

CONCURRENT MANAGEMENT OF EXERCISE AND OTHER VALUED LIFE GOALS:  
A FOCUS ON SELF-REGULATORY EFFICACY

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## ABSTRACT

While being physically active is an important and valued goal for many individuals, family, work, school, and friends are also valued aspects of their lives. Many social cognitive theories examine health behaviours in isolation, without taking into consideration the context, or life circumstances, in which people seek to achieve such health behaviours. Examining a single goal-directed behaviour without acknowledging the possible influence of other concurrent goals managed by an individual may oversimplify the self-regulation needed in daily life. The overarching purpose of this dissertation was to examine exercise behaviour in the context of *concurrently* held, valued non-exercise activities (e.g., academics, family). Relationships between valued non-exercise goals, concurrent self-regulatory efficacy, and exercise behaviour were explored. Social cognitive theory provided the theoretical framework for the three studies conducted. Study 1 sought to discriminate university students whose exercise level was either commensurate or not with achieving health benefits using social-cognitive predictors. These predictors took into account participants' beliefs about the concurrent management of exercise with other valued non-exercise goals. Results indicated that concurrent self-regulatory efficacy (belief in abilities to self-regulate the management of multiple goals including exercise) discriminated those active enough to achieve health benefits from those who were not active enough. Study 2 used a prospective design to explore potential mechanisms that allow individuals to successfully self-regulate exercise behaviour with other goals during hectic times. Undergraduate students were observed during a 4-week examination period where they faced greater than usual challenges to exercising regularly. Concurrent self-regulatory efficacy was identified as a partial mediator of the relationship between value of an exercise goal and future exercise behaviour, and this effect was stable during this challenging period of time. Study 3

used a randomized experimental design to test the social cognitive theory hypothesis that individuals with greater concurrent self-regulatory efficacy would persevere with exercise to a greater extent when facing numerous exercise barriers than their lower efficacy counterparts. Forty-nine busy working mothers with young children who were exercisers or wanted to exercise comprised the study sample. Participants either high or low in concurrent self-regulatory efficacy were exposed to numerous or minimal exercise barrier scenarios. Consistent with social cognitive theory, when exercise barriers were numerous, mothers with higher concurrent self-regulatory efficacy demonstrated greater perseverance towards achieving their exercise goals, and perceived the concurrent management of exercise along with their other valued life goals as more positively challenging, than did mothers with lower concurrent self-regulatory efficacy. Taken together, these results provide preliminary support for the utility of using social cognitive theory to examine beliefs about concurrent self-regulation of exercise along with other valued non-exercise goals when studying exercise behaviour. Future directions and applications to theory are discussed.

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## INTRODUCTION

Although the majority of Canadians consider being physically active as very important to them personally (Canadian Fitness and Lifestyle Research Institute [CFLRI], 1998), over half of Canadian adults remain physically inactive (CFLRI, 2005). A widely held assumption is that adults encounter barriers to exercise that prevent them from being active. Indeed, lack of time is one of the most commonly-cited exercise barriers reported in research concerning determinants of and barriers to exercise (Brawley, Martin, Gyurcsik, 1998; Salmon, Owen, Crawford, Bauman, & Sallis, 2003; Trost, Owen, Bauman, Sallis, & Brown, 2002). When individuals report lack of time as a barrier to exercise, the implication is that other activities, such as work, family, and social commitments, are consuming the majority of their time, with little time left for exercise. An alternative hypothesis to this explanation may be that individuals who claim lack of time is a barrier may be ineffective at self-regulating exercise amongst other valued goals during daily life.

Many expectancy-value theories have been used to study exercise behaviour (e.g., health belief model, Rosenstock, 1974; theory of planned behaviour, Ajzen, 1985). Several investigations using such theories have considered exercise as a single, goal-directed behaviour (Riediger & Freund, 2004). Any non-exercise activities, such as work, family, or schoolwork, have often been measured as exercise *barriers* (Brawley et al., 1998; Yoshida, Allison, & Osborn, 1988), rather than considering these activities as valued goals that may be perceived to influence, and be influenced by, exercise activities. Further, viewing all valued, non-exercise goals as hindrances to exercise behaviour limits the exploration of any potential *positive* effects of individuals concurrently pursuing multiple goals. In order to advance the current understanding of exercise behaviour, it is important to shift from studying exercise behaviour

independent of other goal activities to studying how individuals can successfully exercise while concurrently pursuing other important, non-exercise goals

### *1.1 Multiple Goal Pursuit*

In an extensive review of the goal literature in psychology, Austin and Vancouver (1996) introduce goal concepts by stating that “single goals cannot be understood when isolated from other goals and from the cognitive, behavioral, and affective responses organized in pursuing goals” (pg. 338). Of the many goal dimensions discussed by Austin and Vancouver (1996), goal importance and goal connectedness are particularly relevant in the study of multiple goal pursuit. Goal importance is often assessed through goal commitment, or how long an individual is willing to strive towards achieving the goal. Goal connectedness refers to the potential of a goal to be connected, or influenced, by another goal. More complex goals, such as adhering to exercise, are argued to have more links to other goals and to have greater potential for conflict with these other goals (Austin & Vancouver, 1996). Interestingly, the study of mutually exclusive goals (such as exercise and work) and how they might interact due to limited resources (such as time) has received relatively little attention in the goal literature. What has been investigated with respect to multiple goal pursuit and how these goals interact are discussed next.

### *1.2 Research on Multiple Goal Pursuit*

Relatively few studies have explored the pursuit of multiple goals, when at least one of the goals is exercise or health-based. Those studies that have been conducted have primarily assumed that goals must conflict with each other in a negative manner. The limited number of exercise studies that examine multiple goals take the singular position that any non-exercise goal impedes progress towards exercise goals, thus casting other goals and exercise as being in goal conflict (Emmons & King, 1988; Gebhardt & Maes, 1998; Karoly, Ruehlman, Okun, Lutz,

Newton, & Fairholme, 2005; Li & Chan, 2008). Little research has considered whether non-exercise goals could positively enhance the attainment of exercise goals.

Emmons and King (1988) introduced the concept of conflict between personal strivings, defining goal conflict as when a personally valued goal is perceived to interfere with the achievement of another personally valued goal. Emmons and King (1988) hypothesized that goal conflict would be negatively associated with physical and psychological well-being.

Undergraduate students reported 15 goals and how each goal was perceived to conflict with all other goals. In a series of studies, the authors demonstrated that as goal conflict increased, physical illness symptomatology (e.g., headaches, nausea, dizziness), number of health visits, illnesses reported at a student health clinic, and rumination on progress towards all goals increased, while reports of physical and psychological well-being decreased. Although these studies did not examine exercise behaviour specifically, Emmons and King (1988) were the first to study the impact of multiple goals on health. Unfortunately, their measure of goal conflict did not allow examination of whether the goals were concurrently held (i.e., occurring at the same time), how personally valued the goals were, or provide any time frame in which the goals needed to be achieved.

It was not until a decade later that the concept of goal conflict was studied within the exercise context. Gebhardt and Maes (1998) argued that the existing research predicting exercise behaviour had not considered the potential influence of “personal goals”, and hypothesized that goals, which were highly valued and in conflict with exercise, would limit exercise behaviour change. The researchers asked participants to anticipate whether exercising would interfere with any of 16 possible “personal goals” from a list developed by the researchers, such as doing the household chores or watching TV. Less active individuals (exercised < 3 times/week) anticipated

more conflict between non-exercise goals and exercising 3 or more times per week than did more active individuals (exercised 3+ times/week). The authors concluded that understanding the role personal non-exercise goals play with respect to engaging in exercise is crucial for the development of exercise intervention programmes.

Although the Gebhardt and Maes (1998) study provided the first step toward studying goals concurrently, there were flaws within this cross-sectional study that could be improved upon. Most importantly, the study was not theoretically-based, and the researcher-developed list of goal activities may not have constituted personally-valued goals for respondents. In order to understand if personally-valued, realistic goals are managed along with exercise goals, both non-exercise and exercise goals should be elicited from the participants. In addition, it cannot be ascertained from the study description whether actual goal conflict was perceived by participants or how potential conflict would impact prospective exercise behaviour. Gebhardt and Maes (1998) were, however, the first to examine possible goal conflict within an exercise context.

More recently, goal conflict has been examined in a study framed by the theory of planned behaviour (Ajzen, 1991). Li and Chan (2008) assessed goal conflict as a potential moderator of the exercise intention – behaviour relationship. Using self-elicited and time-specific goals, participants were asked how much conflict each goal had with exercise. Results demonstrated a three-way interaction between goal conflict, intention, and intention stability in explaining vigorous exercise. No other results pertaining to goal conflict were reported, except for a negative correlation between conflict and past exercise activity. These findings suggest that non-exercise goals are correlated with exercise goals, although only goal conflict and not goal enhancement was assessed. Assessing goal enhancement, or how pursuing multiple goals at once can be perceived as positively facilitating the achievement of all goals, could provide researchers

with a better understanding of how non-exercise goals are thought to influence exercise goals. Participants did not need to have a exercise goal to be eligible for the study, which begs the question of whether Li and Chan's sample had the experience that would allow their participants to estimate how their non-exercise goals would influence exercise goals. Determining whether goal conflict would predict exercise behaviour prospectively is also unknown given the cross-sectional nature of Li and Chan's study.

Karoly and colleagues (2005) took a different approach when examining life pursuits and their potential interference on exercise goals in their cross-sectional study of college students. Irregular (exercised < 3 times/week) and regular (exercised 3+ times/week) exercisers were compared with respect to their self-regulatory cognitions as assessed through Karoly's goal systems assessment battery (GSAB; 1995). Briefly, the GSAB assessed self-regulatory thoughts, such as self-efficacy, social comparison, and self-reward toward participants' non-exercise and exercise goals. Irregular exercisers responded with more self-regulatory thought towards their interfering, non-exercise goal as compared to their exercise goal, whereas regular exercisers put forth the same amount of self-regulatory thought about both goals. Similar to all of the aforementioned studies, Karoly and colleagues assumed that goals would only interfere with each other, versus having an enhancing effect. These findings did, however, provide insight into social cognitions (i.e., self-efficacy) that could potentially mediate the relation between participants' concurrent goals and their exercise adherence (cf. Bandura, 1997).

There is one published prospective study that examined the potential for non-exercise and exercise goals to positively facilitate each other. In a five-month investigation of exercise behaviour, Riediger and Freund (2004) elicited three non-exercise and one exercise goal in participants who intended to begin exercising. The researchers assessed: a) intergoal facilitation,

which was defined as how much the pursuit of one goal simultaneously *increased* the likelihood of success in reaching another goal, as well as b) intergoal interference, which was defined as how much the pursuit of one goal *impaired* the likelihood of success in reaching another goal. Neither intergoal facilitation nor interference predicted exercise behaviour in the first three months. However, month 1 reports of intergoal facilitation significantly and positively predicted months 4 and 5 exercise behaviour. This study introduced an important concept within multiple goal pursuit research -- the idea that concurrent goals may positively enhance one another. Unfortunately, the study was atheoretical. Thus, mechanisms that may have influenced their finding about goals positively enhancing one another remain unknown, without theory-based hypotheses to guide subsequent investigation.

Several unknown factors were also potential covariates or confounding variables in Riediger and Freund's (2004) study. For example, it is unclear whether the months examined were times when other goals would present challenges to, or interfere with exercise (e.g., when work is hectic, or during academic examinations). Further, Riediger and Freund 's (2004) sample was a dichotomy of young (mean age 25.2 years) and older adults (mean age = 63.8 years). The demands that exercise and non-exercise goals have on one another could differ substantially in young versus older adults. It is quite possible that the type and extent to which non-exercise goals influenced exercise goals varied greatly in students versus retirees, masking any potential influence intergoal interference could have had on exercise behaviour.

In summary, there is limited research examining exercise and multiple goal pursuits. Of the few studies conducted, most have had the disadvantage of being atheoretical. Research guided by theory provides a more evidence-based, organized consideration of scientific questions (Brawley, 1993). A theoretical framework that has been utilized in the exercise research to

examine goals and the self-regulatory actions needed to pursue them is social cognitive theory (Bandura, 1986). A brief perspective outlining how this theory could apply to the investigation of multiple goal pursuits and exercise is instructive.

### *1.3 Social Cognitive Theory and Goals*

According to Bandura's social cognitive theory (1986), one's actions, thoughts, affect, and all other personal factors interact with environmental factors to determine an individual's behaviour. One major assumption in social cognitive theory is that human action is goal-directed (Bandura, 1986). Goals are, in fact, an integral component of social cognitive theory, as it forms the basis for why humans act as personal agents to self-direct their own behaviour, thoughts, and emotions (Maddux & Gosselin, 2003). Bandura argues that people use forethought to consider what potential outcomes would result if certain actions are undertaken. In turn, individuals use the action-outcome information to subsequently decide which goals to set for themselves, and then plan subsequent courses of action likely to produce desired outcomes (Bandura, 1997). Future goal-oriented *exercise* behaviour therefore, should be associated with one's thoughts, feelings, current behaviour, and surrounding environment in bidirectional relationships. It is within this social cognitive theoretical framework that it is plausible to examine if non-exercise goals and exercise goals inter-relate. The use of social cognitive theory, and the associated self efficacy theory (Bandura, 1997), to explore multiple concurrent goal pursuit within the exercise literature has yet to be accomplished.

Self-efficacy beliefs are posited to be the central mechanism of goal-directed behaviour within social cognitive theory. Self-efficacy, or individuals' beliefs about their capabilities to exert control and carry out goal-oriented actions, influence goal-setting, the types of activities chosen for participation, how much one will persevere, put forth effort, and problem-solve in

order to achieve goals (Bandura, 1997; Latham & Locke, 1991). Taken together, self-efficacy influences self-regulation of goal-directed behaviours (Maddux & Gosselin, 2003). Considering the goal of exercise adherence, self-efficacy theory, which is housed within social cognitive theory, would posit that peoples' efficacy to self-regulate their exercise behaviours will determine the extent to which they will persevere in adhering to exercise. Further, Bandura (1997) has argued that self-regulatory efficacy should mediate the relationship between goals and behaviour. Specifically, he suggests that goals operate through self-reactive influences instead of directly regulating individuals' motivation and behaviour. Self-efficacy, he emphasizes, is one major self-influence *through which* goals create their motivational impacts.

In sum, social cognitive theory appears to be a tenable model that could be used to explore concurrent management of exercise and non-exercise goals. This dissertation research constitutes the beginning of a theoretically-based approach to examining the pursuit of multiple goals and how this pursuit relates to exercise adherence.

#### *1.4 Primary Purpose of this Dissertation*

Little empirical research in the exercise domain has focused on the pursuit of other valued life goals in conjunction with the pursuit of an exercise goal. Realistically, exercise is rarely the only goal in one's life. If we are to improve upon our understanding of how to increase exercise adherence in the general population, acknowledging the potential perceived influence that other valued life goals may have on exercise behaviour is critical. Based on the review of current literature on multiple goal pursuit, it appears that a theoretically-based examination of concurrent exercise and non-exercise goals is lacking. Social cognitive theory (Bandura, 1986) provides a potentially useful theoretical framework in which to study the concurrent pursuit of exercise with non-exercise goals.

The overall purpose of this dissertation was to obtain information that was related to the self-regulatory processes that allowed individuals to successfully pursue exercise-related goals while managing other important goals in their lives, such as work and family. Three studies were conducted to address the overall purpose. All studies utilized social cognitive theory generally and self-efficacy theory specifically as the underlying foundation..

Whereas these theories are based upon the well-recognized assumption that humans make logical and rational decisions, assumptions were also made with regards to the life goals examined in the dissertation. It was assumed within this dissertation that life goals are highly valued and volitional goals that require ongoing persistence and self-regulation. Further, goals examined in this dissertation were longer-term, overarching goals rather than incidental or moment to moment sub-goals. Such complex goals require conscious planning and forethought for progress or completion to be realized.

The first study attempted to add to the information from the findings of Karoly and colleagues (2005) concerning regular and irregular exercisers, their self-regulatory thought, and pursuit of multiple goals. Study 1 examined the social-cognitive variables (i.e., concurrent self-regulatory efficacy) that discriminate individuals sufficiently active to achieve health benefits from those who are not sufficiently active. As well, participants' perceptions as to whether the concurrent management of exercise and non-exercise goals positively enhances or interferes with one another (as opposed to assuming interference as previous studies have) were examined.

Study 2 sought to examine whether concurrent self-regulatory efficacy beliefs mediate the relationship between valued goals and exercise behaviour. Bandura (1997) suggests that this mediation should occur, particularly when individuals are strongly efficacious in the face of challenges or possible failure. Thus, the concurrent pursuit of valued goals during a particularly

hectic and difficult time might be facilitated by a strong sense of concurrent self-regulatory efficacy. Accordingly, concurrent self-regulatory efficacy was tested as a mediator over the course of a challenging self-regulatory period for undergraduate students -- end of term examinations.

Whereas concurrent self-regulatory efficacy was examined for its potential mediational relationship between goals and behaviour in Study 2, a question still remains. Will individuals higher in concurrent self-regulatory efficacy be better able to deal with challenging circumstances as compared to individuals lower in this efficacy belief? Social cognitive theory posits that more efficacious individuals should persevere longer in the face of challenges than individuals with lower efficacy beliefs.

The third study in this dissertation attempted to examine the foregoing hypothesis in an experimentally controlled setting. The level of challenge to exercise regularly in Study 2 was *assumed* to be higher than usual during the examination period. In Study 3, the level of challenge was controlled experimentally such that hypotheses about perseverance in the face of numerous versus minimal exercise barriers could be tested. Working mothers with young children who had the desire to be active or remain physically active while concurrently managing work, family, and childcare were examined for their perseverance toward exercising in more and less challenging conditions.

### *1.5 Secondary Purpose of this Dissertation: Exploration of Suitable Measures*

According to Bandura, self-efficacy beliefs are specific to varying activities, varying levels of the same activity, and even for the same activity at the same level under differing circumstances (Bandura, 1997, Maddux & Lewis, 1995; Maddux & Gosselin, 2003). It has been suggested that self-efficacy pertaining to isolated motor acts (i.e., task self-efficacy) will have

limited utility when studying complex health behaviours, such as long-term exercise adherence (Bandura, 1995; Kirsch, 1995; Maddux & Gosselin, 2003). Instead, researchers have been encouraged to examine self-regulatory efficacy (Bandura, 1995; Kirsch, 1995; Woodgate, Brawley, & Weston, 2005). This form of self-efficacy is the perceived confidence that includes, but is not limited to, beliefs about self-regulatory performance accomplishments, such as overcoming barriers, self-monitoring progress, scheduling, preventing relapse, and problem-solving in order to achieve exercise regularity (Maddux & Gosselin, 2003). Considering the unique context that multiple goal pursuits may present, it was concluded that the use of a self-regulatory efficacy measure specific to concurrent management of an exercise goal *along with* other important discretionary non-exercise goals was a necessary measure to serve the studies in the dissertation.

Another measurement need for studying the influence of multiple goal pursuits on exercise adherence was an assessment of potential positive influences that goals could have on one another. Previous research on multiple goal pursuits has mainly considered non-exercise goals as impeding the pursuit of exercise. Little research has considered whether the pursuit of multiple goals (including exercise) would be perceived as being positively challenging to individuals and potentially enhancing the attainment of exercise goals. For this reason, it was of interest to assess how participants in these three studies viewed the concurrent management of their valued goals. Specifically, a secondary objective of this dissertation was to assess whether exercise and non-exercise goals were perceived as challenging or interfering with one another, and the relative strength of this perception. This assessment was considered exploratory and no specific hypotheses were advanced given that the studies in the dissertation constitute an initial program of research.

### *1.6 Dissertation Format*

The studies in this dissertation were written as primarily independent articles, with each article including an introduction, description, and conclusion. Specific hypotheses were advanced in each study. The general dissertation discussion provides a collective perspective on the three studies and summarizes their contribution to theory and the existing exercise literature.

## **STUDY 1. CONCURRENT MANAGEMENT OF EXERCISE AND OTHER VALUED LIFE GOALS: COMPARISON OF FREQUENT AND LESS FREQUENT EXERCISERS**

While being physically active is an important goal for many individuals, family, work, school, and friends are also valued aspects of their lives. In social psychology, many of these valued goals and actions are studied independently for the purposes of understanding a specific behaviour (Carver & Scheier, 1981; Emmons, 1986; Gollwitzer, 1996; Latham & Locke, 1991). Many social cognitive theories used to examine health behaviours consider only thoughts and affect specific to the targeted behaviour (e.g., health belief model; Rosenstock, 1974; theory of planned behaviour, Ajzen, 1985). However, examining a single goal-directed behaviour without acknowledging the possible concurrent influence of other valued goals and their management by individuals may oversimplify the self-regulation needed in daily life.

It is commonly accepted in the self-regulation literature that people are active agents in personal behaviour change (Bandura, 1997). Humans organize, plan, and make decisions in order to make progress towards attaining their goals. Self-regulatory processes have been defined as those “mental and behavioral processes by which people enact their self-conceptions, revise their behavior, or alter the environment so as to bring about outcomes in line with their self-perceptions and personal goals” (Fiske & Taylor, 1991, p. 181).

Self-efficacy theory (SET; Bandura, 1997) suggests that efficacious beliefs are one possible social cognitive mechanism that can influence self-regulation. Self-efficacy is situation-specific and concerns confidence in personal skills and abilities to achieve specific outcomes. Self-regulatory efficacy (SRE), which includes, but is not limited to, one’s confidence in his/her skills and abilities to self-monitor, goal set, schedule and prevent relapse, is considered critical in encouraging the self-regulatory actions and persistence necessary for exercise adherence

(Bandura, 2004; Maddux, 1995; Woodgate, Brawley, Weston, 2005). SET propositions regarding self-regulation and self-efficacy suggest that successful *concurrent management of activities*, including exercise, would require SRE.

Goals and perseverance are also important self-regulatory variables housed within SET (Bandura, 1997). Goals can be viewed as incentives that provide motivation for behaviour change, whereas perseverance, or persistence, reflects the striving and effort needed to attain the goal (Austin & Vancouver, 1996). A plethora of research has been devoted to goal setting and its relation to self-regulation (see Latham & Locke, 1991; Locke & Latham, 2002), while less research has focused on perseverance. Although we acknowledge the import of the numerous goal setting factors that may be related to self-regulation, the primary focus of the present study was SRE and perseverance. Reference to goals in the present study pertained to internally-set, challenging standards and the behaviour associated with managing the goal(s).

In day-to-day circumstances, where individuals need to concurrently attend to more than one goal, self-regulation of exercise does not occur in isolation. Rather, exercise must be managed in conjunction with other valued activities, such as family and work. The thoughts about and value of these other activities as well as the time spent managing them may influence individuals' exercise behaviour in direct and indirect ways. Surprisingly few studies have considered the *concurrent* influence of valued activities (e.g., academics, family) on exercise behaviour, and how individuals self-regulate when these activities vie for time and attention. Specifically, we are aware of just three studies that have examined exercise goals along with other personally-important goals (Gebhardt & Maes, 1998; Karoly et al., 2005; Li & Chan, 2008).

In a cross-sectional study involving nursing home staff, Gebhardt and Maes (1998) introduced the concept that personal goals may prevent one from exercising. A list of 16 “personal goals” created by the researchers (e.g., doing household chores, watching TV) was presented to participants. Participants were asked to rate, for each goal, how disturbed they would be if they could not attain this goal because the time needed to achieve it was used for exercising. The researchers found that participants exercising 3 or more times per week anticipated less interference, or competition, than sedentary participants, and concluded that “any theoretical model of exercise behaviour should take into account the influence of competing personal goals on the initiation and continuation of exercise during leisure time” (pg. 755).

In a study examining intention stability and goal conflict as moderators in the intention – behaviour relationship, Li and Chan (2008) assessed goal conflict by asking university students how much conflict they anticipated occurring between exercise goals and self-selected personal goals. While Li and Chan improved upon the applicability of Gebhardt and Mae’s work (1998) by allowing participants to self-select their non-exercise goals, both studies did not provide participants with the opportunity to discuss whether goals could positively enhance each other.

Li and Chan concluded that when goal conflict was high, intention stability led to weaker intention – behaviour relations as compared to when goal conflict was low. This three-way interaction provided important information for future work with the theory of planned behaviour, however the applicability of these findings should be considered. Given that most individuals in a typical day will always have valued goals other than exercise (e.g., family, work), and thus always deal with goal conflict, it is imperative to learn how to deal with concurrent life goals, and how to circumvent conflict.

Karoly and colleagues (2005) asked undergraduate students to define their most important exercise goal, and the goal that most *interfered* with that exercise goal. For each goal, participants subsequently completed Karoly's goal systems assessment battery (GSAB, 1995), which measured value, task self-efficacy, social comparison, self-monitoring, planning, self-reward, self-criticism, and positive and negative arousal. Participants were dichotomized as either "irregular exercisers" or "regular exercisers" based on their self-selected single-item response to a stages of change measure. The researchers found that *irregular* exercisers valued, monitored, planned, socially compared, and self-rewarded their progress towards their interfering goal more than their exercise goal. *Regular* exercisers tended to have equivalent self-regulatory focus towards both goals. While this study introduced the concept of examining cognitions and self-regulatory skills for exercise and for a goal that may interfere with exercise, the *concurrent management* of goals and related social cognitions were not assessed. Karoly et al. (2005) were in agreement with Gebhardt and Maes (1998), in that they concluded "a dual focus on exercise goals and their aspirational rivals may inform motivational theory and intervention" (p. 427).

Several research questions were inspired from the limited research available on goals that may influence exercise behaviour:

1) What differentiates individuals who are more effective at managing both exercise and other valued goals in their lives, from those who are less effective? Karoly and colleagues (2005) introduced the concept of self-regulation in their work on multiple goals. Given what is known about the import of self-efficacy in the self-regulation process, SET was used as the framework for the present study. Thus, this primary research question was made more specific: Can constructs housed within SET differentiate individuals who are active enough to achieve health benefits from those who are not active enough to achieve these benefits?

2) Can the concurrent management of two valued goals be *perceived* as having a positive influence on one another, or are they always perceived to have an interfering influence? The existing research on concurrent goals has failed to examine this possibility.

3) Is self-regulatory efficacy, rather than task self-efficacy (as was used in Karoly et al., 2005 study), the more appropriate self-efficacy belief to assess when examining the self-regulation of concurrent goals?

These questions led to the study objectives for the present investigation. Specifically, the main objective was to understand the relationships between individuals who are active enough to achieve health benefits (frequent exercisers) from those who are not active enough to achieve health benefits (less frequent exercisers) and their goals, efficacy beliefs, persistence, and values for two different, valued activities in their lives. To address this objective, social cognitive variables housed in self-efficacy theory (SET; Bandura, 1997) were used to discriminate between more frequent and less frequent exercisers, as defined by the current ACSM exercise guidelines (2007).

It was hypothesized that concurrent SRE, intentions to be physically active (as a crude measure of an exercise goal), value of goals, and persistence would successfully discriminate frequent exercisers from less frequent exercisers (hypothesis 1). Exercising frequently enough to achieve health benefits does not guarantee effective concurrent management of exercise and other life goals. However, it was argued that those who were able to manage exercising at the recommended frequency without compromising time spent on their other valued goals would be more successful at self-regulating concurrent goals than their less successful counterparts.

A secondary objective for this study was to gain insight about the nature of influence that exercise and other valued goals are *perceived* to have on one another when concurrent

management is demanded in daily life. To address this objective, self-regulatory efficacy to manage concurrent goals (from herein referred to as concurrent SRE) and the perceived management of two valued goals within the same relative time frame were examined.

Four hypotheses were made specific to this secondary objective (hypotheses 2 through 5). First, based on selective findings by Karoly and colleagues (2005), more frequent exercisers were hypothesized to hold greater value for their exercise goal than less frequent exercisers, but both groups of exercisers would hold equal value for their nonexercise concurrent goal (hypothesis 2). The third hypothesis was based on SET and the specificity Bandura suggests is crucial when examining efficacy. More frequent exercisers were hypothesized to hold stronger concurrent SRE beliefs than their less frequent exercise counterparts. SET also posits that stronger self-efficacy is associated with greater persistence towards the behaviour associated with the efficacious beliefs. Thus, in hypothesis 4, it was proposed that more frequent exercisers would also report greater persistence towards concurrently attaining both goals than less frequent exercisers. The fifth and final hypothesis was exploratory in nature: more frequent exercisers were hypothesized to perceive the management of their valued goals as positively challenging, while less frequent exercisers would perceive this management as more interfering.

## 2.1 Method

This protocol was approved by the University of Saskatchewan's Research Ethics Board (see Appendix A).

### *2.1.1 Participants and Design*

Three hundred and thirty-six adults (mean age = 24.86 years,  $\pm 8.7$ , 66% women) from a university campus were recruited to participate in this cross-sectional, web-based questionnaire study. Advertisements were placed on the university's home webpage and verbal announcements

requesting volunteers were made in undergraduate lectures and fitness classes. Eligible criteria included being between the ages of 18 and 45 years, currently engaging in or attempting to engage in exercise at least 3 times per week, and free of any health restrictions or injuries that may impede exercise.

### 2.1.2 Measures

See Appendix B for all Study 1 measures.

*Demographics questionnaire.* Information regarding participants' age, gender, and occupation was assessed for descriptive purposes.

*Goals.* To elicit specific goals that were of high personal value and necessitate self-regulation (operationalized as “goals that require various steps, or actions, in order for the goal to be achieved”), participants were asked to enter their most important academic/work, social, family, and fitness goals. Following each open-ended goal response, participants were asked to provide a value for each respective goal on a 1 (*do not value this goal at all*) to 9 (*value this goal very much*) point Likert scale (see Table 1). Third, participants were asked to report, in hours per week, how much time they anticipated spending on tasks that would help them achieve their academic/work, social, family, and fitness goals, respectively. Finally, participants were asked to choose “your one most valued *non-exercise* (academics/work, social, or family) goal that requires the greatest effort to manage along with exercise.” Academics was reported to be the most important non-exercise goal for the majority of the study population (62.8%), with family goals being the second most commonly reported (15.4%). For all subsequent questions pertaining to the concurrent management of exercise, participants were asked to refer back to this “other important non-exercise goal.”

*Perceived management of concurrent goals.* To assess the possibility that multiple valued goals could be seen as being on a continuum of positively enhancing through to completely conflicting, the anchors for this scale were polar opposite. In this manner, participants could report the extent to which they felt their other important non-exercise goal and exercise goal either interfered with (consistent with past literature) *or* enhanced each other. The single item response scale utilized a 1 (*counterproductive and interfere with each other*) to 9 (*positively enhance each other and can accomplish both*) point Likert scale.

*Exercise activity.* The Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985) was modified and required participants to report the number of 30-minute bouts of mild, moderate, and strenuous exercise in which they engaged during the past week. Given the current ACSM exercise guidelines (Haskell et al., 2007) do not include mild forms of exercise, and the study purpose was based on these guidelines, mild exercise was not used in any analyses. The original measure has demonstrated acceptable reliability, with test-retest reliability scores of .74 and .81 having been demonstrated in a healthy adult sample (Godin & Shephard, 1985). Further, the original measure demonstrates convergent validity with objective physiological measures of fitness (e.g., VO<sub>2</sub> max, body fat; Godin & Shephard, 1985) and energy expenditure (kcal estimates; Miller, Freedson, & Kline, 1994).

*Exercise intentions.* Participants stated their intentions for exercise over the next week by indicating the number of days per week in which they planned to be physically active for thirty minutes or more at a i) moderate and ii) strenuous level. The sum score of these two items was used in subsequent analyses. This methodology was consistent with suggestions by Courneya and McAuley (1993), and has been used previously in published research to study exercise intentions (e.g., Dawson, Brawley, & Maddux, 2000; Shields & Brawley, 2006).

*Concurrent self-regulatory efficacy (Concurrent SRE).* To assess confidence in abilities to concurrently regulate their exercise goals *along with* their other important non-exercise goal, participants were first asked to think about “concurrently managing exercise *with* your other most important non-exercise goal.” Participants were then asked to rate their confidence to engage in five self-regulatory behaviours used to manage *both* goals over the next week on a 0 (*not at all confident*) to 100% (*extremely confident*) Likert type scale. The specificity with which the time course and action of the 5 items were created was in accordance with recommendations (Bandura, 1997; McAuley & Mihalko, 1998). Example items included: “During the next week, how confident are you in your ability to accurately monitor your time so that your progress for both your exercise goal and your other important non-exercise goal is effective?”, and “During the next week, how confident are you in your ability to make up for any missed sessions for both your exercise and your other important non-exercise goals.” Each participant’s average score for the 5 items was calculated and used in subsequent analyses. The scale was internally consistent at an acceptable level (Cronbach’s  $\alpha = .95$ ; Tabachnick & Fidell, 2001).

*Perseverance.* Participants were asked to rate their perseverance with respect to attaining and/or working towards both their exercise and other most important non-exercise goals. Specifically, participants were asked to respond on a perseverance scale of four items – how much time, effort, persistence, and attention they would be willing to put forth in order to pursue both their most important non-exercise and exercise goals over the next 7 days. Responses to each of the four items were recorded on a 1 (*little to none*) to 9 (*as much as it takes*) point Likert scale, with higher scores indicating greater perseverance. Participants’ average scores for all 4 items were calculated and used in subsequent analyses. The internal consistency of the scale was deemed acceptable (Cronbach’s  $\alpha = .95$ ; Tabachnick & Fidell, 2001).

### 2.1.3 Procedure

As recommended by Tabachnick and Fidell, (1996), attainment of sufficient power for discriminant function analyses (DFA) was ensured by recruiting more than 200 participants. All eligible and interested volunteers provided the researcher with their email address. Participants were then emailed a link to the online study questionnaire. Participants were required to read and indicate consent on the online consent form before accessing the study questionnaire.

## 2.2 Results

### 2.2.1 Data Management and Screening

Data management strategies were used to address missing data, the presence of outliers, and to assess normality in all three studies. To avoid redundancy, these strategies are described in detail here and only summarized in Studies 2 and 3.

*Missing data.* In accordance with Tabachnick and Fidell's recommendations (2001), missing data accounting for less than 5% of any particular scale, which was also random, was addressed by replacing missing item(s) with that participant's mean for the items on the remainder of the scale. Participants leaving single-item scales (e.g., gender) missing were not excluded from the analyses, but rather their missing single-item value was left blank. No instances of missing responses that exceeded 5% of the scale were observed.

*Outliers.* The procedures outlined by Tabachnick and Fidell (2001) were followed when detecting, assessing impact, and adjusting for outliers. Outliers were visually and statistically identified by using the benchmark of a standardized score greater than 3.29 ( $p < .001$ ) away from all other scores for that specific variable. All outliers were tested for impact on the results and assessed as potential multivariate outliers. As outlined by Tabachnick and Fidell (2001; pg. 70), when the sample size is large, "a few standardized scores in excess of 3.29 are expected." If

deletion of first-identified outliers led to other cases becoming extreme, Tabachnick and Fidell suggest not adjusting later-identified outliers if they do not influence results. In other words, analysis procedures were conducted again after deleting the later-found, potentially influential outlier, and if results did not change, the outlier remained as part of the distribution. Outliers that were noted to be the cause for any multivariate outliers (detection via Mahalanobis distance score of  $p < .001$ ) were deleted. Outliers that were influential on results were transformed according to the skewness and kurtosis of the variable to minimize their impact. If the transformations did not eliminate the outlier, the outlier was replaced with a score that was one standard deviation larger or smaller than the next most extreme score.

*Testing of assumptions.* All data assumptions were tested in accordance with Tabachnick and Fidell's recommendations (2001). Unless otherwise stated, assumptions underlying the use of a multivariate analysis of variance (normality, homogeneity of variance-covariance matrices, linearity, reliability of covariates, multicollinearity, homogeneity of regression) were met. Likewise, assumptions underlying the use of a) multiple regression (ratio of cases to independent variables, outliers, multicollinearity and singularity of independent variables, normality, linearity, homoscedasticity, and the independence of residuals) and b) discriminant function analysis (ratio of cases to independent variables, outliers, normality, homogeneity of variance-covariance matrices, linearity, multicollinearity and singularity of independent variables) were not violated unless otherwise stated.

### 2.2.2 Descriptive Statistics

A total of 474 volunteers visited the study website and provided informed consent. Three hundred and thirty-six of these individuals (71%) provided informed consent and completed the

questionnaire. Of these 336 participants, 87% were students at the university, 66% were female, and the mean age was 24.86 years ( $\pm 8.7$ ).

In order to categorize participants as more or less frequent exercisers, the 2007 American College of Sports Medicine (ACSM) and American Association of Cardiologist's exercise guidelines (Haskell et al., 2007) were used. Accordingly, participants engaging in 5 or more 30 minute bouts of moderate and/or vigorous activity per week *or* at least 3, 30 minute bouts of vigorous exercise were considered "more frequent" exercisers. Individuals who reported performing 3 or less 30 minute bouts of moderate and vigorous activity (with less than 3 of these bouts being vigorous) were categorized as "less frequent" exercisers. Using this categorization, 106 participants (31.5%) were classified as less frequent exercisers and 230 participants (68.5%) were classified as more frequent exercisers. A multivariate analysis of variance (MANOVA) confirmed that there were no demographic differences (e.g., age) between more and less frequent exercisers,  $F(3, 331) = .82, p = .48, \eta^2 = .01$ .

### *2.2.3 The Discrimination of Frequent and Less Frequent Exercisers*

In accordance with my main objective and hypothesis 1, a discriminant function analysis (DFA) was conducted in order to discriminate between more and less frequent exercisers using social cognitive variables housed within SET (Bandura, 1986). Of particular interest was the relation of the variables pertinent to holding concurrent goals (value of goals, intentions as a measure of goals, SRE, persistence) to this discrimination. Value of participants' most important non-exercise and exercise goal, concurrent SRE, persistence, and exercise intentions were entered into the DFA. These five variables correctly classified 76.7% of the study sample ( $\omega = .75, \chi^2 = 94.45(5), p < .001$ ) to their respective groups, with the predictors of intentions and concurrent SRE making the greatest contribution to the overall function (standardized canonical

discriminant function coefficients, .79 and .28, respectively; functions at group centroids, -.85 and .39, respectively).

#### 2.2.4 Social Cognitive Differences Between Frequent and Less Frequent Exercisers

While the discrimination of the groups was one study objective, a determination of whether the activity groups differed on all of the variables pertinent to the perception of holding concurrent goals was also of interest. To test hypotheses 2 through 5, a one-way between groups omnibus MANOVA was first performed to detect any differences between groups for the multiple dependent variables. Recall that the between-groups variable was meeting or not meeting ACSM recommended levels of regular exercise (those who met the recommendations were classified as *more frequent exercisers*, those who failed to meet the recommendations were classified as *less frequent exercisers*), and the dependent variables were value of non-exercise goal, value of exercise goal, concurrent SRE, persistence, and perception of interference/challenge of goals. The omnibus test was significant,  $F(5, 324) = 8.81, p < .001, \eta^2 = .12$ .

A follow-up univariate ANOVA was subsequently performed on each of the dependent variables. The means are reported in Table 2. *Hypothesis 2* was supported in that the value of participants' non-exercise goal was not significantly different between groups, but the value of the exercise goal was significantly higher for the more frequent exercisers,  $F(1, 328) = 3.17, p = .08, \eta^2 = .01$  and  $F(1, 328) = 18.68, p < .001, \eta^2 = .05$ , respectively. *Hypothesis 3* was supported in that more frequent exercisers reported significantly higher concurrent SRE than their less frequent exercise counterparts,  $F(1, 328) = 36.39, p < .001, \eta^2 = .10$ . *Hypothesis 4* was also supported. More frequent exercisers reported significantly higher persistence for concurrently managing both valued goals than their less frequent exercise counterparts,  $F(1, 328) = 27.15, p$

$< .001, \eta^2 = .08$ . *Hypothesis 5* was supported in that more frequent exercisers perceived the concurrent management of both valued goals as more challenging and achievable than their less frequent exercise counterparts, who perceived such concurrent management as more interfering,  $F(1, 328) = 7.93, p = .005, \eta^2 = .02$ .

Table 1

*Descriptive Statistics on More and Less Frequent Exercisers' Goals*

	MORE FREQUENT EXERCISERS (n = 226)		LESS FREQUENT EXERCISERS (n = 104)	
	<i>M/Mode</i>	<i>SD/Frequency</i>	<i>M/Mode</i>	<i>SD/Frequency</i>
Value of most important non-exercise goal	8.31	1.06	8.08	1.19
Time spent on non-exercise goal*	40 or more hours/week	24.6%	40 or more hours/week	25.9%
Value of exercise goal	7.50**	1.30	6.76**	1.70
Time spent on exercise goal*	4-6 hours/week	30.3%	1-3 hours/week	42.0%

Note: \* Time spent on goals was assessed categorically in 3 hour/week blocks of time (range from 0 to 40 or more hours/week). The values for time spent on goals (range from 1 to 9) represent the mode and its associated frequency.

\*\* Denotes significant difference between more and less frequent exercisers at  $p < .01$ .

Table 2

*Descriptive Statistics on More and Less Frequent Exercisers' Social Cognitions*

	MORE FREQUENT EXERCISERS (n = 230)		LESS FREQUENT EXERCISERS (n = 106)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Perceived management of concurrent goals	6.08*	1.89	5.40*	2.05
Exercise activity last week	10.60*	6.00	2.11*	1.46
Exercise activity intentions for next week	8.66*	4.84	3.96*	2.53
Concurrent SRE	67.39*	18.80	53.04*	23.48
Perseverance	7.04*	1.38	6.08*	1.78

Note: \* Denotes significant difference between more and less frequent exercisers at  $p < .01$ .

Possible mean scale ranges: Perceived management of concurrent goals was 1

*(counterproductive and interfere with each other)* to 9 *(positively enhance each other and can*

*accomplish both)*; concurrent self-regulatory efficacy (SRE) was 0% (not at all confident)

to 100% (extremely confident); perseverance was 1 (little to none) to 9 (as much as it takes).

Exercise activity last week refers to the sum number of strenuous and moderate bouts of exercise

which participants reported engaging during the last 7 days. Exercise activity intentions for next

week refers to the sum number of strenuous and moderate bouts of exercise participants

anticipated intending to engage in during the next 7 days.

## 2.3 Discussion

Little attention has been placed on how exercise and other valued life goals may directly or indirectly influence one another by virtue of an individual's self-regulatory attempts to concurrently manage both. One theoretical backdrop for the examination of self-regulating concurrent goal-relevant behaviour is self-efficacy theory (Bandura, 1997). The present study attempted to take a first step towards understanding the concurrent management of multiple goals among individuals who exercised frequently (i.e., sufficient enough for health benefits) and those who did not.

Examining differences in how the management of concurrent, highly valued, discretionary goals is perceived, as well as differences in self-regulatory social cognitions that exist between more and less frequent exercisers may offer some insight into the thought processes needed to exercise when concurrently pursuing other valued life goals (Li & Chan, 2008). Of particular importance in this examination was that a specific aspect of self-regulation was addressed: self-regulatory efficacy when attempting to carry out exercise activity in the challenging circumstances of accomplishing more than one valued life goal. Self-efficacy theory posits self-regulatory efficacy as the critical belief in understanding persistent behaviour in the face of challenges (Bandura, 2004; Maddux & Gosselin, 2003), although this has rarely been empirically demonstrated (Woodgate, Brawley, & Weston, 2005). Evidence in the current study of an association between self-regulatory efficacy and exercise, whilst concurrently attempting to satisfy another valued life goal, offers important information to the exercise literature.

The first objective of the present study was to assess whether constructs from self-efficacy theory (Bandura, 1997), specifically, self-regulatory efficacy and goal-related constructs, could differentiate between more frequent (active enough to achieve health benefits)

and less frequent (not active enough to achieve health benefits) exercisers. The examination of this objective indicated that a function including these variables successfully discriminated the more frequently active individuals from the less frequently active individuals. The second study objective was addressed by examining perceptual differences between more and less frequent exercisers with respect to the value of their goals, concurrent self-regulatory efficacy, perseverance, and perceived difficulty of managing concurrent goals. Consistent with Karoly and colleague's (2005) findings, the results indicated that more frequent exercisers valued their exercise goal significantly more than less frequent exercisers, yet valued their non-exercise concurrent goal just as much as their less frequent exercise counterparts.

The time spent on both goals was also assessed and seems to correspond to the value of goals for individuals in both groups (see Table 1). While both groups appeared to spend equal amounts of time on their *non-exercise goal* (~40 hours or more per week), the more frequent exercisers spent more time per week on their exercise goal (4-6 hours/week) than the less frequent exercisers (1-3 hours/week).

Taken together, the goal value and time-spent-on-goal findings suggest that lack of time cannot be used to explain differences between the two groups' exercise behaviour. These findings may suggest that the more frequent exercisers were better able to self-regulate exercise into their already busy schedule. However, this speculation requires further theory-driven research to examine, as implied in this speculation, if self-regulatory efficacy is indeed a mediator between concurrently occurring goals and behaviour.

Self-efficacy theory (SET; Bandura, 1997) posits that individuals with higher efficacy beliefs regarding accomplishing a specific task will be more likely to persevere with the task, and will therefore be more likely to achieve their personal goal. In line with this prediction, the

present findings demonstrated that individuals who met the ACSM exercise guidelines had significantly higher levels of self-regulatory efficacy to manage concurrent, highly valued goals, as well as perseverance to achieve both types of goals, than individuals who failed to meet the guidelines.

The present study also examined the extent to which individuals' concurrent pursuit of an exercise goal with their most important, non-exercise goal was perceived to be positively enhancing or interfering and disruptive. Interestingly, individuals who were exercising more frequently perceived the pursuit of concurrent goals more positively (i.e., positively enhance and can accomplish both) than did those who were not exercising as frequently (i.e., counterproductive and interfering). This finding contrasts with previous literature examining multiple goals, which have assumed that the existence of more than one goal at a time is burdensome to an individual (Gebhardt & Maes, 1998; Li & Chan, 2008; Karoly et al., 2005) and detracts from regular exercise behaviour.

One application of Parkinson's Law is "If you want something done, give it to a busy person" (cf., "Work expands to fill the time available for its completion.," Cyril Northcote Parkinson [1909–1993]). This law suggests that more than one goal can be pursued at the same time as another. Indeed, pursuing multiple, highly valued personal goals during the same time frame may elicit the necessary self-regulatory skills that aid individuals to achieve goals in effective fashion. We can all likely recall, for example, high school athletes who were also top honours students, and participated in extra-curricular activities, such as music or dance in their "spare time". Some people are willing to juggle multiple goals and are successful in doing so, while others seem less willing and less prepared to accomplish this. What means do successful people have that allows them to do many things concurrently? Self-efficacy theory (Bandura,

1997) would suggest that past performance accomplishments at managing concurrent goals bolsters related self-regulatory efficacy, which in turn, increases perseverance and optimism about managing multiple goals at once. Self-regulatory efficacy may be a potential mediator between concurrently pursued goals and the behaviour toward each goal. This possibility is an objective to be answered by future research.

### *2.3.1 Strengths and Limitations*

Relatively little work in the exercise literature has acknowledged that the pursuit of an exercise goal rarely occurs in isolation. The present study was novel in that it explored the association between concurrently pursued goals and social cognitions and whether these variables discriminated between the more and less frequently active. In addition, this was the first study in the exercise psychology domain that used a measure of concurrent self-regulatory efficacy (i.e., confidence to concurrently self-regulate multiple valued goals) to predict exercise behaviour.

A number of contributions were made to the literature based upon the methods and suggestions of Karoly and colleagues' study (2005). First, Karoly et al.'s measure of exercise behaviour was replaced with the validated Godin leisure time assessment of exercise. In turn, the use of this measure was coupled with the dichotomization of participants into activity level groups based on recommendations of levels sufficient for health benefits (Haskell et al., 2007), which improves upon the applicability of the findings. Similarly, the measure of task self-efficacy used by Karoly et al. (2005) was replaced with self-regulatory efficacy to concurrently manage valued life goals. This contribution was a measure aimed to be more pertinent to the self-regulation of exercise behaviour in a typical busy life where individuals concurrently pursued other valued goals.

A third contribution was the examination of participants' perceptions of how positively enhancing versus interfering concurrently pursuing valued goals was. This measurement offered an opportunity to scale the concurrent management of goals as perceived by participants, rather than assuming that their goals interfered in a negative manner. Finally, more information was obtained regarding the actual value of goals and length of time spent on such goals. This quantitative contribution to the study afforded the opportunity to compare activity groups on time spent and value of goals, rather than assuming that more active individuals place greater value and spend more time on exercise goals than less active individuals.

Although we were able to demonstrate support for self-efficacy theory (Bandura, 1997) propositions, one of the limitations of the present study was that the cross-sectional design did not permit examining directionality of the relationships reported. Further, exercise behaviour was assessed via participants' self-reports. Some forms of self-report are known to be biased. However, this form of exercise measurement has been shown to be stable (Baranowski, 1988), valid in relation to physiological assessments of energy expenditure (Schechtman, Barzilai, Rost, & Fisher, 1991), and is currently acknowledged as the standard in behavioural studies that involve larger research samples (Gebhardt & Maes, 1998). Finally, generalizability of these findings, outside of the healthy, student population, cannot be ascertained from the present data.

Future research in this area could examine the directionality of the relationships between self-efficacy theory and goal-related constructs and exercise behaviour. Given the social cognitive differences noted here between more and less physically active individuals, it may be informative to assess the prospective utility of concurrent self-regulatory efficacy and other social cognitions related to managing multiple life goals in predicting and/or mediating exercise behaviour. Similarly, now that it has been demonstrated that valued, non-exercise goals are not

*always* perceived to interfere with exercise goals, gaining a better understanding of what role this perceived outlook may play in explaining exercise behaviour may aid future interventions.

## **STUDY 2. CONCURRENT SELF-REGULATORY EFFICACY AS A MEDIATOR OF THE GOAL - EXERCISE BEHAVIOUR RELATIONSHIP: A TEST IN CHALLENGING CONDITIONS**

Regardless of the population studied, one of the most frequently reported barriers to engaging in regular exercise is lack of time (Booth, Bauman, Owen, & Gore, 1997; Courneya, Friedenreich, Quinney, Fields, Jones, Vallance, et al., 2005). The implication that follows from this commonly reported obstacle is that people may be busy doing other activities that compete or take precedence over exercise, such as fulfilling family needs, school responsibilities, and work tasks. Indeed, Gebhardt and Maes (1998) found a strong negative correlation between other valued life tasks and exercise frequency, such that those who expected a higher number of personal goals to compete with exercise were less active than those who did not expect as much competition. Much of the exercise literature has focused on identifying barriers to exercise (e.g., Trost et al., 2002), with little attention being paid to goals that may concurrently consume an individuals' time (i.e., family, work). These goals, or concurrent activities, may demand self-regulation and consequently influence exercise behaviour.

Self-efficacy theory (SET; Bandura, 1997) posits self-regulatory efficacy as a seminal determinant of whether an individual will engage in a motivated behaviour. Bandura argues that people use forethought to consider what outcomes would result if certain actions are undertaken. In turn, individuals use the action-outcome information to subsequently decide which goals to set for themselves. Given adequate incentives associated with the goal(s) and confidence in personal abilities, people then plan subsequent courses of action likely to produce desired outcomes (Bandura, 1997). The utility of exercise-specific self-regulatory efficacy in predicting exercise behaviour has been demonstrated elsewhere (e.g., Woodgate et al., 2005). In Study 1 of this

dissertation, differences existed between individuals active enough to achieve health benefits and individuals who were not active enough to achieve health benefits with respect to their confidence to perform self-regulatory skills to *concurrently* manage multiple, valued goals (i.e., concurrent self-regulatory efficacy). This was the first study in the exercise literature that took into account valued, concurrently held goals people have whilst examining self-regulatory efficacy and exercise behaviour. However, research about the *mechanisms* that influence the concurrent self-management of behaviours is still lacking (Baranowski, Anderson, & Carmack, 1998; Bauman, Sallis, Dzewaltowski, & Owen, 2002; Lewis, Marcus, Pate, Dunn, 2002).

In behavioural science research, mechanisms are frequently referred to as mediators. Mediators can be simply defined as variables that explain the relation between a predictor and an outcome (Baron & Kenny, 1986, Bauman et al., 2002). With respect to the self-regulation of concurrent, valued goals, research pertaining to the identification and function of mediators could provide further insight into the relationship between holding a valued goal and subsequent changes in exercise behaviour. Knowledge of the mechanisms, or mediators, is required in order to develop interventions that can effectively manipulate the self-regulatory actions and cognitions that result in measurable changes in exercise behavior (Baranowski et al., 1998; Lewis et al., 2002).

Potential mediators proposed by theory must be formally tested and examined prior to inclusion in any intervention. According to the tenets of SET, self-regulatory efficacy should act as a mediator when examining exercise in conjunction with other valued life goals. Specifically, self-regulatory efficacy should function as a mediator between holding a goal and pursuing goal-related behaviours. SET argues that a certain level of self-regulatory efficacy is required before one purposely engages in the outcome behaviour, and that one must have a goal in the first place

before self-efficacy towards goal-related behaviour is established (Bandura, 1997; 2004). Stated differently, having a goal may not ultimately lead to acting upon that goal unless the necessary efficacy to do so is present. Further, it has been argued that self-regulatory efficacy becomes even more critical in the face of challenging circumstances (Bandura, 1997; Maddux, 1995). Therefore, the probability of detecting a mediator may be greater under particularly taxing conditions, when its influence is most critical.

In the academic domain, a challenging set of circumstances related to the pursuit of concurrent goals is the examination period. The demands of finishing course assignments, studying, and writing examinations makes the pursuit of other valued goals (e.g., continuing to exercise) even more challenging than usual. It was thus hypothesized that concurrent self-regulatory efficacy would mediate the relationship between a valued exercise goal and future exercise behaviour during a challenging time of self-regulation for young adults – the university examination period. To confirm that this period was perceived as a challenging, self-regulatory time, perceived difficulty of pursuing concurrent goals was assessed.

#### *Detecting Potential Mediators: Recommendations for Using Hierarchical Multiple Regression*

There are several statistical procedures available that test for potential mediation effects (Fritz & MacKinnon, 2007; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). One method of examining hypotheses about mediation has been to consider relationships between hypothesized variables in the context of a prospective design (Baron & Kenny, 1986). A widely used protocol in behavioural science research recommended by Baron and Kenny (1986) for the purpose of examining mediation is hierarchical multiple regression (HMR). This procedure will be outlined in the subsequent analytical methods section of this study.

It has been noted that despite the wide-spread use of the Baron and Kenny (1986) method in detecting mediation (MacKinnon et al., 2002), very few studies ensure that all recommended procedures are followed (Frazier, Tix, & Barron, 2004; Lewis et al., 2002; Preacher & Hayes, 2004). Frazier and colleagues (2004), for example, argue that there is much room for improvement in the literature when designing and conducting studies that have the detection of mediation as an objective. Many studies use cross-sectional designs where no temporal order of assessment driven by theory is considered. In such cases, the relationships between predictor and outcome and mediator and outcome variables have no theoretical basis for organizing the mediation hypotheses. A valuable checklist has been developed to assist researchers who use multiple regression to test for mediation (Frazier et al., 2004). The list addresses 13 criteria that can affect detection and interpretation of a mediator. Frazier and colleagues suggest that, although any single study might not satisfy all criteria, satisfying a broad array of these criteria when attempting to test for mediation will offer a substantial improvement over many of the published studies that do not use any.

While the main objective of the present study was to examine concurrent self-regulatory efficacy as a potential mediator of the valued goal – exercise relationship, a related, secondary objective was to conduct this examination using as many of the Frazier et al.'s (2004) and MacKinnon et al.'s (2002) recommendations as possible (within the limits of study design).

Failure to detect mediation can be caused by failure to capture changes in the mediator (Baron & Kenny, 1986). The selection of appropriate measurement time points is thus essential when testing for mediation. No previous research could be found that suggested when potential mediation may be occurring during the examination period. I thus measured the mediator at more than one time point in attempts to capture any possible changes. Given that the present study

prospectively assessed social cognitions over a period of examinations, whereby participants could be experiencing varying rates of self-regulatory challenges throughout, multiple measurements were taken during this challenging time. Having multiple assessments of variables allowed for more than one examination of mediation. As well, the data obtained at more than one time allowed for a determination of whether any mediation effects were reliably detected. In other words, does concurrent self-regulatory efficacy *reliably* mediate the relationship between value of an exercise goal and exercise behaviour when examined at more than one point during a period of challenging concurrent management? This question was examined as a related, secondary interest to the main hypothesis about mediation.

### 3.1 Method

This protocol was approved by the University of Saskatchewan's Research Ethics Board (see appendix C).

#### 3.1.1 Design and Participants

This study used a prospective observational design of four weeks duration, whereby measures were taken once per week for one month. While three prospective time points are needed to examine mediation, four assessment time points were taken (once per week) to allow for two opportunities to identify when hypothesized mediators might be functioning (e.g., between weeks 1, 2, and 3, or weeks 1, 3, and 4). A total of 405 university students initiated participation by visiting the study website after an advertisement was placed on the university's home webpage. Eligibility criteria for entry to the study were as follows: i) between the ages of 18 and 45 years, ii) currently enrolled in university classes, which had December examinations, iii) currently had exercise and academic goals that were valued/considered important in life, and iv) free of any health restrictions or injuries that prevented engaging in exercise.

### 3.1.2 Measures

See Appendix D for all Study 2 measures.

*Demographics questionnaire.* Information regarding participants' age, gender, and number of upcoming exams was gathered at Week 1 only.

*Goals.* To elicit specific goals that require self-regulation, a goal was operationalized as “an objective we try to accomplish by engaging in specific behaviours”. Participants were first asked to write down the most valued academic and exercise goal that they wanted to achieve over the next month. Next, participants provided a value for each respective goal on a 1 (*do not value this goal at all*) to 9 (*value this goal very much*) point Likert scale. Third, verbatim to Study 1, participants were asked to report, in hours per week, how much time they anticipated spending on tasks that would help them achieve their academic and exercise goals, respectively. Time spent on goals was assessed in the present study to encourage participants to critically consider the time needed to achieve each of their goals (see Table 3).

*Perceived management of concurrent goals.* The present study sought to examine mediation during a particularly challenging time for self-regulating exercise. To confirm that the examination period was such a time, perceived concurrent management was assessed in the same manner as in Study 1. This single item measure assessed the extent to which participants felt their academic and exercise goals conflicted or enhanced each other by asking participants to rate how the management of their goals was perceived using a 1 (*counterproductive and interfere with each other*) to 9 (*positively enhance each other and can accomplish both*) point Likert scale.

*Perceived difficulty.* Similar to perceived management of concurrent goals, perceived difficulty was assessed as a general indicant of the extent to which participants had difficulty in managing exercise and academic goals over the examination period using a single item: “Over

the next 7 days, how difficult do you anticipate it will be for you to balance both academic and exercise goals?" The response scale was a 1 (*no difficulty*) to 9 (*extreme difficulty*) point Likert scale.

*Exercise activity.* The revised Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985) requires participants to report the number of 30-minute bouts of mild, moderate and strenuous exercise in which they engaged during the past week. The original measure is reliable, with test-retest reliability scores of .74 and .81 having been demonstrated in a healthy adult sample (Godin & Shephard, 1985). Further, this original measure demonstrates convergent validity with objective physiological measures of fitness (e.g., VO<sub>2</sub> max, body fat; Godin & Shephard, 1985) and energy expenditure (kcal estimates; Miller, Freedson, & Kline, 1994).

Consistent with the rationale advanced in Study 1 in predicting prospective exercise, and the current ACSM exercise guidelines (Haskell et al., 2007), mild exercise was not examined. Instead, a sum score of the frequency of strenuous and moderate bouts of exercise was computed for each assessment point (week) in the prospective design.

*Concurrent self-regulatory efficacy (Concurrent SRE).* To assess confidence in abilities to concurrently regulate exercise goals along with academic goals, volunteers were first asked to think about "concurrently managing exercise *with* your academic goal." Participants were then asked to rate their confidence to engage in five self-regulatory behaviours used to manage *both* goals over the next week using a 0% (*not at all confident*) to 100% (*extremely confident*) Likert scale. The specificity with which the time course and action of the 5 items were created is in accordance with recommendations for measurement expressed by Bandura (1997) and by McAuley and Mihalko (1998). This measure was also patterned after other published self-regulatory efficacy measures (Woodgate, Brawley, & Weston, 2005), but modified with

reference to concurrent management. Sample items included: “During the next week, how confident are you in your ability to accurately monitor your time so that your progress for both your exercise and your academic activity is effective?”, and “During the next week, how confident are you in your ability to make up for any missed sessions for both your exercise and your academic goals.” Participants’ average score for all 5 items was calculated and used in subsequent analyses. This scale was found to be internally consistent across all 4 assessment points in this study (Cronbach’s  $\alpha = .96, .97, .97, .97$ ; respectively, Tabachnick & Fidell, 2001).

### *3.1.3 Procedures*

A link to the study website was embedded in an online advertisement placed on the university’s home webpage, such that interested men and women could click on the link and confirm eligibility immediately. Those eligible were asked to read the letter of information about the study, complete informed consent if they wished to volunteer, and provide their email address for the purposes of both tracking participants’ data throughout the study and sending reminder emails for those participants who had not completed a questionnaire within a specified week of the 4-week study period. Participants were emailed a link to study online questionnaires one week prior to the examination period (time 1), one week into exams (time 2), two weeks into exams (time 3), and one week following exams (time 4). Exercise recall was always assessed for the past 7 days, thus time 4 exercise activity assessed exercise behaviour the week following exams. Volunteers who failed to complete any of the questionnaires within the first day of the link being emailed out were sent a reminder email the subsequent day, asking them to complete the questionnaire in a timely fashion. Participants were only sent the subsequent online questionnaire link if they had completed the previous week’s online questionnaire.

The baseline study questionnaire took approximately 10-15 minutes to complete, and assessed all measures with the exception of perceived difficulty. Participants were thanked for their time and reminded that they were going to be emailed each week for the next 3 weeks with links to the second, third, and fourth questionnaires. The second and third questionnaires took approximately 5 minutes to complete, and assessed perceived management of concurrent goals, perceived difficulty, concurrent SRE, and exercise. The fourth questionnaire took approximately 10 minutes to complete, and assessed all measures with the exception of demographical information. Upon completion of the fourth questionnaire, participants received \$10 dollars remuneration in thanks for their participation.

## 3.2 Results

### *3.2.1 Data Management*

Data management and screening strategies were used to address missing data, the presence of outliers, as well as to test normality and other assumptions pertinent for multiple regressions. These data management procedures were used in all three studies. To avoid redundancy, these procedures were described in Study 1.

The only variables that did not meet assumptions for normality in Study 2 were the self-report exercise variables, as assessed by the GLTEQ (Godin & Shephard, 1985), and value of academic goals. The data for the PA variables at all time points (sum of strenuous and moderate PA for time 1, 2, 3, and 4; respectively) did not meet the assumption of normality, as determined by a) visual assessment of the distribution using frequency histograms, b) expected normal probability plots c) detrended expected normality plots, and d) statistical inferences from skewness and kurtosis statistics.

Although this dataset was considered large enough to be robust to most violations of normality assumptions (Tabachnick and Fidell, 2001), these positively skewed variables were square root transformed to create more conservative, normal distributions and to eliminate outliers. Analyses were performed with both the raw and transformed PA variables. Because the results were not altered when using the transformed variables, and for ease of interpretation, the raw PA data were used in the statistical analyses and are reported here (see Table 4 for the PA descriptive statistics). The significance level for all statistical tests was set at  $p < .05$ .

The value of academic goals variable also did not have a normal distribution, as determined by previously mentioned methods. As suggested by Tabachnick and Fidell (2001), this negatively skewed variable was transformed first by reflecting and then square root transforming the variable. Although this marginally improved the skewness and kurtosis statistics, and decreased the outliers from five to three, it did not permit mean comparisons between value of academic goals and value of exercise goals. Furthermore, the variable “value of academic goals” was not used in any subsequent analyses, and thus was kept in its original, raw format and presented as descriptive data.

### *3.2.2 Descriptive Statistics*

Of the 405 interested volunteers who accessed the time 1 questionnaire, 192 completed all four surveys ( $n = 301$  at time 1,  $n = 248$  at time 2,  $n = 210$  at time 3, and  $n = 192$  at time 4). Volunteers with complete sets of data had a mean age of 21.7 years  $\pm 4.1$ , 3.8 upcoming exams  $\pm 1.2$ , held exercise and academic goals that they valued highly (mean value of exercise goal = 6.5; mean value of academics goal = 8.1, respectively), and 64.7% of the sample was women. Independent samples t-tests confirmed that there were no differences between study adherers and dropouts on any baseline variables. Baseline descriptive statistics for the adherer’s goals and

outcome variables are reported in Tables 3 and 4, respectively. For the purposes of these descriptive statistics, study adherers are those individuals who completed all four assessments.

Table 3

*Baseline Descriptive Statistics on Goals of Adherers*

	(n = 192)	
	<i>M/Mode</i>	<i>SD/Frequency</i>
Value of academic goal	8.06	1.36
Time spent on non-exercise goal*	40 or more hours/week	18.8%
Value of exercise goal	6.52	1.85
Time spent on exercise goal*	4-6 hours/week	33.9%

Note: \* Time spent on goals was assessed categorically in 3 hour/week blocks of time. The values for time spent on goals represent the mode and its associated frequency.

Table 4

*Descriptive Statistics on Social Cognitions and Exercise of Adherers*

	<i>Time 1</i>		<i>Time 2</i>		<i>Time 3</i>		<i>Time 4</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Perceived concurrent management	5.79	2.00	5.52	2.09	5.80	2.08	6.60	1.78
Perceived Difficulty	N/A	N/A	4.46	2.26	5.27	2.33	6.41	2.16
Exercise last week	4.61	3.79	3.96	3.30	3.59	2.97	4.07	3.24
Concurrent SRE	61.02	21.61	57.07	24.08	59.09	23.54	67.05	22.91

Note. N = 192. Study adherers are those individuals who completed all four assessments.

Possible mean scale ranges: Perceived management of concurrent goals was 1

(*counterproductive and interfere with each other*) to 9 (*positively enhance each other and can accomplish both*), perceived difficulty was 1 (*no difficulty*) to 9 (*extreme difficulty*), exercise last week refers to the sum strenuous and moderate bouts of exercise participants reported in engaging in during the last 7 days, and concurrent self-regulatory efficacy (SRE) was 0 (*not at all confident*) – 100% (*extremely confident*).

### 3.2.3 Correlational Analyses

Pearson's bivariate correlation coefficients between the variables examined for mediation at times 1, 2, and 3, and times 1, 3, and 4 are presented in Tables 5 and 6, respectively.

Table 5

*Correlation Matrix of Social Cognitions in Mediation Analyses at Times 1, 2, and 3*

	1	2	3
1. Value of Exercise Goal at Time 1	-		
2. Concurrent SRE at Time 2	.411	-	
3. Exercise at Time 3	.368	.436	-

Note. N = 210. All correlations were significant at  $p < .001$ .

Table 6

*Correlation Matrix of Social Cognitions in Mediation Analyses at Times 1, 3, and 4*

	1	2	3
1. Value of Exercise Goal at Time 1	-		
2. Concurrent SRE at Time 3	.317	-	
3. Exercise at Time 4	.263	.306	-

Note. N = 192. All correlations were significant at  $p < .001$ .

### 3.2.4 Mediation Analyses

In accordance with the Baron and Kenny procedure (1986), the two proposed mediational relationships were tested using a series of prospective, hierarchical multiple regressions to assess whether the following four necessary conditions were met to establish mediation:

Condition 1. The predictor variable must be significantly related to the outcome variable to demonstrate that there was an effect to be mediated, as shown by the solid line labeled Path A in Figure 1.

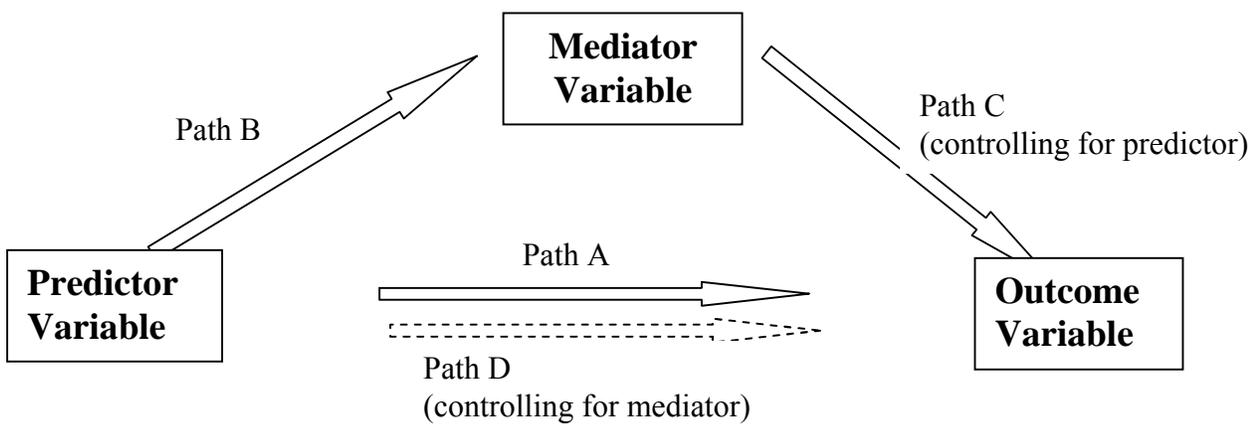
Condition 2. The predictor variable must be significantly related to the mediator, as shown by the solid line labeled Path B in Figure 1.

Condition 3. The mediator must be significantly related to the outcome variable, as shown by the solid line labeled Path C in Figure 1.

Condition 4. The effect of the predictor variable on the outcome variable was eliminated or was reduced when the mediator is controlled for, as shown by the dashed line labeled Path D in Figure 1.

Figure 1

Path Diagram of a Mediated Relationship



The Baron and Kenny procedure (1986) has been criticized for lacking sensitivity to detect small but important mediational changes in small sample sizes, as well as for not verifying the significance of the mediated effect (McKinnon et al., 2002, Preacher & Hayes, 2004). To remedy these criticisms, the present study aimed to recruit the sample size necessary for attaining sufficient power (Fritz & MacKinnon, 2007). In addition, when the possibility of mediation was observed, this effect was examined using a Sobel test, which statistically ascertains whether the detected mediator significantly mediated the relationship between the proposed independent and outcome variables at a level greater than that detected by chance (Preacher & Hayes, 2004).

This study was designed following Baron and Kenny's (1985) and Frazier et al.'s (2004) recommendations for properly testing mediation. Specifically, the following recommendations were followed: a) the research question concerning the variables examined in the mediational relationship was theoretically-driven, b) these variables were temporally distinct in order to preserve the prospective order of the theoretically proposed relationship, c) the mediator proposed is a malleable social cognition with demonstrated adequate reliability (i.e., internal consistency) to ensure measurement error was kept to a minimum, d) the strength of the relationship between the predictor and mediator should be relatively equal (and significant) to the strength of the relationship between the mediator and outcome variables (Baron & Kenny, 1985; Frazier et al., 2004), and this was confirmed before continuing tests of mediation. Finally, all four of Baron and Kenny's suggested steps in testing for mediation were addressed in the statistical analyses and the identification of potential mediators were confirmed with a Sobel test as recommended by Preacher and Hayes (2004) and Baron and Kenny (1985). The Sobel test statistically examines if the reduction in the relationship between the independent variable and dependent variable was significantly reduced after controlling for the hypothesized mediator variable.

*Concurrent SRE as a potential mediator.* Results from the hierarchical multiple regression (HMR) procedures used to examine the mediation of the relationship between value of exercise goal at time 1 – time 3 exercise behaviour by concurrent SRE at time 2 (i.e., the hypothesized mediator) are presented in Table 7. After meeting the necessary criteria for testing mediation, HMR revealed that the relationship between the value of exercise goals at time 1 and exercise behaviour at time 3 was reduced after controlling for concurrent SRE at time 2 (i.e., beta of .37 reduced to .23), but remained significantly different from 0 ( $p = .001$ ; see Table 7). As

explained by Baron and Kenny (1986), this result suggests the presence of partial mediation of the value of the exercise goal – exercise behaviour relationship by concurrent SRE. Partial mediation by concurrent SRE was confirmed by a follow-up Sobel test (*Sobel z* = 4.07, *p* < .001).

Table 7

*Mediation of the Time 1 Exercise Goal– Time 3 Exercise Relationship by Time 2 Concurrent SRE*

Predictor	Criterion	Adjusted R <sup>2</sup>	R <sup>2</sup> Δ	<i>p</i>	β
Value of exercise goal <sup>T1</sup>	Exercise behaviour <sup>T3</sup>	.131		< .001	.37
Value of exercise goal <sup>T1</sup>	Concurrent SRE <sup>T2</sup>	.166		< .001	.41
Concurrent SRE <sup>T2</sup> (controlling for value of exercise goal)	Exercise behaviour <sup>T3</sup>		.094	< .001	.34
Value of exercise goal <sup>T1</sup> (controlling for concurrent SRE <sup>T2</sup> )	Exercise behaviour <sup>T3</sup>		.043	.001	.23

Note. N = 210. T1, T2, and T3 represent the time at which the measure was assessed, and correspond with weeks 1, 2, and 3 of the examination period, respectively.

Mediation could also potentially be observed at a later point in the examination period. Thus, a second mediation analysis was performed with concurrent SRE at time 3 as a potential mediator of the relationship between value of exercise goal at time 1 and time 4 exercise behaviour. Results from HMR analyses are presented in Table 8. The relationship between the value of exercise goals at time 1 and exercise behaviour at time 4 was reduced when controlling for concurrent SRE at time 3 (i.e., beta .263 reduced to .185), but remained significantly different from 0 (*p* = .001; see Table 8). Therefore, partial mediation of the value of the time 1 exercise goal – time 4 exercise behaviour relationship by time 3 concurrent SRE was detected and confirmed by a follow-up Sobel test (*Sobel z* = 2.77, *p* < .01).

Table 8

*Mediation of the Time 1 Exercise Goal – Time 4 Exercise Relationship by Time 3 Concurrent SRE*

Predictor	Criterion	Adjusted R <sup>2</sup>	R <sup>2</sup> Δ	p	β
Value of exercise goal <sup>T1</sup>	Exercise behaviour <sup>T4</sup>	.064		.001	.263
Value of exercise goal <sup>T1</sup>	Concurrent SRE <sup>T3</sup>	.096		.001	.317
Concurrent SRE <sup>T3</sup> (controlling for value of exercise goal <sup>T1</sup> )	Exercise behaviour <sup>T4</sup>		.059	.001	.253
Value of exercise goal (controlling for concurrent SRE <sup>T3</sup> )	Exercise behaviour <sup>T4</sup>		.031	.011	.185

Note. N = 192. T1, T3, and T4 represent the time in which the measure was assessed, and correspond with weeks 1, 3, and 4 of the examination period, respectively.

*Difficulty and challenge of the examination period.* This prospective study design was planned to occur over the examination period because it was assumed that it was a situation in which the valued goals of academics and exercise were competing for time and attention. It was also assumed that this presented a more difficult period in which participants had to concurrently self-regulate their goals. Theoretically, self-regulatory efficacy would be related to whether individuals continued exercising in the face of challenges posed by the examination period.

To examine this assumption, a within-subjects, repeated measures MANOVA was performed to compare the three weekly assessments of perceived difficulty and perceived concurrent management taken during the month of examinations (times 2, 3, and 4). The overall omnibus F test was significant,  $F(4, 732) = 22.88, p < .01, \eta = .11$ . Follow-up univariate ANOVA were also significant for perceived concurrent management and perceived difficulty,  $F(2, 342.21) = 48.53, p < .01, \eta = .21$ , and  $F(2, 115.11) = 24.24, p < .01, \eta = .12$ , respectively. As

can be seen by the means reported in Table 4, participants perceived the management of academic and exercise goals as least difficult (mean = 4.5) and interfering (mean = 5.54) at the onset of the examination period, but as they progressed through examinations, the level of perceived difficulty was perceived as more (mean = 6.41), and goals were perceived as more positively enhancing (mean = 6.63).

### 3.3 Discussion

Little empirical research in the exercise domain has focused on the pursuit of other valued life goals concurrent with the pursuit of an exercise goal. Whereas Study 1 in this dissertation detected a cross-sectional relationship found between activity level, valued goals, and self-regulatory beliefs, Study 2 addressed these relationships prospectively. These relationships were examined during a challenging situation requiring concurrent management of two highly valued life goals competing for individuals' time and attention -- exercising and performing well academically. Specifically, the concurrent goal context of the present study was when students were preparing for and writing academic examinations. Based on the tenets of self-efficacy theory (SET; Bandura, 1997), it was hypothesized that self-regulatory efficacy for managing both goals concurrently would function as a mediator when these two highly valued goals required greater management of time and attention than usual.

Consistent with SET, concurrent self-regulatory efficacy partially mediated the relationship between value of an exercise goal and associated exercise behaviour. Although self-efficacy is frequently suggested to be an underlying mechanism in the execution of behaviour (Bandura, 1997), its mediational role is rarely examined under conditions when having higher self-efficacy beliefs actually matters – conditions that challenge the execution of the behaviour (Bandura, 1997). Interestingly, the inclusion of concurrent self-regulatory efficacy in the goal-

behaviour relationship reduced the magnitude of the relationship during a challenging month when participants were attempting to satisfy the demands of both valued goals. Partial mediation effects were reliably identified in the two time periods examined. Given this mediation was partial, however, it must be recognized that there may indeed be other partial mediators influencing this relationship that were not assessed here. It is important to note that concurrent self-regulatory efficacy assessed participants' confidence in their abilities to self-regulate the management of *exercise and academic goals* during this hectic time in their lives, rather than just the ability to self-regulate exercise behaviour.

Taken together, these factors provide preliminary support for the notion that social cognitions relating to concurrently held exercise and non-exercise goals predict exercise behaviour. This finding adds to the exercise literature in a number of ways. First, this study identified concurrent self-regulatory efficacy as a potential mediator, which addresses suggestions made by Karoly and colleagues (2005) to pinpoint mechanisms in relationships pertaining to multiple goal pursuit. Second, the investigation directly considered exercise in conjunction with other important factors in peoples' lives. To date, most studies consider exercise in isolation. Participants are seldom asked to consider other valued activities when responding about their beliefs on self-regulation of exercise. Although it may be argued that individuals in other studies *implicitly* take other life circumstances into account when questioned about self-regulating their exercise, this has not been demonstrated empirically.

Third, another related extension to the literature concerns the nature of the self-regulatory beliefs measure and how it differs from other measures typically found in the literature. The most frequently used measure of self-regulatory efficacy in the exercise literature has concerned respondents' confidence in overcoming barriers to exercise (cf. McAuley & Mihalko, 1998).

Many of these barriers concern transient, unpredictable events (e.g., weather conditions, fatigue), while others indirectly infer factors that compete with exercise for attention (e.g., lack of time, work or school responsibilities). Barrier efficacy measures including the latter factors do not require a response that directly addresses concurrent management.

By contrast, the measure of concurrent self-regulatory efficacy in the present study required participants to identify valued goals necessitating concurrent management. It also required participants to consider this management during a period of greater challenge, when those with stronger self-regulatory efficacy would be more apt to persist if the propositions of self-efficacy theory (Bandura, 1997) are valid. Few studies in the exercise literature examine self-regulatory efficacy's predictions of exercise when participants face a common challenging context.

### *3.3.1 Strengths and Limitations of the Investigation*

One strength of the present research was the ecological applicability of examining ongoing exercise behaviour when the self-regulation of that behaviour is more demanding than usual. More often than not, people attempt to fit exercise into their already busy lives, with family, work, academics, and friends concurrently demanding action. Without considering these conditions, it is reasonable to question if we are predicting exercise and identifying its determinants as accurately as we would like.

Other strengths included testing theoretically-driven relationships, allowing participants to report their valued goals rather than asking them to respond to a list of researcher-set goals (e.g., Gebhardt & Maes, 1998), and following the recommended steps (from study design to statistical procedures) in attempting to test for mediation. As noted by Frazier et al. (2004) many of the published examinations of mediation found in the literature do not follow the criteria

recommended for detecting mediators. Frazier and colleagues (2004) point out that while it is unlikely that a given study can follow *all* the recommendations, following some of these would be a definite improvement. By making a conscious effort to follow a number of recommendations, the present findings offer a stronger basis for the conclusion that concurrent self-regulatory efficacy beliefs may be a partial mediator of exercise behaviour. In making this statement, the cautions offered by Frazier and colleagues (2004) and MacKinnon and colleagues (2002) were kept in mind. Specifically, when correlational methods are used to examine mediation, even in prospective designs, it is inappropriate to use causal language to discuss the effects. Therefore, the present conclusions were focused upon detecting a potential mediator, which could be examined in future randomly-controlled experiments for its causal effects on exercise behaviour.

The present study is not without limitations. Although it is very likely that university students experience self-regulatory challenges when attempting to manage academics with exercise pursuits, the generalizability of these results is limited to this population. Individuals with other valued goals in their lives (e.g., work and exercise, parenting and exercise), or even multiple goals in their lives (e.g., parenting, career, spousal care, exercise) may differ in the way they self-regulate concurrent goals. Similarly, the concurrent goals addressed here were experienced in a relatively short-term context (within 4 weeks). Other mediators may be influential when life goals are concurrently managed over longer periods of time (e.g., one academic term or one year).

Another potential limitation could be the assumption made about the examination period being perceived as challenging/difficult by participants. However, some evidence that this assumption was valid was offered by the analysis of perceived difficulty and perceived

concurrent management. Study participants found the concurrent management of academic and exercise goals relatively difficult and somewhat counterproductive and interfering. These perceptions were similar across the examination period, only differing slightly (although significantly) between the first and final week of the examination period. A possible limitation of these perceptions is that they were single-item and did not capture sufficient variability in responses. However, they were not the focus of the study and could be developed more in future research.

### *3.3.2 Future Research*

These findings add to the limited body of research examining the relationships between the execution of multiple goals and behaviour (Emmons & King, 1988; Riediger, Freund, & Baltes, 2005). The present study also stimulates several possibilities for future directions with respect to research examining concurrent management of exercise along with other valued life goals. Specifically, it would be interesting to explore other hypotheses offered by social cognitive theory (Bandura, 1986) when researching concurrent exercise and non-exercise goals. Social cognitive theory's reciprocal triadic causation (Bandura, 1986) principle would suggest that goals from different aspects of our life not only influence one another, but are also influenced by a host of other factors, such as the environment around us and the people whom we wish to impress. As such, Bandura's reciprocal triadic causation would suggest that there may be potential moderators of the mediation effects found here. This use of social cognitive theory and hypotheses about self-efficacy to better understand the pursuit of concurrent goals with exercise and other health behaviours has not been previously addressed in any systematic fashion.

Another related future direction offered by Bandura (1997) is that self-efficacy should predict perseverance towards attaining desired goals. Exploration of the relationships between self-efficacy and perseverance in conditions when the concurrent management of multiple goals is made salient requires an empirical test. It would be informative to test whether perseverance mediates the relationship between concurrent self-regulatory efficacy and exercise adherence. Ultimately, the present research begs the following research question: Is the potential mediator identified in this study modifiable such that people can continue to exercise in busy life situations? An affirmative answer would suggest that a social-cognitive counseling plus exercise intervention could teach individuals the self-regulatory skills needed to successfully pursue exercise along with their other valued life goals.

### **STUDY 3. EXERCISE PERSEVERANCE IN THE FACE OF VARYING EXERCISE CHALLENGES: A TEST OF SELF-EFFICACY THEORY IN WORKING MOTHERS**

Women with children are significantly less physically active than women without children (Brown, Mishra, Lee, & Bauman, 2000; Verhoef, Love, & Rose, 1992). While being physically active is an important goal for most women, family and work are also valued goals that must be balanced within a working mother's busy schedule. One possible reason for the low exercise rates in this population may be their lack of self-regulatory skills and efficacy needed to concurrently manage work, family, and an active lifestyle. Self-regulatory efficacy has been deemed crucial in the management of exercise adherence and other complex behaviours (Bandura, 1997; Maddux, 1995).

In order to maximize the relevancy and predictive utility of a self-regulatory efficacy measure, it must be tailored to the situational demands and circumstances of the population and outcome behaviour of interest (Bandura, 1997). Taking into consideration the typical situation of a working mother trying to exercise regularly, confidence to concurrently manage various valued life goals, or concurrent self-regulatory efficacy, may be the most suitable measure to assess self-regulatory efficacy. Thus far, my dissertation examinations of concurrent goals and self-regulatory efficacy (SRE) have demonstrated that a) differences in concurrent SRE existed between students who could successfully manage non-exercise goals whilst exercising frequently enough to achieve health benefits from those students who could not (Study 1), and b) concurrent SRE partially mediated the relationship between value of exercise goals and adherence to exercise over the examination period (Study 2).

The purpose of the present study was to further the examination of concurrent SRE by considering its impact on working mothers' perseverance in overcoming exercise barriers. With

respect to self-efficacy theory (Bandura, 1997), the present study sought to provide empirical support *in an exercise context* for the tenet that self-efficacy should influence the degree of perseverance devoted to the related goal in the face of barriers. “When faced with difficulties, people who are beset by self-doubts about their capabilities slacken their efforts or abort their attempts prematurely and quickly settle for mediocre solutions, whereas those who have a strong belief in their capabilities exert greater effort to master the challenge” (Bandura, 1989, pg. 1176).

An experiment that manipulates the challenges/barriers participants face and presents these to individuals high and low in their efficacy would test the viability of Bandura’s premise. Surprisingly, this type of experiment in the context of exercise has not yet been performed with respect to self-regulatory efficacy. Most exercise efficacy research has focused on task or self-regulatory efficacy to predict adherence to exercise (McAuley & Blissmer, 2000; McAuley & Mihalko, 1998).

Previous literature has demonstrated the influence of task-related efficacy in predicting perseverance to seek out academic subject solutions (Bandura & Schunk, 1981) and to overall academic success (Bandura, 1986; Bandura & Cervone, 1983; Jacobs, Prentice-Dunn, & Rogers, 1984). Many of these studies experimentally examined participants’ perseverance in completing word or math problems (Jacobs et al., 1984). However, findings gleaned from such tasks may differ substantially from the type of self-regulatory perseverance needed to adhere to exercise. As an example, Jacobs and colleagues (1984) examined undergraduate students’ perseverance to an insolvable task after forcing failure on an initial performance task. The researchers attempted to manipulate self-efficacy by providing positive verbal persuasion remarks (high self-efficacy) or negative verbal persuasion remarks (low self-efficacy) to the participants prior to administering a second insolvable task. Perseverance was measured as the amount of time

participants spent trying to complete the task, with participants unaware that they were being timed. As self efficacy theory (Bandura, 1997) would predict, individuals assigned to the high self-efficacy condition persisted longer than those exposed to the low self-efficacy condition. These findings, however, relate to task rather than self-regulatory efficacy.

In considering the exercise literature to date, to the best of my knowledge, there has not been an experiment that varies the level of challenge with varying levels of self-regulatory efficacy. Certainly, there has not been an exercise investigation of this type with respect to *concurrent* SRE.

It is important to experimentally evaluate whether perseverance towards exercise adherence is dictated by level of self-regulatory efficacy as it is with math problems, as well as improve upon the ecological validity of past experimental designs. This can be accomplished by soliciting participants based on existing concurrent SRE levels, using “real-life” problems or scenarios, and by measuring perseverance to report solutions that have “real-life” applicability. In the present experiment, I considered the impact of concurrent SRE on working mothers’ perseverance in dealing with salient exercise barriers.

The main objective of the present study was to examine whether individuals with higher concurrent SRE exhibited greater perseverance towards managing and dealing with exercise barriers/challenges than individuals with lower concurrent SRE, and, if differences in perseverance were found, to examine whether the difference was observed during more challenging circumstances. In other words, do individuals with greater concurrent SRE persist longer in the face of salient exercise barriers than individuals with lower concurrent SRE when the barriers presented are plentiful and thus challenging? Does the same pattern emerge between higher and lower concurrent SRE when the barriers presented are minimal and thus less

challenging? From this primary objective, an interaction between concurrent SRE and level of exercise barrier/challenge was hypothesized (hypothesis 1). Individuals with higher concurrent SRE were hypothesized to persevere to a greater extent than individuals with lower concurrent SRE when the exercise barriers presented were numerous. When the exercise barriers were few, no difference in perseverance between individuals with higher and lower concurrent SRE was hypothesized

A secondary exploratory objective of the present study was to continue the examination of how concurrent management of valued goals was perceived. Specifically, did working mothers attempting to exercise regularly see the management of their multiple concurrent goals as interfering or as more positively enhancing? It was hypothesized that mothers with higher concurrent SRE would perceive concurrent goal management as more positively enhancing when exercise barriers were numerous than mothers with lower concurrent SRE (hypotheses 2). In contrast, and as part of this same hypothesis, no difference was anticipated in perceived concurrent goal management between mothers with higher and lower concurrent SRE when the exercise barriers presented were few.

In order to achieve these study objectives, a pilot and experimental study were conducted. The pilot study elicited salient exercise barriers that working mothers faced. These salient barriers were used in the stimulus material developed for the experimental study.

#### 4.1 Method

The protocols for both the pilot and experimental study were approved by the University of Saskatchewan's Research Ethics Board (see appendix E). The pilot study method will be detailed first, followed by the experimental study method.

#### 4.1.1 Pilot Study

##### 4.1.1.1 Participants

A total of 74 volunteers participated in the pilot study, with a mean age of 32.8 years, and who had a mean of 1.7 children. Employed women with at least one child under the age of 10 years comprised the study sample for both the pilot and experimental studies. Volunteers were recruited through advertisements placed on the university's home webpage, in a local newspaper, and by an email that was sent to all members of a mother's website forum. Eligibility criteria for participant inclusion in the pilot and experimental study were the same: i) between the ages of 18 and 49 years of age, ii) had at least one child under the age of 10 years, iii) working as a paid employee, iv) engaged in *or* have attempted to engage in regular exercise in the past 12 months (defined as a minimum of 3 times per week), and v) be free of any health restrictions or injuries that prevented regular exercise.

##### 4.1.1.2 Measures

See Appendix G for all Study 3 measures.

*Demographics questionnaire.* Information regarding participants' age, income, ethnicity, marital status, number of children, age of children, as well as number of extracurricular activities in which their child(ren) was(were) involved in was gathered. Descriptive statistics on all demographic and exercise variables for the pilot and experiment samples are reported in Table 9.

*Exercise activity.* A modified version of the Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985) required participants to report the number of 30-minute bouts of moderate and strenuous exercise they engaged in during the past week. The original measure is reliable, with test-retest reliability scores of .74 and .81 having been demonstrated in a healthy

adult sample (Godin & Shephard, 1985). Further, the original measure demonstrates convergent validity with objective physiological measures of fitness (e.g., VO<sub>2</sub> max, body fat; Godin & Shephard, 1985) and energy expenditure (kcal estimates; Miller, Freedson, & Kline, 1994).

*Exercise barriers.* To assess salient barriers working mothers faced while attempting to exercise, pilot study participants were asked to write down their four most debilitating exercise barriers, with unlimited space to explain each. Barriers were operationalized as obstacles or circumstances that you personal have found make achieving your exercise goals challenging. After each open-ended barrier explanation, participants were asked to report how limiting that barrier was on a Likert scale of 1 (*not at all limiting*) to 9 (*completely limited me from exercising*), and the frequency per week in which that barrier occurred.

#### *4.1.1.3 Study Design and Procedures*

The pilot study was conducted to gather information about relevant and personal barriers that participants felt were potential challenges to their engagement in regular exercise. This information was subsequently used to develop the stimulus material for the experiment. Interested and eligible volunteers were directed to an online pilot study website. Participants were first asked to read the letter of informed consent. Access to the study questionnaire was only permitted by clicking on a button that indicated consent was given. The online pilot questionnaire took approximately 10-15 minutes to complete. Upon completion of the pilot questionnaire, participants were mailed a gift certificate to a local coffee shop as thanks for participating in the study.

#### 4.1.1.4 Results

Both the frequency and strength of limitation of the reported barriers were used to determine which barriers would be presented in the experimental study scenario. Specifically, the 8 most frequently reported barriers with a mean limitation score of 5 or higher (on a Likert scale of 1-9) were used in writing the scenarios. Specifically, 8 salient exercise barriers were presented in the numerous exercise barriers condition, and 2 of these 8 barriers were presented in the minimal exercise barriers condition (see Appendix G).

#### 4.1.2 Experimental Study

##### 4.1.2.1 Participants and Study Design

A two (higher self-regulatory efficacy versus lower self-regulatory efficacy condition) by two (numerous barriers versus minimal barriers condition) between groups factorial design was used in the experiment. Eligibility criteria for inclusion in this study, as well as recruitment methods, were identical to the pilot study. For the experimental study, 49 mothers were recruited, with a mean age of 35.7 years and who had a mean of 1.9 ( $\pm 0.8$ ) children.

##### 4.1.2.2 Measures

*Demographics questionnaire.* Information regarding participants' age, income, ethnicity, marital status, number of children, age of children, as well as number of extracurricular activities in which their child(ren) was(were) involved in was gathered using the online confirmation of eligibility questionnaire. Descriptive statistics on demographics and exercise are reported in Table 9.

*Exercise activity.* A modified version of the Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985) required participants to report the number of 30-minute bouts of

moderate and strenuous exercise in which they engaged in during the past week. The original measure is reliable, with test-retest reliability scores of .74 and .81 having been demonstrated in a healthy adult sample (Godin & Shephard, 1985). Further, the original measure demonstrates convergent validity with objective physiological measures of fitness (e.g., VO<sub>2</sub> max, body fat; Godin & Shephard, 1985) and energy expenditure (kcal estimates; Miller, Freedson, & Kline, 1994).

Table 9

*Descriptive Statistics on Exercise and Demographical Information for Pilot and Experiment Samples*

	Pilot Sample (n = 74)		Experiment Sample (n = 49)	
	<i>M/Mode</i>	<i>SD/Frequency</i>	<i>M/Mode</i>	<i>SD/Frequency</i>
Age	32.8	5.6	35.7	4.0
Income+	21,000-40,000	18.8%	81,000-100,000 101,000-120,000	23.4% 23.4%
Ethnicity+	Caucasian	90.5%	Caucasian	96.0%
Marital status+	Married	65.4%	Married	81.6%
Number of children	1.7	.91	1.9	.75
Number of children under 10 years	1.44	.69	1.71	.74
Number of extracurricular activities children involved in	3.21	2.49	2.80	1.81
Exercise bouts last week+++	3.81	3.86	3.76	2.38

Note: +Values displayed for income, ethnicity, and marital status represent the mode and its associated frequency in the respective samples. A tie for highest mode was found for most frequently reported income in the experimental sample, thus both modes are shown. Participants for pilot and experimental studies were drawn from two separate geographic locales (Saskatoon, SK and Hamilton, ON, respectively), possibly resulting in income differences between studies.

++*Exercise last week* refers to the sum frequency of strenuous and moderate bouts of PA participants reported in engaging in during the last 7 days.

*Exercise perseverance.* To objectively assess perseverance in overcoming exercise barriers, a personal brainstorming activity was included in the questionnaire. Participants were asked to list as many plausible solutions that could help counter the exercise barriers presented in the scenario. Both the number of solutions put forth and the amount of time spent on this brainstorming activity were measured by the researcher and used to test the study hypotheses.

*Anticipatory perseverance.* In attempts to subjectively assess perseverance in overcoming exercise barriers, participants were asked to rate their perseverance for exercising regularly over the next 7 days if they were to encounter the barriers posed in the scenario they read. Specifically, participants responded to a 4-item measure on which they were asked how much time, effort, persistence, and attention they were willing to put forth in order to exercise over the next 7 days. Responses to each item were recorded on a 1 (*little to none*) to 9 (*as much as it takes*) point Likert scale, with higher scores indicating greater perseverance. Participants' average score for all 4 items was calculated and used in subsequent analyses. The scale was reliable (Cronbach's  $\alpha = .92$ ; Tabachnick & Fidell, 2001).

*Perceived management of concurrent goals.* To assess the extent to which participants felt their work, family, and exercise goals conflicted or enhanced each other, participants were

asked to rate how the management of their goals was perceived using a 1 (*counterproductive and interfere with each other*) to 9 (*positively enhance each other and can accomplish both*) point Likert scale.

*Concurrent self-regulatory efficacy (Concurrent SRE)*. To assess confidence in abilities to concurrently regulate exercise goals along with work and family goals, volunteers were first asked to think about “your present life goals, including your family, work, and fitness goals. This survey wants you to consider your confidence in your own abilities to concurrently manage exercise with all of your work and family goals.” Participants were then asked to rate their confidence to engage in five self-regulatory behaviours used to concurrently manage *all* goals over the next week using a 0% (*not at all confident*) and 100% (*extremely confident*) scale. The specificity with which the time course and action of the 5 items were created followed recommendations by Bandura (1997) and McAuley and Mihalko (1998). Sample items include: “During the next week, how confident are you in your ability to accurately monitor your time so that your progress for your exercise, work, and family activities is effective?”, and “During the next week, how confident are you in your ability to make up for any missed sessions/activities for your exercise, work, and family goals?” Participant’s responses to all 5 items were summed and averaged. The measure was assessed in the online confirmation of eligibility questionnaire and the concurrent SRE scores were subsequently used to stratify participants into higher and lower efficacy groups. Approximately one week after the presentation of the barriers manipulation, a post-test measure was obtained. Participants’ average score for all 5 items was calculated and used in subsequent analyses. At both times the scale was deemed reliable (Cronbach’s  $\alpha = .89$  and  $.93$ , respectively; Tabachnick & Fidell, 2001).

*Manipulation check.* To determine if participants in all conditions could relate to the individual in the written scenario, a 3-item manipulation check was administered. Participants responded on a 1 (*very little*) to 9 (*very much*) Likert scale to questions such as “To what extent could you empathize with the problems and challenges of the person in the message?” Participants’ average score for all 3 items was calculated and used in subsequent analyses. The internal consistency for this scale was deemed acceptable at  $\alpha = .80$ .

#### *4.1.2.3 Procedures and Scenario Material*

*Scenario construction.* Using the information gleaned from the pilot study on salient exercise barriers working mothers with young children face, two written scenarios were constructed. Both scenarios described a typical working mother (Jennifer) with the same demographical characteristics. Specifically, both written scenarios portrayed “Jennifer” as a 37-year old mother of two children, ages 7 and 5 years. Participants read that Jennifer took 12-month maternity leaves from work when each of her daughters were born, loves spending time with her daughters, and that her children are involved in a variety of extracurricular activities throughout the week. Attempts were also made to keep the length of scenarios similar. The scenario written for the numerous exercise barriers condition (NEB) was 439 words, while the scenario written for the minimal exercise barriers (MEB) condition was 409 words.

The scenarios differed in terms of the number of barriers highlighted. For the NEB condition, the scenario detailed eight salient exercise barriers (work and domestic commitments, child(ren)’s extracurricular activities, preference to spend free time with children and associated guilt for not spending free time with children, lack of exercise motivation, fatigue, general lack of time; see Appendix F). For the MEB condition, the scenario detailed only two salient exercise barriers (work commitments, child(ren)’s extracurricular activities; see Appendix F). The

barriers solicited to be used in both scenarios were determined by frequency and limitation of report in the pilot study data. As such, the barriers used in the NEB and MEB scenarios were the most frequently reported, salient barriers working mothers in the pilot study reported.

#### *4.1.2.4 Procedures*

Interested volunteers were first emailed a link to an online survey that confirmed eligibility and assessed concurrent self-regulatory efficacy (concurrent SRE). The concurrent SRE measure was assessed in order to stratify participants into equal group assignments of higher and lower concurrent SRE. Participants were stratified into lower (less than 50%, cut-off point determined by values in pilot study and re-checked based on the data in the experimental study) or higher concurrent SRE (50% or greater). They were then randomly assigned (using computer generated randomized lists) to either a NEB condition or a MEB condition. This randomization resulted in 4 conditions: higher concurrent SRE/NEB ( $n = 13$ ), lower concurrent SRE/NEB ( $n = 11$ ), higher concurrent SRE/MEB ( $n = 13$ ), and lower concurrent SRE/MEB ( $n = 12$ ). Following randomization, participants were scheduled to meet with the primary researcher.

Informed consent was obtained at the beginning of each scheduled appointment. Next, participants were asked to read a scenario about a mother similar to themselves encountering exercise barriers (derived from the pilot study). Participants randomized to the NEB condition read a scenario detailing a working mother who had to deal with eight salient exercise barriers. Participants randomized to the MEB condition read a scenario about a working mother who had to deal with only two salient exercise barriers. These scenarios are reported in Appendix F.

After reading their respective scenarios, participants were asked to place themselves in the context of the situation that they had just read and imagine dealing with these competing activities themselves. All participants were next asked to complete an identical questionnaire

package containing the measures for the study and the manipulation check. The researcher stayed with each participant as the questionnaire was completed in order to both answer any questions and to objectively measure the time put forth in completing the exercise solutions measure using a stopwatch. Upon completion of the package, participants were given a gift certificate for a local coffee shop in thanks for their participation in the study.

## 4.2 Results

### *4.2.1 Data Management*

Data management and screening strategies were used to address missing data, the presence of outliers, as well as to conduct tests of normality and other assumptions pertinent for multivariate analysis of variance (MANOVA). These data management procedures were used in all three studies. These general procedures were described in detail in Study 1. To avoid redundancy, they are not repeated here.

In accordance with Tabachnick and Fidell's guidelines for the presence of outliers (2001), 5 outliers were addressed in the pilot data. Two of these outliers were found within the strenuous exercise recall variable, and three were found within the moderate exercise recall variable. In all 5 cases, the standardized z scores were greater than 3.29. Given the sample size for the pilot was not large, and thus outliers had the potential to severely skew results, these outliers were replaced with one unit larger than the next most extreme score in the distribution.

### *4.2.2 Effectiveness of Randomization*

To assure that randomization of participants was effective, a 2 (concurrent SRE: higher versus lower) x 2 (exercise barriers: numerous versus minimal) between – subjects MANOVA was performed on all continuous demographic variables (age, income, number of children,

number of children under age 10 years, and the number of extracurricular activities of the children). The omnibus main effect of concurrent SRE,  $F(7, 37) = 1.81, p = .114, \eta^2 = .26$ , main effect of exercise barriers  $F(7, 37) = 1.24, p = .305, \eta^2 = .19$ , and the interaction effect were not significant  $F(7, 37) = 1.22, p = .315, \eta^2 = .19$ . Categorical demographic variables (ethnicity and partner status) were separately tested for any between group differences using nonparametric chi square tests. There was no significant differences in ethnicity between higher and lower SRE groups receiving minimal exercise barriers or between higher and lower SRE groups receiving numerous exercise barriers,  $\chi^2(1, N = 24) = 1.23, p = .46, \chi^2(1, N = 24) = 1.23, p = .26$ ; respectively. Similarly, there was no significant differences on partner status between higher and lower SRE groups receiving minimal exercise barriers or between higher and lower SRE groups receiving numerous barriers,  $\chi^2(2, N = 25) = 1.14, p = .56, \chi^2(3, N = 24) = 4.08, p = .25$ , respectively.

#### 4.2.3 Group Differences in Perseverance

*Multivariate effects.* To test hypothesis 1, a 2 x 2 between – subjects MANOVA was performed on all three perseverance dependent variables: time spent brainstorming, number of solutions brainstormed, and anticipatory perseverance. Independent levels of the 2 by 2 factorial design were concurrent SRE (lower and higher) and exercise barriers (numerous and minimal). An omnibus main effect of concurrent SRE,  $F(3, 43) = 11.37, p < .001, \eta^2 = .44$  was significant, but the main effect of barriers,  $F(3, 43) = .08, p = .97, \eta^2 = .01$  was not significant. These main effects were superseded by the detection of a significant, omnibus interaction effect between barriers and concurrent SRE,  $F(3, 43) = 3.50, p = .02, \eta^2 = .20$ . Given these significant multivariate effects, follow-up univariate tests were examined for each of the dependent perseverance variables.

*Univariate effects.* Significant differences for the main effect between higher and lower concurrent SRE groups were found for the number of solutions brainstormed and anticipatory perseverance ( $F(1, 45) = 4.10, p = .049, \eta^2 = .08$ ;  $F(1, 45) = 24.34, p < .001, \eta^2 = .35$ , respectively), such that individuals with higher concurrent SRE brainstormed more solutions to overcome exercise barriers presented to them as compared to individuals with lower concurrent SRE ( $M_{higherSRE} = 7.08, SD = .43$  vs.  $M_{lowerSRE} = 5.78, SD = .46$ ), and reported greater willingness to persist with such exercise barriers than individuals with lower concurrent SRE ( $M_{higherSRE} = 7.32, SD = .26$  vs.  $M_{lowerSRE} = 5.48, SD = .27$ ). There were no significant differences between higher and lower concurrent SRE groups on time spent brainstorming solutions ( $F(1, 45) = 2.85, p = .098, \eta^2 = .06$ ), although the means suggested a trend in the expected direction ( $M_{higherSRE} = 337.38$  seconds,  $SD = 29.88$  vs.  $M_{lowerSRE} = 263.48$  seconds,  $SD = 31.80$ ). There was no significant interaction effect for time spent brainstorming solutions or number of solutions brainstormed,  $F(1, 45) = .09, p = .77, \eta^2 = .00$ ,  $F(1, 45) = 2.52, p = .12, \eta^2 = .05$ , respectively.

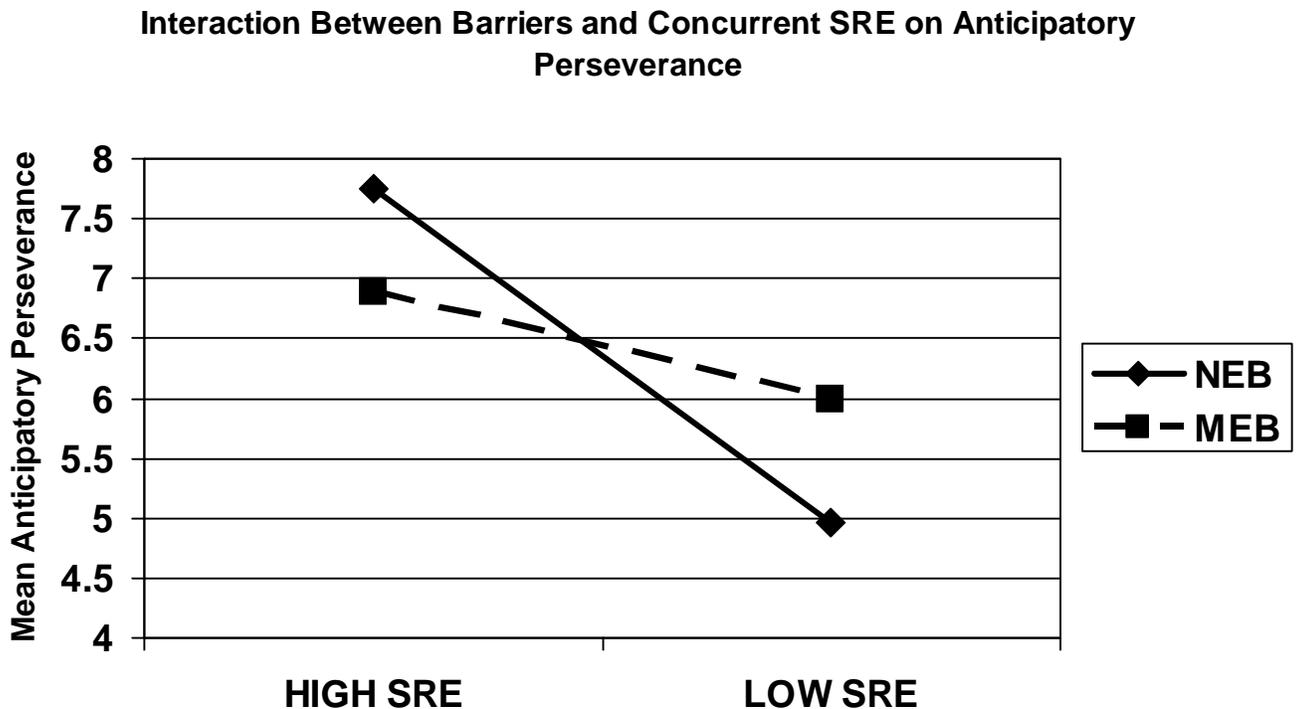
With respect to the interaction term between barriers and concurrent SRE, there was a significant interaction for anticipatory perseverance in the expected direction,  $F(1, 45) = 6.56, p = .01, \eta^2 = .13$ . Consequently, post hoc follow-up tests were conducted. Fisher's least significant difference (LSD) procedure was used to perform post hoc pairwise comparisons between groups (Kirk, 1982).

Based on the theoretical tenets of self-efficacy theory, the following comparisons were tested: 1) higher concurrent SRE/numerous exercise barriers versus lower concurrent SRE/numerous exercise barriers, 2) lower concurrent SRE/numerous exercise barriers versus lower concurrent SRE/minimal exercise barriers, and 3) higher concurrent SRE/numerous exercise barriers versus higher concurrent SRE/minimal exercise barriers. To account for these

three multiple comparisons, the alpha was adjusted using the Bonferroni correction method ( $0.05/3 = 0.02$ ).

One aspect of the first hypothesis concerning an expected interaction was supported. As shown in Figure 2, under conditions of numerous exercise barriers (NEB; solid line), participants with higher concurrent SRE reported greater perseverance overcoming the barriers presented than participants with lower concurrent SRE ( $t = 5.23$  as compared to Critical  $t$  at  $p < .01 = 2.62$ ,  $M_{HISRENEB} = 7.75, SD = .75$  vs.  $M_{LOWSRENEB} = 4.95, SD = 1.63$ ). Numerous and minimal exercise barriers did not differentially affect perseverance in participants with lower concurrent SRE ( $t = 1.93, p > .05$ ,  $M_{LOWSREMEB} = 6.00, SD = 1.73$  vs.  $M_{LOWSRENEB} = 4.95, SD = 1.63$ ) or in participants with higher concurrent SRE ( $t = 1.31, p > .05$ ,  $M_{HISRENEB} = 7.75, SD = .75$  vs.  $M_{HISREMEB} = 6.88, SD = .91$ ), although means were in the expected direction.

Figure 2



Note: NEB refers to numerous exercise barriers, MEB refers to minimal exercise barriers. HIGH SRE refers to higher concurrent self-regulatory efficacy, and LOW SRE refers to lower concurrent self-regulatory efficacy. This interaction between barriers and concurrent SRE on anticipatory perseverance was significant,  $F(1, 45) = 6.56, p = .01, \eta^2 = .13$ .

#### 4.2.4 Group Differences in Perceived Concurrent Management

To test hypothesis 2, that when facing numerous exercise barriers, mothers with higher concurrent SRE would perceive concurrent goal management as more positively challenging (as opposed to interfering) than mothers with lower concurrent SRE, a 2 x 2 between – subjects ANOVA was conducted. Independent levels of the 2 by 2 factorial design were concurrent SRE (lower and higher) and exercise barriers (numerous and minimal). Perceived concurrent management was the dependent variable.

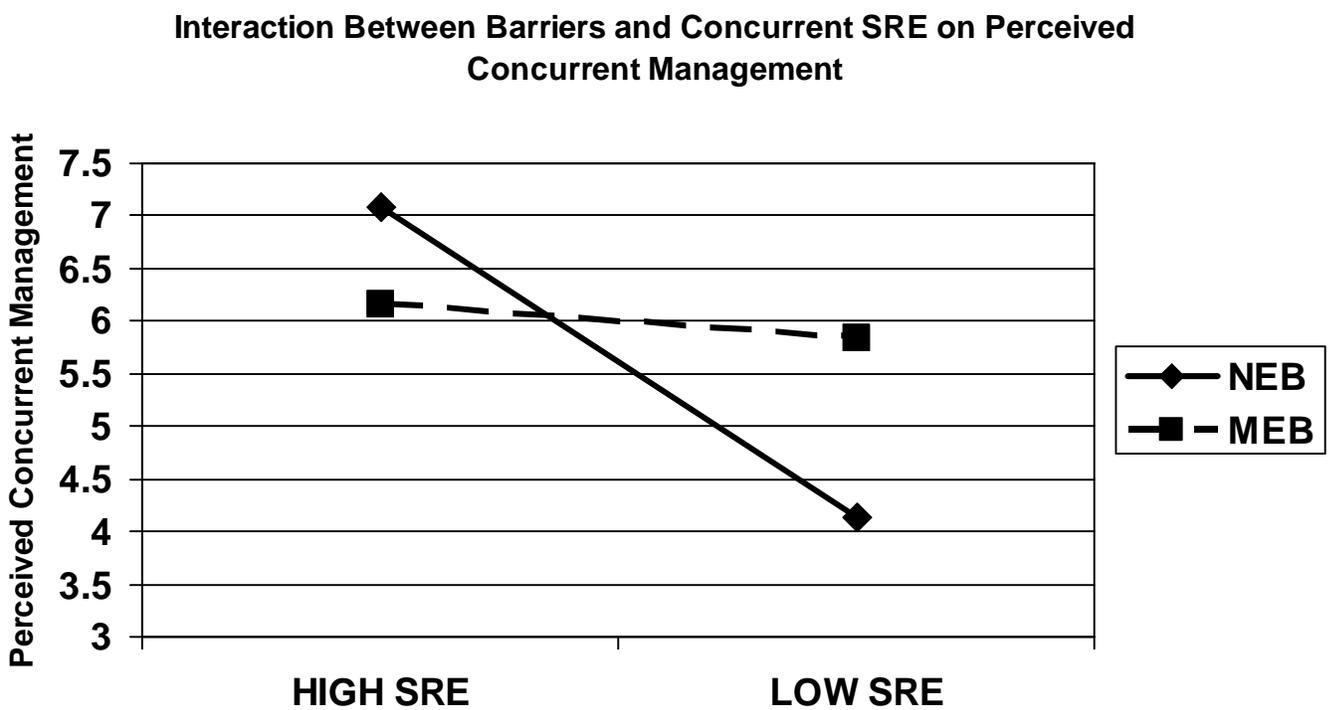
There was a significant main effect for concurrent SRE,  $F(1, 32.4) = 14.25, p < .001, \eta^2 = .24$ . Individuals with higher concurrent SRE perceived concurrent management as more positively enhancing whereas individuals with lower concurrent SRE perceived concurrent management as more interfering ( $M_{higherSRE} = 6.62; SD = .30$  vs.  $M_{lowerSRE} = 4.99; SD = .32$ ). There was no significant main effect of barriers on perceived concurrent management,  $F(1, 45) = .80, p = .375, \eta^2 = .02$ . A significant interaction was found between concurrent SRE and barriers on perceived concurrent management,  $F(1, 45) = 9.20, p = .004, \eta^2 = .17$ . Consequently, post hoc follow-up tests were conducted. Fisher's least significant difference (LSD) procedure was used to perform post hoc pairwise comparisons between groups (Kirk, 1982).

Based on the theoretical tenets of self-efficacy theory, the following comparisons were tested: 1) higher concurrent SRE/numerous exercise barriers versus lower concurrent SRE/numerous exercise barriers, 2) lower concurrent SRE/numerous exercise barriers versus lower concurrent SRE/minimal exercise barriers, and 3) higher concurrent SRE/numerous exercise barriers versus higher concurrent SRE/minimal exercise barriers. To account for these three multiple comparisons, the alpha was adjusted using the Bonferroni correction method ( $0.05/3 = 0.02$ ).

As depicted in Figure 3 by the solid line, when imagining themselves in the NEB condition, mothers with higher concurrent SRE perceived the concurrent management of multiple goals as more positively challenging and less interfering as compared to those with lower concurrent SRE, ( $t = 4.77$  as compared to Critical  $t$  at  $p < .01 = 2.62$ ,  $M_{HISRENEB} = 7.08$ ,  $SD = 1.19$  vs.  $M_{LOWSRENEB} = 4.14$ ,  $SD = 1.48$ ).

Not surprisingly, among mothers with lower concurrent SRE, those who were asked to imagine facing only minimal exercise barriers perceived managing multiple goals concurrently as more positively challenging and less interfering than did mothers who were asked to imagine themselves facing numerous exercise barriers ( $t = 2.70$ ,  $p < .01$ ,  $M_{LOWSREMEB} = 5.83$ ,  $SD = 2.08$  vs.  $M_{LOWSRENEB} = 4.14$ ,  $SD = 1.48$ ). In contrast, the level of barriers imagined did not influence mothers' perception of the concurrent management of exercise with other life goals for those with higher concurrent SRE ( $t = 1.57$ ,  $p > .05$ ,  $M_{HISRENEB} = 7.08$ ,  $SD = 1.19$  vs.  $M_{HISREMEB} = 6.15$ ,  $SD = 1.14$ ).

Figure 3



Note: NEB refers to numerous exercise barriers, MEB refers to minimal exercise barriers. HIGH SRE refers to higher concurrent self-regulatory efficacy, and LOW SRE refers to lower concurrent self-regulatory efficacy. This interaction between barriers and concurrent SRE on perceived concurrent management was significant,  $F(1, 45) = 9.20, p = .004, \eta^2 = .17$ .

#### 4.2.5 Manipulation Check

To assure differences between groups in the experiment were due primarily to the barrier manipulation and not to other stimulus material characteristics, the manipulation check items were analyzed. The 3-item measure of the extent to which participants empathized with the problems and challenges of the person in the message was examined for any potential differences between groups. A 2 x 2 between – subjects ANOVA was conducted. Concurrent SRE (higher and lower) and exercise barriers (numerous and minimal) were the independent variables and perceived empathy with the situation being experienced in the written scenario was the dependent variable. There was no significant main effects  $F(1, 45) = .91, p = .346, \eta^2 = .02$ ,  $F(1, 45) = .00, p = .998, \eta^2 = .00$ , and no interaction effect between concurrent SRE and barriers, and  $F(1, 45) = .09, p = .766, \eta^2 = .002$ . The check on equal empathy of participants with the barrier experience of the target mother in the scenario was supported. The average mean empathy score was 8.0 (SD = 1.0).

### 4.3 Discussion

The present experiment was designed to manipulate the degree of exercise management challenges that working mothers would have to concurrently confront in order to exercise. These challenges were presented in scenario form to working mothers with young children who had either lower or higher levels of concurrent self-regulatory efficacy. These challenges were elicited from the pilot study, and represented realistic, salient exercise barriers a working mother often faces in her attempts to engage in regular exercise. Mothers in the experiment rated their anticipated perseverance to exercise if they had to confront the barriers in the scenario, as well as report how they perceived the concurrent management of the challenging conditions faced.

Consistent with the tenets of efficacy theory (Bandura, 1997), significant differences between higher and lower concurrent SRE groups were found for the number of solutions brainstormed and anticipatory perseverance. Individuals with higher concurrent SRE brainstormed more solutions to overcome exercise barriers presented to them as compared to individuals with lower concurrent SRE, and reported greater willingness to persist with such exercise barriers than their lower concurrent SRE counterparts.

Of greater interest was the significant interaction between the number of barriers individuals faced and level of concurrent SRE. Notably, with respect to exercise perseverance, when the number of exercise barriers was numerous (i.e., challenge was high), working mothers with a greater sense of self-efficacy to concurrently manage work, family, and exercise goals anticipated persevering longer in the face of these barriers than working mothers with lower efficacy. This interaction supports hypotheses advanced from self efficacy theory (Bandura, 1997), which would suggest individuals with higher self-efficacy will persist longer in the face of challenges when in pursuit of a meaningful goal than individuals with lower self-efficacy.

It should be noted that only partial support was found for the interaction hypothesis relative to perseverance and related indicators of perseverance and effort. No significant interaction effects were observed for time spent brainstorming exercise solutions or number of solutions elicited. Two possible explanations for this null finding are that individuals with higher self-efficacy are a) more confident in their solutions, and thus write only ones that they are certain will work, and b) more efficient about writing them because they already know *what* will work. In contrast, individuals with lower self-efficacy may have had to brainstorm at length before any ideas came to mind on how to solve the exercise barriers posed to them. In addition, while the number of barriers presented differed between numerous (NEB) and minimal exercise

barrier (MEB) conditions (8 versus 2, respectively), the barriers presented in MEB were also presented in NEB. Thus, simply altering the number of barriers presented may not have been drastic enough to elicit changes in the personal brainstorming done by mothers in each group.

The significant differences between higher and lower concurrent SRE groups with respect to how concurrent management was perceived was superseded by the significant interaction between number of barriers and level of mothers' self-regulatory efficacy. When the number of exercise barriers was numerous, working mothers with higher concurrent self-regulatory efficacy perceived the concurrent management of multiple goals as more positively challenging (and less interfering) than did working mothers with low concurrent self-regulatory efficacy. Although not specifically outlined in self-efficacy theory, it is plausible to suggest that personal efficacy beliefs are related to the degree of challenge and difficulty regarding how manageable a future goal is perceived. Bandura (1989) has argued that "There is a growing body of evidence that human attainments and positive well-being require an optimistic sense of personal efficacy" (pg 1176). Perhaps perceiving concurrent goals as manageable and positively challenging is a sign or outcome of optimistic efficacy beliefs, which in turn, motivate one to persist longer in the pursuit of achieving these goals. Given that efficacious individuals will not likely attempt goals that are perceived as daunting (Bandura, 1997), it would follow that when challenging goals are coupled with high self-efficacy, a more positive outlook would be expected with regards to managing future goals.

In looking only at working mothers with lower concurrent SRE, the number of barriers presented also influenced how concurrent management was perceived. Specifically, women with lower concurrent SRE who were presented with minimal exercise barriers had a more optimistic

view of the concurrent management (i.e., challenging versus interfering) than did women with lower concurrent SRE who faced numerous exercise barriers.

#### *4.3.1 Strengths and Limitations of the Investigation*

A major strength of the present study was its novelty. The form of self-efficacy measured took into account the concurrent management of multiple, valued life goals, and the study design permitted an experimentally controlled examination of self-regulatory efficacy's influence on exercise-related perseverance. In reviewing the exercise literature, no investigations of the relationship between self-regulatory efficacy and exercise - goal perseverance were found. Past exercise research has not examined the relationship under conditions when barriers to self-regulation have been experimentally manipulated and participants have been randomly assigned to barrier conditions. To the best of my knowledge, this was the first investigation in the exercise domain to do so. Results support Bandura's (1997) contentions.

Another strength of the present experiment was the attempt to make the scenario content externally valid and ecologically meaningful to study participants. Careful pilot testing permitted the development of very salient scenarios, which were subsequently used in this experiment to explore the effects of concurrent SRE on perseverance to real life exercise barriers. Finally, care was taken to stratify and randomly assign participants to equal conditions. Follow-up analyses and a manipulation check analysis were then performed to confirm that the random assignment was effective (e.g., no demographic differences between groups, scenario description was perceived as equally salient to all mothers).

With respect to study limitations, failure to detect effects in some of the hypothesized relationships may be due to the limited sample size. Perhaps not surprisingly, recruiting mothers who work full time, have young children, are trying to pursue exercise goals, and have enough

time to commit to a research experiment was difficult. Another limitation of the present study was that perseverance to exercise despite challenges was garnered from anticipatory self-report measures and a written brainstorming task, not through prospective observations of actual exercise behaviour. Although these measures were chosen due to anticipated difficulty controlling for real-life exercise challenges posed to participants, future research should seek to provide more objective data on how self-efficacy interacts with barriers to influence exercise perseverance over an extended period of time.

#### *4.3.2 Future directions*

The present study functioned as a prototype to determine if barriers could be manipulated in order to examine if theory-driven hypotheses about self-regulatory efficacy could be observed. Given the promising initial results, more demanding investigations can be planned for the future. For example, future studies could attempt to control real-life exercise challenges experienced by participants and prospective observations of actual exercise behaviour might be obtained. Future research should seek to provide more objective data on the actual strategies or solutions used by individuals high in self-regulatory efficacy when they face numerous barriers or conditions of extremely challenging concurrent management of valued goals. In addition, future research could obtain multiple estimates of exercise perseverance over an extended period of time to test the persistence hypotheses more stringently.

Implications from this study have promising real-world applicability. It is unlikely that mothers that work full-time and have young children will be able, or willing, to change the number of valued goals in their life or eliminate all of the exercise barriers they face. What may be more apt to change are the self-regulatory skills that these women hold or can learn. Interventions aimed at teaching working mothers and other busy individuals how to efficiently

manage these multiple goal pursuits should, as a result, increase their concurrent self-regulatory efficacy and subsequent ability to exercise regularly. In addition to conducting interventions which target concurrent self-regulatory skills and efficacy as a means to increase exercise behaviour, more research is needed that not only acknowledges the many non-exercise goals that people hold, but how these goals may influence the pursuit of exercise goals. It would be informative to know, specifically, other ways in which exercise perseverance can be improved despite the numerous life goals people are encountering.

## ***GENERAL DISCUSSION***

The majority of Canadians are not physically active enough to achieve health benefits (CFLRI, 2005). Extensive research on exercise barriers suggests that one commonly-reported reason for this high level of inactivity is lack of time (Brawley, Martin, Gyurcsik, 1998; Salmon, Owen, Crawford, Bauman, Sallis, 2003; Trost, Owen, Bauman, Sallis, Brown, 2002). While being physically active is an important goal for many individuals, family, work, school, and friends are also valued aspects of their lives. One intuitive hypothesis for the barrier of “not enough time” being reported is that other valued, non-exercise goals are attended to first, and thus respondents feel they do not have enough time for exercise. However, an equally plausible hypothesis is that individuals may be ineffective at concurrently managing all of these goals, including exercise. An examination of whether this latter hypothesis is tenable was needed. This dissertation addressed self-regulatory aspects of the concurrent management of exercise with other valued non-exercise goals.

Social cognitive theory provides an ideal framework in which to study the relationship between non-exercise goals and exercise goals using the concept of personal agency. One belief from this theory that has demonstrated utility in predicting exercise behaviour in multiple contexts and with varied populations is self-regulatory efficacy (Bandura, 1997; 2004). Bandura (1995) has argued that self-regulatory efficacy is particularly crucial in situations which challenge one’s self-regulation, such as attempting to exercise in the face of numerous other life commitments. Further, the specificity of any self-efficacy measure has been deemed critical when attempting to study its relationship to the outcome behaviour (Bandura, 2004; Maddux & Gosselin, 2003). There has been limited research examining exercise behaviour in conjunction with other non-exercise goals (e.g., Gebhardt & Maes, 1998; Karoly et al., 2005; Riediger &

Freund, 2004; Li & Chan, 2008), and none of this research has measured individuals' capacity for concurrent self-regulatory efficacy in their management of valued life goals as a viable research direction. This gap in the literature concerning concurrent self-regulatory efficacy and exercise behaviour needs to be explored.

In order to address this need, three theoretically-driven studies were conducted. Study 1 explored the use of self-regulatory efficacy to *concurrently manage multiple valued goals* in predicting exercise levels. Differences in concurrent self-regulatory efficacy were observed between university students who were active enough to achieve health benefits from those who were not active enough to achieve health benefits. Study 1 also demonstrated that non-exercise and exercise goals were not always perceived to conflict with each other, as previously assumed (Emmons & King, 1988; Gebhard & Maes, 1998; Karoly et al., 2005; Li & Chan, 2008).

Given the evidence that activity level was related to concurrent self-regulatory efficacy, SET was used to test one of its central tenets with respect to concurrent self-regulatory efficacy in Study 2. Bandura (1997) has argued that self-regulatory efficacy should mediate the relationship between goals and behaviour. Specifically, goals operate through self-reactive influences instead of directly regulating individuals' motivations and behaviours (Bandura, 1997). As hypothesized, concurrent self-regulatory efficacy was identified as a partial mediator of the goal – exercise behaviour relationship across a busy month of university exams, when this form of self-regulatory confidence may be particularly important.

The mediational findings from Study 2, while promising, were from correlational analyses. To further explore the utility of concurrent self-regulatory efficacy and another tenet from self efficacy theory, Study 3 examined if differential strengths of concurrent self-regulatory efficacy altered the perseverance responses of individuals who faced either numerous or minimal

barriers. The design of Study 3 differed from Study 2 in that it involved an *experimental manipulation* of the number of exercise barriers that participants perceived they would face. Working mothers with young children either high or low in concurrent self-regulatory efficacy were randomly assigned to conditions where they considered facing either a minimal number of barriers or facing numerous exercise barriers. Barriers represented an array of work, family, and household responsibilities that may compromise a working mother's time to exercise and require concurrent management. Participant's responses to the variables of perseverance and perceived concurrent management of valued goals suggested that working mothers with higher concurrent self-regulatory efficacy to exercise felt that they would persevere longer in the face of numerous exercise barriers, and perceived the concurrent management of multiple goals as more positively challenging and enhancing than did mothers with low concurrent self-regulatory efficacy.

### *5.1 Contributions to Theory*

Results from these three dissertation studies provide empirical support for a number of Bandura's (1986; 1997) theoretical tenets from social cognitive theory and self efficacy theory. These studies represent the first attempt to examine hypotheses about self-regulatory efficacy in the context of exercising while concurrently pursuing valued, multiple goals. Self efficacy theory emphasizes the importance of self-regulatory efficacy in the management of behaviour, and argues that its importance for motivation is heightened during times of increasing self-regulatory challenge (Bandura, 1997; Maddux, 1995). Concurrent management of multiple life goals thus provides an excellent context in which to study the utility of self-regulatory efficacy. As hypothesized, self-regulatory efficacy to manage concurrently-held goals successfully discriminated, amongst other social cognitive variables, between more and less active individuals, was identified as a potential partial mediator in the relationship between value of

exercise goal and exercise behaviour, and influenced the amount of exercise perseverance participants perceived they would express in the face of differential levels of challenge to their exercise. Collectively, the findings from the three studies provided strong evidence supporting the theorized relationships and function of self-regulatory efficacy in regard to managing exercise alongside other valued goals. Most importantly, these studies explored participants' *conscious consideration and forethought* about concurrent management of activities that are assumed to compete/conflict with the pursuit of exercise.

### *5.2 Unique Contributions to the Exercise Literature*

There is a paucity of literature that takes into account concurrently held non-exercise goals in relation to the pursuit of exercise. Asking questions about exercise behaviour as a single, goal-directed behaviour without specifically acknowledging the possible influence of other concurrent goals may be oversimplifying the self-regulation needed to exercise in daily life. This dissertation attempted to address this gap in the literature by conducting three related studies about the self-regulatory efficacy to concurrently manage exercise and non-exercise goals. There were several novel findings from the present studies that can contribute to the current level of knowledge on exercise adherence.

The first contribution concerns the concept of viewing non-exercise goals, such as work and academics, as important goals that need attention rather than exercise barriers that one has to overcome or eliminate. Having people respond to this conceptualization focused their attention on the realistic situation of having to self-regulate behaviour towards multiple goals in day to day, week to week life. By asking participants how exercise behaviour was completed along with other important goal pursuits, their responses about related social-cognitive beliefs may paint a more realistic picture of actual confidence needed to exercise within the context of a busy life.

This focus on concurrent management for valued goals also allowed for the examination of a social cognition (i.e., concurrent self-regulatory efficacy) that may aid in more feasibly balancing the management of all goals. Learning the skills with which individuals are concurrently managing exercise pursuits, how this management is perceived, and what social cognitive mechanisms permit successful concurrent management all provide essential information on “real life” self-regulation of exercise behaviours.

A second contribution to the exercise literature was the exploration of perceived possible positive influences that concurrent management of multiple goals could have relative to exercise goal pursuit. Unlike the extensive literature on exercise barriers (e.g., Brawley, et al., 1998) and limited past research on goal conflict (e.g., Gebhardt & Maes, 1998; Karoly et al., 2005; Li & Chan, 2008), participants in the three dissertation studies were asked whether concurrent management of non-exercise and exercise goals interfered or enhanced the achievement of *all goals*. Interestingly, participants who were most active and/or most efficacious perceived concurrent management more enhancing than their less active and/or less efficacious counterparts. An alternative caveat to such perspectives might be that the most active or most efficacious individuals have more time to manage their activities. However, examination of time spent on non-exercise goals suggests that there is some truth to the old adage “If you want something done, give it to a busy person”. Individuals who were active enough to meet exercise guidelines were just as busy as those who failed to meet such guidelines (Study 1). What did differ between active and less active individuals was their self-regulatory efficacy to manage non-exercise and exercise goals concurrently.

The third contribution to the exercise literature pertains to the protocol for measurement of valued goals and concurrent self-regulatory efficacy concerning exercise. Bandura’s (1997)

recommendations about specificity and the nature of the self-regulatory performance (concurrent management of multiple actions) were taken into account and offer a different alternative to measuring self-regulatory efficacy than the more traditionally-used measure of barrier efficacy.

### *5.3 Limitations*

*Measures.* Given the new approaches utilized to examine self-regulatory efficacy and exercise in the three studies, this program of research must be considered with respect to possible study limitations. Because the investigation of concurrent management of multiple goals is new to the exercise domain, validated measures were unavailable for the present dissertation studies. The measurement paradox is that in the few studies that have examined the influence of non-exercise goals on exercise behaviour, only measures of goal conflict have been used. Investigators in the past have assumed that multiple goals must conflict with exercise in a negative manner. Since one of the objectives of this dissertation was to demonstrate that individuals may not always perceive multiple goals as interfering, goal conflict measures were not appropriate. Similarly, although item content could be borrowed from published studies of exercise-related self-regulatory efficacy where items do mention self-regulatory actions (e.g., scheduling planning, coping), they were not worded in the context of concurrent management. Thus, development and validation of the present measure of concurrent self-regulatory efficacy is required. Testing of a more developed measure among other asymptomatic and symptomatic populations would be useful to examine the potential generality of its use.

*Samples.* The study of multiple goal pursuit required a sample that consisted of individuals who had exercise goals to some extent, and were thus motivated to continue or become physically active. This prerequisite, although permitting the study of concurrently managed non-exercise goals with exercise goals, limits the generalizability of study findings to

only motivated individuals. Individuals who have quit their goal of becoming physically active because they feel their other life goals are too overwhelming may respond differently than the individuals in the present samples. It should be noted, however, that people who had previously exercised, and desired to be active again but were not currently participating were included in all three dissertation studies.

*Experimental context.* A third possible limitation concerns the experimental study, specifically. Steps were taken to obtain more objective measures of perseverance (e.g., time spent brainstorming solutions to exercise barriers and number of solutions reported) in addition to perceived measures (i.e., perseverance index). These objective measures require more development. Ideally, a prospective and objective measure of exercise perseverance would be assessed. While the perseverance measures included in Study 3 were novel and add valuable information to the experimental results, they can only suggest what may happen if participants were to actually face the exercise barriers presented in the numerous and minimal barriers conditions. Measuring naturally occurring exercise barriers and participants' numerous ways of persevering with exercise over time was outside the objectives of the present study, and of course, experimentally controlling the number of barriers is not often possible in a naturalistic setting.

#### *5.4 Strengths*

Despite these limitations, important strengths of these studies should not be overlooked. In addition to the novelty of examining the pursuit of exercise behaviour concurrently with other valued life goals, a strength in all three studies was strong ecological meaning and external validity. One underlying aim of this dissertation was to gain a better understanding of how people with busy lives realistically manage exercise, while acknowledging that other life goals

such as academics, work, and family, will be prioritized as more valued or of equal value to exercise. Studying isolated predictors of exercise behaviour without recognizing other goal behaviour is less ecologically meaningful and externally valid than considering concurrently managed activity. Furthermore, elicitation of a) participant's own non-exercise goals that were perceived to most influence their exercise goals (Studies 1 and 2), and b) salient exercise barriers (pilot study to Study 3) helped to increase ecological meaning and relevance to study participants.

There were several methodological and analytical strengths of these three dissertation studies. First, the metrics used for group dichotomization in Studies 1 and 3 were carefully considered. The values used to assign participants to groups were based on evidence-based recommendations for the amount of activity sufficient for health benefits (ACSM exercise activity guidelines, Study 1); and from the pilot study data of concurrent self-regulatory efficacy (Study 3). Another strength concerned the use of published procedures and recommendations for tests of mediation by means of hierarchical multiple regression (Study 2). Finally, use of an experimental design with random assignment of participants, as well as use of a manipulation check, were both assets to Study 3. Random assignment and experimental manipulation of barrier scenario content in Study 3 permitted a controlled test of hypotheses about exercise perseverance, while the manipulation check confirmed that differences between groups was not the result of any perceived differences in the character described in the story or believability of the scenario.

### *5.5 Future Research Directions*

The study of concurrently held exercise and non-exercise goals is in its infancy. The preliminary findings from this dissertation raise the possibility of several investigations for future

research. The influence of type and proximity of goals are both research avenues which should be explored with respect to concurrent management. With regard to type of goal, work and academic goals may have very different requirements, structure, and regulatory compatibilities with exercise as compared to self-development goals, such as becoming more altruistic. It would be informative to learn whether people manage such self-development goals along with exercise in the same manner as observed with the non-exercise goals studied in this dissertation. Similarly, there may be regulatory differences when goals are discretionary versus nondiscretionary. With respect to proximity of goals, relatively short-term goals such as those assessed here (e.g., one-month goals relating to academics) may have unique behavioural mechanisms and related social cognitions as compared to longer-term goals (e.g., becoming a doctor) and the maintenance of exercise.

Just as there may be multiple goal characteristics that could influence concurrent management of several goals, the concept of goal conflict may be more complex than originally conceived. The present findings demonstrated that goals are not always perceived to interfere with one another, as was once assumed (e.g., Gebhardt & Maes, 1998; Karoly et al., 2005). It has recently been suggested (Segerstrom & Nes, 2006) that there may be different *types* of conflict, such as inherent (whether one goal inherently helps, hurts, or has no effect on the other goal) and resource conflict (degree to which two goals use the same resources). Would the self-regulation of these types of conflict between exercise and non-exercise goals influence individuals' perseverance toward exercise behaviour? More research is needed to answer such questions and to ascertain whether these different forms of conflict are experienced by individuals attempting to exercise among other life pursuits.

It has been recommended that future research should examine the thoughts provoked by goal conflict, and more specifically, ascertain which thoughts are adaptable and assist in conflict resolution (Emmons & King, 1988). This dissertation represents a first theoretically-driven step towards understanding which social cognitions would be relevant and influential in the concurrent management of exercise and non-exercise goals. Certainly, self-efficacy has been demonstrated to be a “malleable” construct in that we know specifically how to increase efficacious beliefs (Bandura, 1997), but there may indeed be other potential mediators influencing concurrent management that were not assessed in this dissertation. Future research should seek out other changeable social cognitions that assist with the self-regulation required for successful concurrent management.

#### *5.6 Potential Practical Implications*

It is unlikely that people will have exercise as their only goal in life, or that exercise time will ever be abundant. Considering these circumstances, the present findings have important and practical implications for the management of exercise adherence by the general population.

First, given the potential influence of concurrent self-regulatory efficacy on successful management of exercise and non-exercise goals, it would be beneficial for this social cognition to be strengthened in individuals struggling with multiple goal pursuits. Potential means for enhancing self-efficacy have been clearly established and outlined elsewhere (e.g., Bandura, 1997; Maddux & Lewis, 1995), but could include strategies such as ensuring success in small, achievable concurrent activities first (e.g., scheduling in one 20-minute walk during a typical, busy week, planning an alternative plan for after-work exercise) and observing how an active individual with a similar schedule fits in exercise into their hectic lifestyle.

Second, a related practical implication would be to inform the general public that beginning an exercise regime does not have to wait until one has “more time”. Rather, the message should be that exercising frequently enough to achieve health benefits does not have to consume a vast amount of time, and that individuals who exercise do not necessarily have more time than those who do not. Spending time with family through playing games in the park, alleviating work stress and improving job focus through vigorous exercise during one’s lunch break, and learning efficient time management through staying active while studying for exams, are all examples of how management of concurrent goals can be challenging yet positively enhance the achievement of one another.

In summary, considerably more research on the concurrent pursuit of exercise with non-exercise goals is needed. However, the preliminary findings from this dissertation suggest that the previous study of exercise adherence may be framed in a one-dimensional fashion. The majority of exercise studies do not take into account the influence other valued life goals may have on exercise behaviour. Acknowledgement of potential influences between exercise and non-exercise goals may provide a more thorough understanding of how to self-regulate exercise behaviour when time and attention are limited. This research could yield practical outcomes for intervention.

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Appendix A: Ethics Approval for Study 1



Behavioural Research Ethics Board (Beh-REB)

**Certificate of Approval**

PRINCIPAL INVESTIGATOR  
Lawrence Brawley

DEPARTMENT  
Kinesiology

BEH#  
07-114

INSTITUTION(S) WHERE RESEARCH WILL BE CONDUCTED (STUDY SITE)  
University of Saskatchewan  
Saskatoon SK

STUDENT RESEARCHERS  
Mary Jung

SPONSOR  
UNFUNDED

TITLE  
Perceptions of Exercise and Other Valued Life Goals: How Competing Goals Influence Frequent and Infrequent Exerciser's Cognitions

APPROVAL DATE  
05-Jun-2007

EXPIRY DATE  
04-Jun-2008

APPROVAL OF:  
Application  
Recruitment Materials  
Consent Form  
Questionnaires

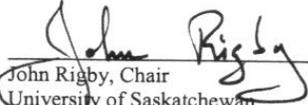
**CERTIFICATION**

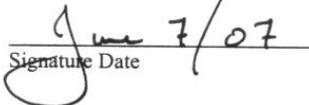
The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

**ONGOING REVIEW REQUIREMENTS**

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: <http://www.usask.ca/research/ethical.shtml>

  
John Rigby, Chair  
University of Saskatchewan  
Behavioural Research Ethics Board

  
Signature Date

Please send all correspondence to:

Ethics Office  
University of Saskatchewan  
Room 306 Kirk Hall, 117 Science Place  
Saskatoon SK S7N 5C8  
Telephone: (306) 966-2084 Fax: (306) 966-2069





Think of all the tasks you do during a **typical week** over the next 4 weeks in order to progress towards achieving your **exercise** goal (e.g., fitness classes, working out, personal training sessions, preparing from workouts, etc.). How many hours during a typical week do these types of exercise tasks take you? \_\_\_\_\_ **hrs/week**

Thus far, we have asked you questions about your academic, social, work/family, and exercise goals.

Now we would like to learn more specifically about *the one most valued nonexercise goal that requires the greatest effort to manage along with exercise* (choose **one** of: academics, social, work, or family).

Please check your chosen goal that requires the most effort:

- academics
- social
- work
- family

The goal that you just checked off will, from here on, be referred to as your “**OTHER IMPORTANT GOAL**”.

Now we would like you to answer questions about the concurrent management of this goal with exercise.

Please keep in mind that your “other important goal” is the goal that you feel requires the most concurrent management with exercise.

### **Perceived Concurrent Management of Valued Goals**

INSTRUCTIONS: Please use the two definitions and the scale provided below to indicate how you characterize the concurrent management of your exercise and other valued goal.

#### Definitions

**Challenging** means that the pursuit of exercise and your other valued goal requires time, effort, persistence, and attention which is fulfilling and yet demanding. Management is very successful and you feel that these goals enhance each other, such that it is easier to accomplish both.

**Counterproductive** means that the pursuit of exercise and your other valued goal requires time, effort, persistence, and attention which is not fulfilling yet demanding. Management is exhausting, requires you to struggle, and wonder if it is worth it because you find these goals interfere with each other.

**Indicate the degree to which you believe your concurrent management of exercise and your other valued goal pursuits is best characterized:**

1	2	3	4	5	6	7	8	9
Completely interfere with each other			Struggle is manageable			Challenging and can accomplish both		

**Physical Activity Recall**

Please think back to the **past week** and answer the following questions as honestly as possible. How many times **on average** did you do the following kinds of exercise for **30 minutes continuously or more** during your **free time**? Write the appropriate **number of times** per week on each line.

*Times per week*

**STRENUOUS EXERCISE (your heart beats rapidly):**

(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, skating) \_\_\_\_\_

**MODERATE EXERCISE (not exhausting):**

(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, dancing) \_\_\_\_\_

**Physical Activity Intentions**

**INSTRUCTIONS:** Consider a typical week over the upcoming 4 weeks and the concurrent management you will have to do with exercise and your other important goal.

A. Please indicate in the blank space below the **number of days per week** that you **intend** to exercise at a moderate intensity (non-exhausting exercise, such as fast walking, tennis, etc) for at least 30 minutes continuously. Try to be as accurate as possible in your intentions.

I intend to perform **moderate exercise** \_\_\_\_\_ times per week (for a minimum of 30 minutes) over the course of the next week.

Please **circle** the number that best represents the strength of your intentions for performing **moderate exercise** (1 – 9).

1	2	3	4	5	6	7	8	9	
Definitely will not exercise									Definitely will exercise

Again, consider a typical week over the upcoming 4 weeks and the concurrent management you will be required to do in order to progress at both your exercise and your other valued goal.

B. Please indicate in the blank space below the **number of days per week** that you **intend** to exercise at a **strenuous intensity** (heart beats rapidly, such as running, vigorous swimming, etc) for at least 30 minutes continuously. Try to be as accurate as possible in your intentions.

I intend to perform **strenuous exercise** \_\_\_\_\_ times per week (for a minimum of 30 minutes) over the course of the next week.

Please **circle** the number that best represents the strength of your intentions for performing **strenuous exercise** (1 – 9).

1	2	3	4	5	6	7	8	9	
<b>Definitely will not exercise</b>									<b>Definitely will exercise</b>

### Confidence in Your Abilities to Manage Your Goals

**INSTRUCTIONS: Think about concurrently managing exercise *with* your other most important goal.** Now, please use the scale below to rate your confidence in your ability to manage **both** important goals over ***a typical week in the next four weeks:***

During a <b><i>typical week</i></b> , how confident are you in your ability to <b>concurrently manage both</b> your exercise and your other important goal?										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all									Extremely	
Confident									Confident	
During a <b><i>typical week</i></b> , how confident are you in your ability to manage <b>both</b> your exercise and your other important goal <b>so that your time is used effectively?</b>										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all									Extremely	
Confident									Confident	
During a <b><i>typical week</i></b> , how confident are you in your ability to manage the goal-setting for <b>both</b> your exercise and your other important activity so that your goals for the week are reached?										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all									Extremely	
Confident									Confident	

During a <i>typical week</i> , how confident are you in your ability to make up for any missed sessions for <b>both</b> your exercise and your other important goals?										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all Confident										Extremely Confident
During a <i>typical week</i> , how confident are you in your ability to accurately monitor your time so that your progress for <b>both</b> your exercise and your other important activity is effective?										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all Confident										Extremely Confident

### Perseverance

**INSTRUCTIONS:** Thinking of concurrently managing both your exercise and your other important goal, please use the scale below to rate your perseverance with respect to both goals.

1. Each and every week, how much time are you willing to put forth in order to pursue your goals for the next 4 weeks?

1	2	3	4	5	6	7	8	9	
Little to no time								Will spend as much time as it takes	

2. Each and every week, how much effort are you willing to put forth in the pursuit of these goals for the next 4 weeks?

1	2	3	4	5	6	7	8	9	
Little to no effort								Will put forth as much effort as it takes	

3. Each and every week, how willing are you to persist with your strategies towards the pursuit of these goals for the next 4 weeks?

1	2	3	4	5	6	7	8	9	
Would not persevere at all								Will to persist until both goals are achieved	

4. Each and every week, how much of your attention can you direct towards pursuing both of these goals for the next 4 weeks?

1 2 3 4 5 6 7 8 9  
Little to no attention needed Complete attention is  
to achieve both goals

## Appendix C: Ethics Approval for Study 2



Behavioural Research Ethics Board (Beh-REB)

### *Certificate of Approval*

PRINCIPAL INVESTIGATOR  
Lawrence Brawley

DEPARTMENT  
Kinesiology

BEH#  
07-252

INSTITUTION(S) WHERE RESEARCH WILL BE CONDUCTED (STUDY SITE)  
University of Saskatchewan  
Saskatoon SK

STUDENT RESEARCHERS  
Mary Jung

SPONSOR  
UNFUNDED

TITLE  
The Influence of Self-Regulatory Efficacy on Exercise Behaviour: A Test of Mediation over the Academic Examination Period

APPROVAL DATE	EXPIRY DATE	APPROVAL OF:
26-Nov-2007	25-Nov-2008	Ethics Application Consent Protocol Survey

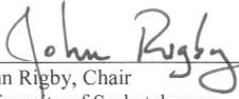
#### **CERTIFICATION**

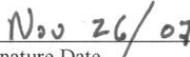
The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

#### **ONGOING REVIEW REQUIREMENTS**

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: <http://www.usask.ca/research/ethical.shtml>

  
\_\_\_\_\_  
John Rigby, Chair  
University of Saskatchewan  
Behavioural Research Ethics Board

  
\_\_\_\_\_  
Signature Date

Please send all correspondence to:

Ethics Office  
University of Saskatchewan  
Room 306 Kirk Hall, 117 Science Place  
Saskatoon SK S7N 5C8  
Telephone: (306) 966-2084 Fax: (306) 966-2069

Appendix D: Study 2 Questionnaires

**Demographic information**

Thank you for participating in this study. Please remember that there will be no way for you or your data to be identified, and that your confidentiality is ensured. After you have received your remuneration, your email address will be disassociated from the answers you provide. If you have any questions, please do not hesitate to contact the primary researcher at [mary.jung@usask.ca](mailto:mary.jung@usask.ca), or call at 966-1099. Thank you!

Please provide your primary email address. This will be used to contact you for the next 4 weeks:

\_\_\_\_\_

Age: \_\_\_\_\_

Sex: \_\_\_\_\_

How many December exams do you have scheduled this year?: \_\_\_\_\_

**Life Goals**

A goal is defined here as an objective we try to accomplish or achieve by making our behaviour consistent with our goal. For example, if my goal is to maintain my standing on the academic Honours Roll, I would need to continue studying and attending all classes. If my goal was to complete a new, challenging work project, my work ethic behaviour may need to become more focused, and I may need to work longer on certain days of the week in order to attain that goal. Many of us have several goals in our lives. Please identify *your most important* goals below.

In the space provided below, please identify your most important **academic** goal that requires various steps or behavioural acts to achieve (e.g., studying, classes, notes, reviewing, group work):

\_\_\_\_\_  
\_\_\_\_\_

Please indicate how much value you place on achieving this academic goal.

1	2	3	4	5	6	7	8	9	
I do not value this goal at all									I value this goal very much

Think of all the tasks you do **during a typical week** in order to progress towards achieving your academic goal (e.g., classes, homework, time spent studying, tutorials, group work, etc.). How many hours during a typical week do these types of academic tasks take you? \_\_\_ **hrs/week**

In the space provided below, please identify your most important **exercise** goal that requires various steps or behavioural acts to achieve (e.g., engaging in specific workouts coinciding with your goal, getting information on how to achieve this goal, meeting with personal trainers, etc.):



## Physical Activity Recall

Please think back to the **past week** and answer the following questions as honestly as possible. How many times did you do the following kinds of exercise for **30 minutes continuously or more** during your **free time**? Write the appropriate **number of times** per week on each line.

*Times per week*

### STRENUOUS EXERCISE (your heart beats rapidly):

(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, skating OR any activity at about this)

### MODERATE EXERCISE (not exhausting):

(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, dancing)

## Confidence in Your Abilities to Manage Your Goals

### INSTRUCTIONS: Think about *concurrently managing exercise with your academic goal*.

Now, please use the scale below to rate your confidence in your ability to manage **both** important goals over *the next 7 days*:

During the <i>next week</i> , how confident are you in your ability to <b>concurrently manage both</b> your exercise and your academic goal?											
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
Not at all										Extremely	
Confident										Confident	
During the <i>next week</i> , how confident are you in your ability to manage <b>both</b> your exercise and your academic goal <b>so that your time is used effectively</b> ?											
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
Not at all										Extremely	
Confident										Confident	
During the <i>next week</i> , how confident are you in your ability to manage the goal-setting for <b>both</b> your exercise and your academic activity so that your goals for the week are reached?											
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
Not at all										Extremely	
Confident										Confident	
During the <i>next week</i> , how confident are you in your ability to make up for any missed sessions for <b>both</b> your exercise and your academic goals?											

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all										Extremely
Confident										Confident
During the <i>next week</i> , how confident are you in your ability to accurately monitor your time so that your progress for <b>both</b> your exercise and your academic activity is effective?										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all										Extremely
Confident										Confident

### Perceived Difficulty

Over the next 7 days, how difficult do you anticipate it will be for you to balance both academic and exercise goals?

1	2	3	4	5	6	7	8	9
Extremely				Somewhat				Not
difficult				difficult				difficult
								at all

Appendix E: Ethics Approval for Study 3



UNIVERSITY OF  
SASKATCHEWAN

Behavioural Research Ethics Board (Behavioural Research Ethics Board)

**Certificate of Approval**

PRINCIPAL INVESTIGATOR  
Lawrence Brawley

DEPARTMENT  
Kinesiology

BEH#  
08-101

INSTITUTION(S) WHERE RESEARCH WILL BE CONDUCTED  
University of Saskatchewan  
Saskatoon SK

STUDENT RESEARCHERS  
Mary Jung

SPONSOR  
UNFUNDED

TITLE  
Does Greater Concurrent Exercise Self-Regulatory Efficacy Lead to Greater Exercise Persistence? A Test of Self-Efficacy Theory in Working Mothers

ORIGINAL REVIEW DATE  
10-Apr-2008

APPROVAL ON  
30-May-2008

APPROVAL OF:  
Ethics Application  
Consent Protocol

EXPIRY DATE  
29-May-2009

Full Board Meeting

Date of Full Board Meeting:

Delegated Review

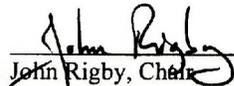
**CERTIFICATION**

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

**ONGOING REVIEW REQUIREMENTS**

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: [http://www.usask.ca/research/ethics\\_review/](http://www.usask.ca/research/ethics_review/)

  
John Rigby, Chair  
University of Saskatchewan  
Behavioural Research Ethics Board

Please send all correspondence to:

Ethics Office  
University of Saskatchewan  
Room 302 Kirk Hall, 117 Science Place  
Saskatoon SK S7N 5C8  
Telephone: (306) 966-2975 Fax: (306) 966-2069

## **NUMEROUS EXERCISE BARRIERS CONDITION**

### **A typical day in the life of: a busy working mother**

**INSTRUCTIONS:** Please read through the following story carefully. You may have already experienced situations like those described below. Please consider yourself in this situation as you read through the story.

Jennifer is a 37-year old mother of two children, Annie (age 7) and Chloe (age 5). Jennifer took maternity leave from work when both of her daughters were born, and headed back to work when each daughter reached 12 months. She loves spending time with her daughters, who are involved in a variety of extracurricular activities throughout the week.

A typical week for Jennifer is quite busy. This particular time of year is busiest for work – so that means more hours than usual at the office. Jennifer works extra hours whenever possible. On top of the larger than usual to-do list on top of her desk, the to-do list at home is also lengthy. After getting home from work, picking up the kids from after-school daycare, deciding what to make for dinner, coordinating with her husband who watches the kids while the other runs to the grocery store, making dinner, cleaning up, bathing the kids and getting them ready for school the next day, there is barely enough time to spend having “fun” with the kids, never mind exercising! To top it off, the girl’s summer sport leagues have started, which means most week nights are filled with either practices or games. This means later dinners and even more rushed attempts to try and get the whole family ready for the next day on those nights.

Jennifer really does want to exercise, not just because she knows she should for health reasons like better sleep and lower anxiety, but also because she’s feeling like she needs to for herself. But when is there time for exercise? Even when there *is* a spare half hour after making dinner, taking the kids to their respective activities, and making sure they bathe and are in bed on time, deciding to exercise is a struggle. Life right now is exhausting, and it’s tough for her to cultivate the energy or motivation for exercise. Lack of time, energy, motivation, and increasing work commitments and desire to spend more time with the kids are all culprits that are making it hard to exercise, but Jennifer believes it is not impossible.

Even if Jennifer was able to make time for exercise, and muster up the energy, she has already heard complaints this year that “Mommy is tired all the time”, and “Mommy never has time to play with me anymore”. Placing exercise for herself over time with the kids, let alone time with *her* friends and family is to say the least, difficult. Yet Jennifer imagines if she was to exercise regularly, she would have the energy for Annie and Chloe despite her busy demanding days.

## **MINIMAL EXERCISE BARRIERS CONDITION**

### **A typical day in the life of: a busy working mother**

INSTRUCTIONS: Please read through the following story carefully. You may have already experienced situations like those described below. Please consider yourself in this situation as you read through the story.

Jennifer is a 37-year old mother of two children, Annie (age 7) and Chloe (age 5). Jennifer took maternity leave from work when both of her daughters were born, and headed back to work when each daughter reached 12 months. She loves spending time with her daughters, who are involved in a variety of extracurricular activities throughout the week.

After graduating from university, Jennifer moved to a mid-size city (population 500,000) with her husband, of whom she met whilst at university. Both Jennifer and her husband worked for a few years before deciding they wanted to start a family. Their first child, Annie, is named after Jennifer's grandmother – of whom Jennifer was particularly close to. Her full name is Angelina. Jennifer's second child, Chloe, is named after her husband's mother's middle name. All in all, the four make a happy family.

A typical week for Jennifer is fairly busy. This particular time of year is one of the busiest for work – so that means more hours than usual at the office. Due to her work industry, each spring through until the end of summer, Jennifer's work tasks are greater in number than usual. She doesn't mind the extra work, and is acknowledged for her increased performance by her boss, but it does mean that Jennifer puts in extra hours whenever possible during the spring and summer months. Jennifer lives not too far from her area of work and so getting home to manage family meals alongside her husband still happens despite her slightly busier schedule.

The girl's summer sport leagues have started, which means most week nights are filled with either practices or games. Her husband gets the children to most of their activities and this gives Jennifer some spare time when she gets home.

With respect to lifestyle, Jennifer really does want to exercise. First off, she knows that she should for health reasons. She is aware of the benefits of exercising, such as decreasing blood pressure, being able to sleep better and decreasing anxiety. Also, Jennifer wants to exercise because she's feeling like she needs to. But Jennifer would need to find the time for exercise within her lifestyle right now. Jennifer believes that finding this time for exercise would not be impossible.

Although she hasn't started to exercise right now, Jennifer still has the desire to become physically active. Jennifer imagines if she was to exercise regularly, she might have more energy for Annie and Chloe.

## Appendix G: Study 3 Questionnaires

### Demographic information

Thank you for participating in this study. Please remember that there will be no way for you or your data to be identified, and that your confidentiality is ensured. After you have received your remuneration, your email and mailing address will be disassociated from the answers you provide. If you have any questions, please do not hesitate to contact the primary researcher at [mary.jung@usask.ca](mailto:mary.jung@usask.ca), or call at 966-1099. Thank you!

Age: \_\_\_\_\_  
Number of children: \_\_\_\_\_  
Age of each child: \_\_\_\_\_

Partner status:

single       common law       married       divorced

Please describe the ethnic group to which you belong to:

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Please indicate your approximate household annual gross income:

\$0-20,000     \$21,000-40,000     \$41,000-60,000     \$61,000-80,000

\$81,000-100,000     \$101,000-120,000     \$121,000-140,000     \$161,000 or more

How many activities (e.g., soccer, tee ball, music lessons) is/are your child(ren) involved in each week? \_\_\_\_\_

### Concurrent Management of Life Goals

Now we would like you to answer questions about the **concurrent management** of your work, family, and exercise goals.

INSTRUCTIONS: Please use the two definitions and the scale provided below to indicate how you characterize the concurrent management of your various life goals.

Definitions

**Challenging** means that the pursuit of your valued life goals requires time, effort, persistence, and attention which is fulfilling and yet demanding. Management is very successful and you feel that these goals enhance each other, such that it is easier to accomplish all of them at once.

**Counterproductive** means that the pursuit of your valued life goals requires time, effort, persistence, and attention which is not fulfilling yet demanding. Management is exhausting,

requires you to struggle, and wonder if it is worth it because you find these goals interfere with each other.

**1. Indicate the degree to which you believe your concurrent management of work, family, and exercise goals pursuits is best characterized:**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Completely interfere with each other</b>			<b>Struggle is manageable</b>					<b>Challenging and can accomplish both</b>

**Exercise Barriers**

This section pertains to exercise barriers. Exercise barriers are obstacles or circumstances that you have found make your exercise challenging or impossible to complete.

Please explain each barrier with as much detail as you can. If you have not experienced a setback, please continue on to the next question.

EXERCISE BARRIER #1:

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HOW LIMITING WAS THIS BARRIER?

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Did not limit my exercise at all</b>				<b>Limited me on at least half of my exercise attempts</b>				<b>Completely prevented me from exercising</b>

HOW FREQUENTLY DID THIS BARRIER OCCUR **PER WEEK**?

---

EXERCISE BARRIER #2:

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---

HOW LIMITING WAS THIS BARRIER?

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Did not limit my exercise at all</b>				<b>Limited me on at least half of my</b>				<b>Completely prevented me from exercising</b>

exercise attempts

HOW FREQUENTLY DID THIS BARRIER OCCUR **PER WEEK**?

---

EXERCISE BARRIER #3:

---

---

HOW LIMITING WAS THIS BARRIER?

1	2	3	4	5	6	7	8	9
Did not limit my exercise at all			Limited me on at least half of my exercise attempts			Completely prevented me from exercising		

HOW FREQUENTLY DID THIS BARRIER OCCUR **PER WEEK**?

---

EXERCISE BARRIER #4:

---

---

HOW LIMITING WAS THIS BARRIER?

1	2	3	4	5	6	7	8	9
Did not limit my exercise at all			Limited me on at least half of my exercise attempts			Completely prevented me from exercising		

HOW FREQUENTLY DID THIS BARRIER OCCUR **PER WEEK**?

---

**Physical Activity Recall:**

Please think back to the **past week** and answer the following questions as honestly as possible. How many times **on average** did you do the following kinds of exercise for **30 minutes continuously or more** during your **free time**? Write the appropriate **number of times** per week on each line.

*Times per week*

**STRENUOUS EXERCISE (your heart beats rapidly):**

(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, skating)

**MODERATE EXERCISE (not exhausting):**

(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, dancing)

**Confidence in Your Abilities to Manage Your Goals despite Exercise Barriers**

INSTRUCTIONS: Thinking of the barriers described in the scenario, and all of your current life goals (e.g., family, work, and exercise goals), please use the scale below to rate your confidence in your ability to manage **all of your life goals concurrently** over *the next 7 days*:

During the <i>next week</i> , how confident are you in your ability to <b>concurrently manage both</b> your exercise and your academic goal?										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all Confident										Extremely Confident
During the <i>next week</i> , how confident are you in your ability to manage <b>both</b> your exercise and your academic goal <b>so that your time is used effectively</b> ?										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all Confident										Extremely Confident
During the <i>next week</i> , how confident are you in your ability to manage the goal-setting for <b>both</b> your exercise and your academic activity so that your goals for the week are reached?										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all Confident										Extremely Confident
During the <i>next week</i> , how confident are you in your ability to make up for any missed sessions for <b>both</b> your exercise and your academic goals?										
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all										Extremely

Confident	Confident
During the <i>next week</i> , how confident are you in your ability to accurately monitor your time so that your progress for <b>both</b> your exercise and your academic activity is effective?	
0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%	
Not at all Confident	Extremely Confident

**EXERCISE PERSEVERANCE**

\*Note that the researcher will at this point discreetly time how long the participant takes in completing this measure.

**Brainstorming Solutions**

INSTRUCTIONS: Please list **as many plausible solutions** as you can in order to deal with the exercise barriers you just read about. Solutions do not have to be limited to ones that only you would use, but all suggested solutions should be realistic. Please use the backside of this paper to add more if you can!

Solution #1.

Solution #2.

Solution #3.

Solution #4.

Solution #5.

Solution #6.

Solution #7.

Solution #8.

Solution #9.

Solution #10.

Please use the back of this page if you have more solutions!

## ANTICIPATORY PERSEVERANCE

### Perseverance

**INSTRUCTIONS: Think of the exercise barriers in the story and solutions you proposed. If you encountered these barriers in the next 7 days, what would your perseverance for your exercise be like?**

1. How much time are you willing to put forth in order to pursue your exercise over the next 7 days, considering these barriers?

1	2	3	4	5	6	7	8	9
Little to no time								Will spend as much time as it takes

2. How much effort are you willing to put forth in the pursuit of your exercise over the next 7 days?

1	2	3	4	5	6	7	8	9
Little to no effort								Will put forth as much effort as it takes

3. How willing are you to persist with your solutions towards the pursuit of your exercise over the next 7 days?

1	2	3	4	5	6	7	8	9
Would not persevere at all								Will persist until both goals are achieved

4. How much of your attention can you direct towards applying your solutions so you can exercise over the next 7 days?

1	2	3	4	5	6	7	8	9
Little to no attention needed								As much attention that is to achieve both goals



Appendix H: Limitation and Frequency of Exercise Barriers Used in Experiment

Exercise Barrier	Barrier Limitation (SD)	Frequency of Barrier (SD)
Work commitments	6.25 (1.98)	2.75 (0.71)
Domestic commitments	6.50 (2.12)	6.00 (1.41)
Children's extracurricular activities	5.67 (2.08)	2.33 (1.53)
Preference to spend free time with children	6.20 (1.79)	4.2 (1.92)
Guilt associated with not spending free time with children	8.50 (0.71)	5.00 (2.82)
Lack of exercise motivation	7.00 (2.19)	4.33 (3.88)
Fatigue	7.09 (2.34)	4.75 (2.67)
General lack of time	7.04 (2.31)	5.73 (2.81)

Note: Barrier Limitation represents the mean reported limiting factor of the barrier on exercise behaviour using a 1 (did not limit) to 9 (completely limited) Likert scale, Frequency of Barrier represents the mean reported frequency in which the barrier occurred in the past 7 days.