and consensus statement*. Champaign, Il: Human Kinetics.

Bourne, J. (2011). *Transformational teaching and relational efficacy beliefs among adolescents: a prospective observational study***.** Retrieved from UBC Circle: http://hdl.handle.net/2429/37850

Brawley, L. R., Rejeski, W. J., & King, A. C. (2003). Promoting physical activity for older adults: The challenges for changing behavior. *American Journal of Preventive Medicine, 25*(3), 172-183.

Bray, S. R., & Cowan, H. (2004). Proxy efficacy: Implications for self-efficacy and exercise intentions in cardiac rehabilitation. *Rehabilitation Psychology, 49*(1), 71.

Bray, S. R., Gyurcsik, N. C., Culos-Reed, S. N., Dawson, K. A., & Martin, K. A. (2001). An exploratory investigation of the relationship between proxy efficacy, self-efficacy and exercise attendance. *Journal of Health Psychology, 6*(4), 425-434.

Bray, S. R. & Shields, C. A. (2008). Proxy agency in physical activity. In M. R. Beauchamp & M. A. Eys (Eds.), *Group dynamics in exercise and sport psychology: Contemporary themes* (p. 79-96). New York, NY: Routledge.

Canadian Paediatric Society (2003). Age limits and adolescents. *Paediatrics & Child Health, 8*(9), 577. Retrieved from http://www.cps.ca/english/statements/AM/ah03-02.htm.

Caspersen, C. J., Pereira, M. A., & Curran, K. M. (2000). Changes in physical activity patterns in the United States, by sex and cross-sectional age. *Medicine and Science in Sports and Exercise, 32*(9), 1601-1609.

Colley, R. C., Garriguet, D., Janssen, I., Craig, C. L., Clarke, J., & Tremblay, M. S. (2011). Physical activity of Canadian children and youth: Accelerometer results from the 2007 to 2009 Canadian Health Measures Survey. *Health Reports, 22*(1), 12-20.

Conner, M., Rhodes, R. E., Morris, B., McEachan, R., & Lawton, R. (2011). Changing exercise through targeting affective or cognitive attitudes. *Psychology & Health, 26*(2), 133-149. doi: 10.1080/08870446.2011.531570

Cook, W. L., & Kenny, D. A. (2005). The actor–partner interdependence model: A model of bidirectional effects in developmental studies. *International Journal of Behavioral Development, 29*(2), 101-109.

Dent, C. W., Sussman, S. Y., & Stacy, A. W. (1997). The impact of a written parental consent policy on estimates from a school-based drug use survey. *Evaluation Review, 21*(6), 698-712.

Diener, E., Suh, E., Lucas, R., & Smith, H. L. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin, 125*(2), 276-302.

Dishman, R. K., Motl, R. W., Saunders, R., Felton, G., Ward, D. S., Dowda, M., & Pate, R. R. (2004). Self-efficacy partially mediates the effect of a school-based physical-activity intervention among adolescent girls. *Preventive Medicine, 38*(5), 628-636.

Dishman, R. K., Sallis, J. F., & Orenstein, D. R. (1985). The determinants of physical activity and exercise. *Public Health Reports, 100*(2), 158-171.

Duncan, S. C., Duncan, T. E., & Strycker, L. A. (2005). Sources and types of social support in youth physical activity. *Health Psychology, 24*, 3-10.

Dunlop, W. L., Beatty, D. J., & Beauchamp, M. R. (2011). Examining the influence of other-efficacy and self-efficacy on personal performance. *Journal of Sport & Exercise Psychology, 33*(4), 586-593.

Dzewaltowski, D. A., Geller, K. S., Rosenkranz, R. R., & Karteroliotis, K. (2010). Children's self-efficacy and proxy efficacy for after-school physical activity. *Psychology of Sport and Exercise, 11*(2), 100-106.

Dzewaltowski, D. A., Karteroliotis, K., Welk, G., Johnston, J., Nyaronga, D., & Estabrooks, P. (2007). Measurement of self-efficacy and proxy efficacy for middle school youth physical activity. *Journal of Sport & Exercise Psychology, 29*(3), 310.

Edwardson, C. L., & Gorely, T. (2010). Parental influences on different types and intensisties of physiccal activity in youth: A systematic review. *Psychology of Sport and Exercise, 11,* 522-535. doi: 10.1016/j.psychsport.2010.05.001

Feltz, D. L., & Magyar, T. M. (2006). Self-efficacy beliefs of adolescents. In F. Pajares & T. Urdan (Eds.), *Adolescence and Education*. Greenwich, Conn: Information Age Publishing, Inc.,.

Ferreira, I., van der Horst, K., Wendel-Vos, W., Kremers, S., van Lenthe, F. J., & Brug, J. (2007). Environmental correlates of physical activity in youth - a review and update. *Obesity Reviews, 8*(2), 129-154. doi: 10.1111/j.1467-789X.2006.00264.x

Fletcher, A. C., Darling, N. E., Steinberg, L., & Dornbusch, S. (1995). The company they keep: Relation of adolescents' adjustment and behavior to their friends' perceptions of authoritative parenting in the social network. *Developmental Psychology, 31*(2), 300.

Frank, L. & Kavage, S. (2009). A national plan for physical activity: The enabling role of the built environment. *Journal of Physical Activity and Health, 6*(Suppl 2), S186-195.

French, D. P., Sutton, S., Hennings, S. J., Mitchell, J., Wareham, N. J., Griffin, S., . . . Kinmonth, A. L. (2005). The importance of affective beliefs and attitudes in the

theory of planned behavior: Predicting intention to increase physical activity. *Journal of Applied Social Psychology, 35*(9), 1824-1848.

Fritz, M. S. & MacKinnon, D. P. (2007). Required sample size to detect mediated effect. *Psychological Science, 18*(3), 233-239. doi: 10.1111/j.1467-9280.2007.01882.x

Galbraith, K. A., & Schvaneveldt, J. D. (2009). Family leadership styles and family well-being. *Family and Consumer Sciences Research Journal, 33*(3), 220-239. doi: 10.1177/1077727X04272362

Garcia, A. W., Broda, M. A., Frenn, M., Coviak, C., Pender, N. J., & Ronis, D. L. (1995). Gender and developmental differences in exercise beliefs among youth and prediction of their exercise behavior. *Journal of School Health, 65*, 213–219.

Gecas, V., Calonico, J. M., & Thomas, D. L. (1974). The development of self-concept in the child: Mirror theory versus model theory. *The Journal of Social Psychology, 92*(1), 67-76.

Gellert, P., Ziegelmann, J. P., & Schwarzer, R. (2011). Affective and health-related outcome expectancies for physical activity in older adults.

Gilman, R. (2001). The relationship between life satisfaction, social interest, and frequency of extracurricular activities among adolescent students. *Journal of Youth and Adolescence, 30*(6), 749-767. doi: 10.1023/a:1012285729701

Godin, G. (2011). The Godin-Shephard leisure-time physical activity questionnaire. *The Health & Fitness Journal of Canada, 4*(1), 18-22.

Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences, 10*(3), 141.

Gustafson, S. L., & Rhodes, R. E. (2006). Parental correlates of physical activity in children and early adolescents. *Sports Medicine, 36*(1), 79-97. doi: 10.2165/00007256-200636010-00006

Guttman, L.B. (1954). A new approach to factor analysis: the radex. In P.F. Lazarsfeld (Ed.), *Mathematical thinking in the social sciences*. New York: Columbia University Press.

Hayes, A. F. (2009). Beyond Barron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*(4), 408-420. doi: 10.1080/03637750903310360

Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to under parameterized model misspecification. *Psychological Methods, 3,* 424–453.

Iacobucci, D. (2010). Structural equations modeling: Fit indices, sample size, and advanced topics. *Journal of Consumer Psychology, 20,* 90-98.

Jackson, B., Banting, L. K., Grove, J. R., & Beauchamp, M. R. (2010). Relational efficacy in undergraduate sports science classes: Outcomes associated with students' self-efficacy, other-efficacy, and RISE beliefs. *Journal of Sport & Exercise Psychology, 32*, S180-S180.

Jackson, B., Beauchamp, M. R., & Knapp, P. (2007). Relational efficacy beliefs in athlete dyads: An investigation using actor-partner interdependence models. *Journal of Sport & Exercise Psychology, 29*(2), 170-189.

Jackson, B., Knapp, P., & Beauchamp, M. R. (2008). Origins and consequences of tripartite efficacy beliefs within elite athlete dyads. *Journal of Sport & Exercise Psychology, 30*(5), 512-540.

Jackson, B., Taylor, I., Myers, N., & Beauchamp, M. R. (2012). Relational efficacy beliefs in physical activity classes: A test of the tripartite model. *Journal of Sport & Exercise Psychology*.

Jackson, B., Whipp, P. R., Chua, K., Pengelley, R., & Beauchamp, M. R. (2011). Assessment of tripartite efficacy beliefs within school-based physical education: Instrument development and reliability and validity evidence. *Psychology of Sport and Exercise, 13*(2), 108-117. doi: 10.1016/j.psychsport.2011.10.007

Jackson, B., Whipp, P. R., Chua, K., Dimmock, J. A. & Hagger, M. S. (in press). Students tripartite efficacy beliefs in high school physical education: Within- and cross-domain relations with motivational processes and leisure-time physical activity. *Journal of Sport and Exercise Psychology.*

Janssen, I., & LeBlanc, A. G. (2010). Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity, 7*. doi: 10.1186/1479-5868-7-40

Kaiser, H.F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20,* 141-151.

Keith, S. E. (2011). *Transformational teaching and children's involvement in physical education***.** Retrieved from UBC Circle: http://hdl.handle.net/2429/12922

Kimm, S. Y. S., Glynn, N. W., Kriska, A. M., Barton, B. A., Kronsberg, S. S., Daniels, S. R., . . . Liu, K. (2002). Decline in physical activity in black girls and white girls during adolescence. *New England Journal of Medicine, 347*(10), 709-715. doi: 10.1056/NEJMoa003277

Lawton, R., Conner, M., & McEachan, R. (2009). Desire or reason: Predicting health behaviors from affective and cognitive attitudes. *Health Psychology, 28*(1), 56-65. doi: 10.1037/a0013424

Ledesma, Rubén Daniel and Pedro Valero-Mora (2007). Determining the Number of Factors to Retain in EFA: An easy-to-use computer program for carrying out Parallel Analysis. *Practical Assessment Research & Evaluation, 12*(2). Available online: http://pareonline.net/getvn.asp?v=12&n=2

Lent, R. W., & Lopez, F. G. (2002). Cognitive ties that bind: A tripartite view of efficacy beliefs in growth-promoting relationships. *Journal of Social and Clinical Psychology, 21*(3), 256-286. doi: 10.1521/jscp.21.3.256.22535

Levy, A., Polman, R., & Clough, P. (2008). Adherence to sport injury rehabilitation programs: an integrated psycho-social approach. *Scandinavian Journal of Medicine & Science in Sports*, *18*(6), 798-809.

Liu, Y. (2011). Documenting the impact on outliers on decisions about the number of factors in exploratory factor analysis. Retrieved from https://circle.ubc.ca/bitstream/handle/2429/39802/ubc_2012_spring_liu_yan.pdf?sequence=8.

Lopez, F. G., & Lent, R. W. (1991). Efficacy-based predictors of relationship adjustment and persistence among college students. *Journal of College Student Development*.

Lubans, D. R., Foster, C., & Biddle, S. J. H. (2008). A review of mediators of behavior in interventions to promote physical activity among children and adolescents. *Preventative Medicine, 47*, 463-470. doi: 10.1016/j.ymed.2008.07.011

Lubans, D. R., Okely, A. D., Morgan, P. J., Cotton, W., Puglisi, L. & Miller, J. (2012). Description and evaluation of a social cognitive model of physical activity behaviour tailored for adolescent girls. *Health Education Research, 27*(1), 115-128. doi: 10.1093/her/cyr039

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*, 130-149.

MacDonald, D. J., Côté, J., Eys, M., & Deakin, J. (2011). The role of enjoyment and motivational climate in relation to the personal development of team sport athletes. *The Sport Psychologist, 25,* 32-46.

Macdonald-Wallis, K., Jago, R., & Sterne, J. A. C. (2012). Social network analysis of childhood and youth physical activity: A systematic review. *American Journal of Preventative Medicine, 43*(6), 636-642.

Maddux, J. E. (1995). *Self-efficacy, adaptation, and adjustment: Theory, research, and application*. New York: Plenum Press.

Magyar, T. M., & Feltz, D. L. (2003). The influence of dispositional and situational tendencies on adolescent girls' sport confidence sources. *Psychology of Sport and Exercise, 4*(2), 175-190.

Martin-Ginis, K. A., Latimer, A. E., Arbour-Nicitopoulos, K. P., Bassett, R. L., Wolfe, D. L., & Hanna, S. E. (2011). Determinants of physical activity among people with spinal cord injury: A test of social cognitive theory. *Annals of Behavioral Medicine, 42*(1), 127-133. doi: 10.1007/s12160-011-9278-9

McAuley, E., & Blissmer, B. (2000). Self-efficacy determinants and consequences of physical activity. *Exercise and Sport Sciences Reviews, 28*(2), 85-88.

McAuley, E., Konopack, J. F., Motl, R. W., Morris, K. S., Doerksen, S. E., & Rosengren, K. R. (2006). Physical activity and quality of life in older adults: Influence of health status and self-efficacy. *Annals of Behavioral Medicine, 31*(1), 99-103. doi: 10.1207/s15324796abm3101_14

McAuley, E., & Mihalko, S. (1998). Measuring exercise-related self-efficacy. *Advances in sport and exercise psychology measurement*, 371-390.

Milevsky, A., Schlechter, M., Netter, S., & Keehn, D. (2007). Maternal and paternal parenting styles in adolescents: Associations with self-esteem, depression and life-satisfaction. *Journal of Child and Family Studies, 16*(1), 39-47.

Moore, L. L., Lombardi, D. A., White, M. J., Campbell, J. L., Oliveria, S. A., & Ellison, R. C. (1991). Influence of parents physical activity levels on activity levels of young children. *Journal of Pediatrics, 118*(2), 215-219. doi: 10.1016/s0022-3476(05)80485-8

Morton, K. L., Barling, J., Masse, L., Rhodes, R., Zumbo, B. D., & Beauchamp, M. R. (2011). The application of transformational leadership theory to parenting: Questionnaire development and implications for adolescent self-regulatory efficacy and life satisfaction. *Journal of Sport and Exercise Psychology, 33*, 688-709.

Motl, R. W., Dishman, R. K., Saunders, R. P., Dowda, M., Felton, G., Ward, D. S., & Pate, R. R. (2002). Examining social-cognitive determinants of intention and physical activity among black and white adolescent girls using structural equation modeling. *Health Psychology, 21*(5), 459.

Munro, B. H. (2005). Statistical methods for health care research. Philadelphia, PA: Lippincott Williams & Wilkins.

Muthén, L.K. and Muthén, B.O. (2010). *Mplus User's Guide* (6th ed.). Los Angeles, CA: Muthén & Muthén.

Nikolaidis, P. T. (2011). Familial aggregation and maximal heritability of exercise participation: A cross-sectional study in schoolchildren and their nuclear families. *Science & Sports, 26*(3), 157-165. doi: 10.1016/j.scispo.2010.09.010

Pajares, F. (2006). Self-efficacy during childhood and adolescence. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents*. Greenwich, Conn: Information Age Publishing, Inc.

Pan, S. Y., Cameron, C., DesMeules, M., Morrison, H., Craig, C. L., & Jiang, X. (2009). Individual, social, environmental, and physical environmental correlates with physical activity among Canadians: A cross-sectional study. *BMC Public Health, 9.* doi: 10.1186/1471-2458-9-21

Patrick, H. & Nicklas, T. A. (2005). A review of family and socail determinants of children's eating patterns and diet quality. *Journal of the American College of Nutrition, 24*(2), 83-92.

Physical Activity Guidelines Advisory Committee. (2008). Physical Activity Guidelines Advisory Committee Report. Washington, DC: Department of Health and Human Services.

Preacher, K. J., Zyphur, M. J. & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods,* 15(3), 209-233. Doi: 10.1037/a0020141

Pugliese, J. & Tinsley, B. (2007). Parental socialization of child and adolescent physical activity: A meta-analysis. *Journal of Family Psychology, 21*(3), 331-343. doi: 10.1037/0893-3200.21.3.331.

Ramirez, E., Kulinna, P. H., & Cothran, D. (2012). Constructs of physical activity behavior in children: The usefulness of Social Cognitive Theory. *Psychology of Sport and Exercise, 13,* 303-310. doi: 10.1016/j.psychsport.2011.11.007

Rhodes, R. E., & Blanchard, C. M. (2007). What do confidence items measure in the physical activity domain? *Journal of Applied Social Psychology, 37*(4), 759-774.

Rhodes, R. E., & Conner, M. (2010). Comparison of behavioral belief structures in the physical activity domain. *Journal of Applied Social Psychology, 40*(8), 2105-2120.

Rhodes, R. E., & Courneya, K. S. (2003). Relationships between personality, an extended theory of planned behaviour model and exercise behaviour. *British Journal of Health Psychology, 8*, 19-36. doi: 10.1348/135910703762879183

Rhodes, R. E., Fiala, B., & Conner, M. (2009). A review and meta-analysis of affective judgments and physical activity in adult populations. *Annals of Behavioral Medicine, 38*(3), 180-204. doi: 10.1007/s12160-009-9147-y

Ruby, M. B., Dunn, E. W., Perrino, A., Gillis, R., & Viel, S. (2011). The invisible benefits of exercise. *Health Psychology, 30*(1), 67-74. doi:10.1037/a0021859

Ryan, G. J., & Dzewaltowski, D. A. (2002). Comparing the relationships between different types of self-efficacy and physical activity in youth. *Health education & behavior, 29*(4), 491.

Santrock, J. W. (2011) *Educational Psychology* (5th ed.). McGraw-Hill Companies Inc.

Sallis, J. F., Buono, M. J., Roby, J. J., Micale, F. G., & Nelson, J. A. (1993). Seven-day recall and other physical activity self-reports in children and adolescents. *Medicine and Science in Sports and Exercise, 25*(1), 99.

Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine and Science in Sports and Exercise, 32*(5), 963-975.

Sallis, J. F., Richard Hofstetter, C., Faucher, P., Elder, J. P., Blanchard, J., Caspersen, C. J., . . . Christenson, G. M. (1989). A multivariate study of determinants of vigorous exercise in a community sample. *Preventive Medicine, 18*(1), 20-34.

Sallis, J. F., Simonsmorton, B. G., Stone, E. J., Corbin, C. B., Epstein, L. H., Faucette, N., . . . Taylor, W. C. (1992). Determinants of phsyical activity and interventions in youth. *Medicine and Science in Sports and Exercise, 24*(6), S248-S257.

Salmon, J., Brown, H., & Hume, C. (2009). Effects of strategies to promote children's physical activity on potential mediators. *Internaltional Journal of Obesity, 33*, S66-S73. doi:10.1038/ijo.2009.21

Santelli, J. S., Rosenfeld, W. D., DuRant, R. H., Dubler, N., Morreale, M., English, A., & Rogers, A. S. (1995). Guidelines for adolescent health research: A position paper of the Society of Adolescent Medicine. *Journal of Adolescent Health, 17*(5), 270-276.

Shell, D. F., Colvin, C., & Bruning, R. H. (1995). Self-efficacy, attribution, and outcome expectancy mechanisms in reading and writing achievement: Grade-level and achievement level differences. *Journal of Educational Psychology, 87*(3), 386-398.

Shields, C. A., Spink, K. S., Chad, K., & Odnokon, P. (2010). The confidence to get going: The moderating effects of depressive symptoms on the self-efficacy–activity

relationship among youth and adolescents. *Psychology and Health*, *25*(1), 43-53. doi: 10.1080/08870440802439065

Shields, C. A., Spink, K. S., Chad, K., Muhajarine, N., Humbert, L., & Odnokon, P. (2008). Youth and adolescent physical activity lapsers - Examining self-efficacy as a mediator of the relationship between family social influence and physical activity. *Journal of Health Psychology, 13*(1), 121-130. doi: 10.1177/1Ram359105307084317

Simonen, R. L., Perusse, L., Rankinen, T., Rice, T., Rao, D. C., & Bouchard, C. (2002). Familial aggregation of physical activity levels in the Quebec family study. *Medicine and Science in Sports and Exercise, 34*(7), 1137-1142. doi: 10.1097/00005768-200207000-00014

Simons, L. G., & Conger, R. D. (2007). Linking mother-father differences in parenting to a typology of family parenting styles and adolescent outcomes. *Journal of Family Issues, 28*(2), 212-241. doi: 10.1177/0192513x06294593

Sirriyeh, R., Lawton, R., & Ward, J. (2010). Physical activity and adolescents: An exploratory randomized controlled trial investigating the influence of affective and instrumental text messages. *British Journal of Health Psychology*, *15*(4), 825-840.

Snyder, M., & Stukas, A. A. (1999). Interpersonal processes: The interplay of cognitive, motivational, and behavioral activities in social interaction. *Annual Review of Psychology, 50*(1), 273-303.

Spink, K. S., Brawley, L. R., Chad, K. E., Humbert, L., Muhajarine, N., & Odnokon, P. A. (2006). Relationship of self-regulatory efficacy to adolescent activity sufficient and insufficient for health benefits. *Journal of Sport & Exercise Psychology, 28*, S173-S173.

Spink, K. S., & Nickel, D. (2010). Self-regulatory efficacy as a mediator between attributions and intention for health-related physical activity. *Journal of Health Psychology, 15*(1), 75-84.

Statistics Canada (2010). Ethnocultural portrait of Canada [Data Table]. Retrieved from http://www12.statcan.ca/census-recensement/2006/dp-pd/hlt/97-562/pages/page.cfm?Lang=E&Geo=CSD&Code=59&Table=1&Data=Count&Sex=1&StartRec=1&Sort=9&Display=Page&CSDFilter=5000

Strauss, R. S., Rodzilsky, D., Burack, G., & Colin, M. (2001). Psychosocial correlates of physical activity in healthy children. *Archives of Pediatrics & Adolescent Medicine, 155*(8), 897-902.

Telama, R., & Yang, X. L. (2000). Decline of physical activity from youth to young adulthood in Finland. *Medicine and Science in Sports and Exercise, 32*(9), 1617-1622.

Tinsley, B. J. (2003). *How children learn to be healthy.* Campridge England: Cambridge University Press.

Trafimow, D., Sheeran, P., Lombardo, B., Finlay, K. A., Brown, J., & Armitage, C. J. (2004). Affective and cognitive control of persons and behaviours. *British Journal of Social Psychology, 43*(2), 207-224.

Tremblay, M. S., Shields, M., Lavioletter, M., Craig, C. L., Janssen, I., & Gorber, S. C. (2010). Fitness of Canadian children and youth: Results from the 2007-2009 Canadian Health Measures Survey. *Health Reports, 21*(1), 7-20.

Tremblay, M. S., Warburton, D. E. R., Janssen, I., Paterson, D. H., Latimer, A. E., Rhodes, R. E., . . . Duggan, M. (2011). New Canadian Physical Activity Guidelines. *Applied Physiology Nutrition and Metabolism, 36*(1), 36-46. doi: 10.1139/h11-009

Trost, S. G., & Loprinzi, P. D. (2011). Parental influences on physical activity behavior in children and adolescents: A brief review. *American Journal of Lifestyle Medicine, 5*(2), 171-181. doi: 10.1177/1559827610387236

Trudeau, F., & Shephard, R. J. (2008). Physical education, school physical activity, school sports and academic performance. *International Journal of Behavioral Nutrition and Physical Activity, 5*. doi: 10.1186/1479-5868-5-10

van Mechelen, W., Twisk, J. W. R., Post, G. B., Snel, J., & Kemper, H. C. G. (2000). Physical activity of young people: the Amsterdam Longitudinal Growth and Health Study. *Medicine and Science in Sports and Exercise, 32*(9), 1610-1616.

Weiss, M., McCullagh, P., Smith, A., & Berlant, A. (1998). Observational learning and the fearful child: influence of peer models on swimming skill performance and psychological responses. *Research quarterly for exercise and sport, 69*(4), 380.

Welk, G. J., Wood, K., & Morss, G. (2003). Parental influences on physical activity in children: An exploration of potential mechanisms. *Pediatric Exercise Science, 15*(1), 19-33.

Williams, D. M. (2010). Outcome expectancy and self-efficacy: Theoretical implications of an unresolved contradiction. *Personality and Social Psychology Review, 14*(4), 417-425. doi: 10.1177/1088868310368802

Williams, D. M., Anderson, E. S., & Winett, R. A. (2005). A review of the outcome expectancy construct in physical activity research. *Annals of Behavioral Medicine, 29*(1), 70-79. doi: 10.1207/s15324796abm2901_10

Williams, J. & MacKinnon, D. P. (2008). Resampling and distribution of the product methods for resting indirect effects in complex models. *Structural Equation Modeling, 15*(1), 23-51. doi: 10.1080/10705510701758166

Wilson, A. J., Liu, Y., Keith, S. E., Wilson, A., Kermer, L., Zumbo, B. D., & Beauchamp, M. R. (2012). Transformational teaching, and child psychological needs satisfaction, motivation and engagement in elementary school physical education. *Sport, Exercise, & Performance Psychology*. doi: 10.1037/a0028635.

World Health Organization. (2010). Global recommendations on physical activity for health. Geneva, Switzerland: World Health Organization.

Wu, A. D. L. (2008). Pratt's importance measures in factor analysis: A new technique for interpreting oblique factor models. Retreived from UBC Circle: https://circle.ubc.ca/bitstream/handle/2429/2333/ubc_1993_spring_wu_ling.pdf?sequence=3

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*(1), 82-91. doi: 10.1006/ceps.1999.1016

# Appendices

## Appendix A - Student Information Letter

*Psychology of Exercise, Health, and Physical Activity Laboratory*
*School of Kinesiology, The University of British Columbia*

### [Student Information Letter]
### Physical Activity and Family

Principal Investigator:
Mark R. Beauchamp, Ph.D.
School of Kinesiology
The University of British Columbia

Co-Investigator:
Alex Wilson, M.Sc. Student
School of Kinesiology
The University of British Columbia

Dear Student,

We are researchers from the University of British Columbia (UBC). We are interested in what you think about physical activity. The information you provide will help us understand what motivates adolescents to be physically active in their leisure time. In two weeks time we will be coming to your school and we will invite you to complete a survey. This should take 25 minutes of your time and this will be done during school hours. A second survey will be completed two months later.

We want to hear your opinion on these issues. This research has been approved by your school board as well as the UBC ethics committee. Please know that your involvement in this study is voluntary. It is up to you 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.

If you decide to take part your answers will be kept private and anonymous. This means your responses will be combined with those of other students so only you will know how you have answered the questions. All completed surveys will be kept in a locked room in War Memorial Gym at UBC. Your survey 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 or Alex Wilson by email or phone with their contact information at the top of this page. 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.

We would also like you to take the parental information letter attached to this letter and give it to one of your parents or legal guardians. Although this study does not involve any known risks we would encourage you to discuss your involvement with your parents/guardians. 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 two weeks time.

Thank you for your help,

Mark Beauchamp, PhD

Alex Wilson, BPHE, BSc.

**Appendix B - Parent Information Letter**

*Psychology of Exercise, Health, and Physical Activity Laboratory*
*School of Kinesiology, The University of British Columbia*

## [Parent Information Letter]
## Physical Activity and Family

Principal Investigator:
Mark R. Beauchamp, Ph.D.
School of Kinesiology
The University of British Columbia

Co-Investigator:
Alex Wilson, M.Sc. Student
School of Kinesiology
The University of British Columbia

February 20, 2012

Dear Parent,

My name is Alex Wilson and I'm a researcher at the University of British Columbia. I am currently involved in a long-term program of research that is designed to better understand adolescents' motivation to be physical active. In two weeks time I will be going in to your child's school and will be inviting him/her to complete a survey during class time. Those who choose not to participate in the study will complete an appropriate alternative activity as decided by your child's teacher. In this survey we will ask a series of questions about their experiences and attitudes towards physical activity in their leisure time. We will administer the same questionnaires again two months later. 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

On both occasions it will take your child approximately 25 minutes to complete the survey. None of the questions that we ask are of a delicate or intrusive nature and there are no known risks associated with involvement in this study. Participation is entirely voluntary, and even if your child initially chooses to take part in this study they may subsequently withdraw at any time without giving a reason or experiencing any negative consequences.

The answers your child provides will be combined with those of other students who are taking part in this research and any information they provide will remain completely confidential. All completed questionnaires will be kept in a locked and secure room in the War Memorial Gym at the University of British Columbia and shall not be made 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 Dr. Beauchamp or Alex Wilson 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 Alex Wilson or Dr. Mark Beauchamp. If you have any concerns about your child's rights or treatment as a research subject please contact the 'Research Subject Information Line' in the UBC Office of Research Services.

Yours sincerely,

Mark Beauchamp, PhD
(Principal Investigator)

Alex Wilson, BPHE, BSc.

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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 …… to take part in this research.

(Child's Name)

Signed…… Date……..

(Parent/Guardian Name)

**Appendix C - Student Questionnaire**

*Psychology of Exercise, Health, and Physical Activity Laboratory*
*School of Kinesiology, The University of British Columbia*

## [Student Questionnaire]
## Physical Activity and Family

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

Co-Investigator:
Alex Wilson, M.Sc. Student
School of Kinesiology
University of British Columbia

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

We want your opinion on these issues. There are no right or wrong answers. This is NOT a test. It will take about 25 minutes to complete this questionnaire package. Please 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 ask the researcher. If for ANY reason, you do not want to take part in this study that is fine, you don't have to. You are free to withdraw at any time without ANY negative consequences or having to give a reason.

PLEASE 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 only you will know how you answered the questions. All completed surveys will be kept in a locked and secure room in 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 at the email or phone number listed 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 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 please return the questionnaire to the researcher.

Thank you for your help,

Mark Beauchamp, PhD

Alex Wilson, BPHE, BSc.

***PART A*: Background Information**

**A1.** What is your age (years): ○ 11 ○ 12 ○ 13 ○ Other _____

**A2.** Sex (select one): ○ Male ○ Female

**A3.** Date of Birth: _____ (Day) _____ (Month) _____ (Year)

**A4.** Place of Birth: _____ (Country)

**A5.** School Name: _____

**A6.** Class Name:_____

**A7.** Please mark which of the following you identify with and CHECK **ALL** THAT APPLY.

- ○ White
- ○ Chinese
- ○ Black
- ○ Filipino
- ○ Latin American
- ○ Arab
- ○ Japanese
- ○ Russian
- ○ African
- ○ South Asian (e.g. East Indian, Pakistani, etc.)
- ○ South East Asian (e.g. Vietnamese, Cambodian, etc.)
- ○ West Asian (e.g. Iranian, Afghan, etc.)
- ○ Korean
- ○ Native/Aboriginal
- ○ Other (please specify) _____

**A8.** With whom do you live?

- ○ Both Mother and Father
- ○ Single Mother
- ○ Single Father
- ○ Mother and Stepfather
- ○ Father and Stepmother
- ○ Other _____

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

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

**A11.** What are the first three digits on your postal code (e.g., V6T): _____

***PART B:***

The following statements focus on **physical activity done in your leisure time (outside of school)**. There are no right or wrong answers to any of these questions, and we would like you to **rate your confidence in your ability at this moment in time** using the following scale...

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

Not at all Somewhat Completely

| **If you really wanted to, how confident are you that you can…** | **Confidence (0-100)** |
|---|---|
| 1. Be physically active even if you feel tired | |
| 2. Be physically active even if you are in a bad mood | |
| 3. Be physically active even if you don't have the time | |
| 4. Arrange your schedule to be active no matter what? | |
| 5. Overcome obstacles that prevent you from being active regularly? | |
| 6. Make up times when you have missed your regular physical activity? | |

***PART C:*** The following questions focus on **your MOTHER/FEMALE GUARDIAN.**

This time, we would like you to **rate your confidence in your mother/female guardian at this moment in time** 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 get your mother/female guardian to…** | **Confidence (0-100)** |
|---|---|
| 1. ... help you plan to do your favourite physical activities | |
| 2. ... give you a ride to do your favourite physical activities | |
| 3. ... find a place where you can be physically active | |
| 4. ... help you find different types of physical activities to do | |
| 5. ... play outside with you or do physical activity/sports with you | |
| 6. … find time to be physically active with you | |

The following questions focus on you again, but this time we would like you to **estimate (or guess) how confident your MOTHER/FEMALE GUARDIAN is in your ability participate in leisure time physical activity at this moment in time**. So, we're not focusing on how confident you are; we're focusing on what you *think* your mother's/guardian's confidence is in you. Just as before, there are absolutely no right or wrong answers, please be honest. Please use the following scale…

| **Estimate how confident your mother/female guardian is in your ability to…** | **Confidence (0-100)** |
|---|---|
| 1. Be physically active even if I feel tired | |
| 2. Be physically active even if I am in a bad mood | |
| 3. Be physically active even if I don't have time | |
| 4. Arrange your schedule to be active no matter what | |
| 5. Overcome obstacles that prevent you from being active regularly | |
| 6. Make up times when you have missed your regular physical activity | |

***PART D:*** The following questions focus on **your FATHER/MALE GUARDIAN.**

This time, we would like you to **rate your confidence in your father/male guardian at this moment in time** 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 get your father/male guardian to…** | **Confidence (0-100)** |
|---|---|
| 1. … help you plan to do your favourite physical activities | |
| 2. … give you a ride do your favourite physical activities | |
| 3. … find a place where you can be physically active | |
| 4. … help you find different types of physical activities to do | |
| 5. … play outside with you or do physical activity/sports with you | |
| 6. … find time to be physically active with you | |

The following questions focus on you again, but this time we would like you to **estimate (or guess) how confident your FATHER/MALE GUARDIAN is in your ability participate in leisure time physical activity at this moment in time**. So, we're not focusing on how confident you are; we're focusing on what you *think* your father's/guardian's confidence is in you. Just as before, there are absolutely no right or wrong answers, please be honest. Please use the following scale…

| **Estimate how confident your father/male guardian is in your ability to…** | **Confidence (0-100)** |
|---|---|
| 1. Be physically active even if I feel tired | |
| 2. Be physically active even if I am in a bad mood | |
| 3. Be physically active even if I don't have time | |
| 4. Arrange your schedule to be active no matter what | |
| 5. Overcome obstacles that prevent you from being active regularly | |
| 6. Make up times when you have missed your regular physical activity | |

***PART E***

1. Considering the past **7-day period** (last week), how many times did you do the following kinds of exercise for **more than 15 minutes** during your free time (write in each square the appropriate number).

**TIMES PER WEEK**

**A. STRENUOUS EXERCISE**
(HEART BEAT RAPIDLY)
(i.e. running, jogging, hockey, football, soccer, squash, basketball, netball, judo vigorous swimming, vigorous long distance, cycling, roller skating) ☐

How many minutes was each strenuous intensity exercise session (approximately)?
_____ minutes

**MODERATE EXERCISE**
(NOT EXHAUSTING)
(i.e. fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, dancing) ☐

How many minutes was each moderate intensity exercise session (approximately)?
_____ minutes

**MILD EXERCISE**
(MINIMAL EFFORT)
(i.e. yoga, archery, bowling, golf, fishing from river bank, easy walking) ☐

How many minutes was each mild intensity exercise session (approximately)? _____ minutes

2. Considering the past 7-day period (last week), during your leisure-time, how often did you engage in any regular exercise long enough to work up a sweat (heart beats rapidly)?

| OFTEN | SOMETIMES | NEVER/RARELY |
|---|---|---|
| ○ | ○ | ○ |

***PART F***

| **If I were physically active on a regular basis…** | **Strongly Disagree** | **Disagree** | **Slightly Disagree** | **Slightly Agree** | **Agree** | **Strongly Agree** |
|---|---|---|---|---|---|---|
| 1. … then I would feel balanced in my daily life | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 2. … then I would feel more alive | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 3. … then I would feel more alert | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 4. … then it would be good for my future health | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 5. … then it would be good for my long-term health | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 6. … then it would be good for my muscles and bones | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 7. … then there is also a short-term benefit for my health | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 8. ... then it would be good for my heart | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 9. ... then it would be good for my current health | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 10. ... then I would feel happier | ① | ② | ③ | ④ | ⑤ | ⑥ |
| 11. ... then I would be in a better mood | ① | ② | ③ | ④ | ⑤ | ⑥ |