

Can a Manipulated Mind Alter Matter? : The Effects of Verbal Feedback on Self-Efficacy, Exercise Intention, and Exercise Behaviour among Low-Active College-Aged Women

Christyn Oda, MA PHED

Submitted in partial fulfillment of the requirements for  
the degree of Master of Arts in Applied Health Sciences  
(*Health and Physical Education*)

Under the supervision of Dr. Kimberley L. Gammage

Faculty of Applied Health Sciences

Brock University

St. Catharines, Ontario

Christyn Oda © August, 2013

**Abstract**

Self-efficacy (SE), a person's confidence in the ability to perform a task, is an important predictor of the adoption and maintenance of physical activity. The present study examined the effects of SE manipulated through verbal persuasion on exercise intentions and behaviour during a 4-week follow-up period and investigated the role of social physique anxiety (SPA) as a moderator. Female college infrequent exercisers ( $n = 66$ ) were randomly assigned into one of three groups (high-efficacy [HE], low-efficacy [LE], or control) and asked to complete several questionnaires at baseline. The HE and LE groups were provided with positive and negative exercise adherence feedback, respectively. The HE group reported higher SE from pre- to post-feedback. Both the HE and LE groups reported increases in exercise behaviour at the 4-week follow-up. Pre- to post-feedback changes in SE, exercise intention, and exercise behaviour did not depend on level of SPA reported.

Key words: Self-efficacy, exercise, feedback, college women, intention, social physique anxiety

**Acknowledgements**

The successful completion of this research project would not have been possible without the contribution and support of several noteworthy people.

First and foremost, I would like to offer my sincerest gratitude to my thesis committee members. I would like to thank Dr. Krista Chandler for your generous and kind feedback, and Dr. Alan Adkin for your assistance and insightful contributions toward my research project. A special thank you goes to Dr. Larkin Lamarche for your continued support, commendable wisdom, and regular comic relief throughout this process.

In addition, I would like to express the deepest appreciation to my supervisor, Dr. Kimberley Gammage. I have no words to describe how incredibly fortunate I feel to have been one of your Masters students. Without your guidance, understanding, limitless knowledge, and endless hours of editing, this research project would not have been possible.

Finally, I must acknowledge my family and close friends for your unconditional encouragement and support during my Masters career at Brock University.

## Table of Contents

Abstract .....	ii
Acknowledgements .....	iii
CHAPTER 1: REVIEW OF LITERATURE .....	1
Exercise Adherence .....	1
Self-Efficacy .....	2
Sources of Self-Efficacy .....	2
Dimensions of Self-Efficacy .....	6
Outcomes of Self-Efficacy .....	7
Self-Efficacy as a Predictor of Behaviour .....	9
Self-Efficacy as a Predictor of Exercise .....	10
Task-Specific Self-Efficacy as a Predictor of Exercise Initiation .....	12
Self-Regulatory Self-Efficacy as a Predictor of Exercise Adherence and Coping .....	14
Perceived Behavioural Control as a Predictor of Exercise Intention and Behaviour .....	18
Body Image .....	23
Exercise and Body Image .....	25
Exercise and SPA .....	26
Body Image and Self-Efficacy .....	28
Effects of Verbal Feedback on Self-Efficacy and Performance in Physical Activity	
Settings .....	29

Body Image as a Moderator of the Relationship between Verbal Feedback and	
Exercise-Related Outcomes .....	38
CHAPTER 2: RATIONALE, PURPOSE, & HYPOTHESES .....	40
Rationale.....	40
Purpose Statement .....	44
Hypotheses .....	44
CHAPTER 3: METHODOLOGY .....	50
Participants .....	50
Materials.....	52
Procedures .....	56
CHAPTER 4: RESULTS .....	61
Treatment of Missing Data.....	61
Subscale Scoring .....	611
Assumptions .....	622
Manipulation Check .....	64
Hypotheses Testing .....	64
CHAPTER 5: DISCUSSION.....	71
Hypothesis 1: Verbal Feedback and Self-Regulatory Self-Efficacy .....	711
Hypothesis 2: Verbal Feedback and Behavioural Intention.....	75
Hypothesis 3: Verbal Feedback and Exercise Behaviour .....	777

Hypothesis 4: SPA as a Moderator .....	811
Extending the Current Literature.....	83
Limitations .....	85
Future Directions.....	85
Implications.....	86
References .....	87
Appendix A: Questionnaires .....	101
Demographic Information .....	101
Behavioural Intention Scale (BIS).....	1022
Godin Leisure-Time Exercise Questionnaire (GLTEQ) .....	103
Self-Regulatory Self-Efficacy Scale (SRSES) .....	1044
Social Physique Anxiety Scale (SPAS).....	1055
Deception Bogus Item Questionnaire (DBIQ) .....	1066
Appendix B: REB: Certificate of ethics clearance .....	108
Appendix C: Verbal script: Class announcement .....	1099
Appendix D: Poster advertisement .....	110
Appendix E: Letter of Invitation .....	1111
Appendix F: Informed Consent .....	1122
Appendix G: Verbal script: Initial session.....	1133
Appendix H: Cover Story .....	1155

Appendix I: Bell-curved graphs: Exercise adherence likelihood score for LE and HE conditions.....	116
Appendix J: Three-week follow-up email: Booster.....	117
Appendix K: Debriefing Form .....	118
Appendix L: Post-debrief consent form .....	120
Appendix M: Feedback request form .....	1211

## CHAPTER 1: REVIEW OF LITERATURE

### Exercise Adherence

As a primary emphasis of health promotion and prevention, regular physical activity provides widespread benefits to Canadians of all ages. When evaluating the general well-being and overall quality of life of active individuals, the importance and benefits of exercise are clear. It has been shown that regular exercise can reduce high blood pressure and cholesterol, promote the development of healthy bones, muscles, and joints, and help prevent injury and several chronic illnesses such as diabetes and heart disease (Penedo & Dahn, 2005; Public Health Agency of Canada [PHAC], 2011). Furthermore, people who are physically active demonstrate more positive mood and energy levels with lower levels of anxiety and depression (PHAC, 2011; Stephens, 1988).

While the physical and psychological benefits of regular physical activity have been extensively documented, low levels of exercise adherence continue to persist (Rodgers & Brawley, 1991). It has been shown that within the first six months of initiating an exercise regimen, half of all individuals drop out (Dishman & Sallis, 1994; Robison & Rogers, 1994; Rodgers, Hall, Blanchard, McAuley, & Munroe, 2002). However, in order to gain the exercise-related health benefits, long-term maintenance is crucial (Marcus et al., 2000). As a result, determinants of exercise adherence have become a central focus in the literature, with the aim to increase exercise participation and maintenance amongst Canadians.



**Self-Efficacy**

While various physiological, cognitive, social, and environmental factors have been shown to predict the adoption and maintenance of physical activity, self-efficacy has consistently been identified as one of the most important determinants (O'Leary, 1985). As a situation-specific characteristic rather than a global personality trait, self-efficacy represents a person's confidence in the ability to perform a specific task in a specific context (Bandura, 1994; Strecher, McEvoy DeVellis, Becker, & Rosenstock, 1986). Individuals with a high sense of self-efficacy tend to have a robust belief in their skills, exert great amounts of effort when confronted with challenging situations, and are quick to rebuild their sense of self-efficacy after failures (Bandura, 1994). However, a high sense of self-efficacy can also impede an individual's performance due to overconfidence in capabilities and underestimation of effort required (Bandura, 1994; Vancouver, Thompson, Tischner, & Putka, 2002). Individuals with a low sense of self-efficacy are likely to have minimal faith in their skills, demonstrate low commitment patterns, give up quickly, and are slow to rebuild their sense of self-efficacy after failures (Bandura, 1994).

**Sources of Self-Efficacy**

Bandura and Adams (1977) identified four sources that can build and sustain an individual's sense of self-efficacy. Mastery experience is the most potent source of self-efficacy, involving repeated successful performances of a given task (Bandura, 1994; Escarti & Guzman, 1999). Gaining personal experience through actual performance successes raises self-efficacy beliefs and promotes the development and refining of skills necessary for success (Bandura, 1994; Strecher et al., 1986). For example, successful

academic performance on a multiple-choice exam fosters the development of self-efficacy through personal experience, such that the individual becomes more confident in his or her ability to succeed on multiple-choice exams in the future. However, repeated failures of a given task may lower self-efficacy beliefs, particularly if the individual is inexperienced at performing that task (Bandura, 1994). For instance, unsuccessful performance on an essay assignment may undermine self-efficacy, such that the individual loses faith in his or her writing capabilities.

Second to mastery, vicarious experience, learning and acquiring skills through the observation of models, fosters a robust sense of self-efficacy (Bandura, 1994; Strecher et al., 1986). Viewing successful performances by models, individuals who possess similar attributes to the observer, can boost perceived self-efficacy by inspiring the observers to believe they too can succeed (Bandura, 1994). The more similar the model, the more likely self-efficacy will be impacted (Bandura, 1986). For example, observing a peer successfully prepare and serve an elaborate meal may prompt the observer to believe he or she also possesses the cooking skills necessary to produce the same outcome. However, witnessing a model fail at a given task may lower perceived self-efficacy, discouraging the observer from engaging in that task (Bandura, 1994). Observing a friend's unsuccessful attempts at snowboarding, for example, may undermine the observer's confidence in his or her ability to perform this same task.

The third most influential source of self-efficacy, and the focus of this research proposal, is social persuasion. Social persuasion refers to providing individuals with encouragement or information on their performance of a given task in order to direct or motivate them to believe they possess the skills necessary to succeed (Bandura, 1994;

Karl, O’Leary-Kelly, & Martocchio, 1993). Social persuasion from others can be used to influence many areas of human performance, including academic, physical, and cognitive functioning (Bandura, 1994). For example, receiving encouragement from a teacher following a test may persuade students to believe they possess the skills required to excel in that particular subject. Often employed in the health field, evaluative feedback from others regarding performance can foster the development of skills and a robust sense of self-efficacy (Bandura, 1994; O’Leary, 1985). However, several factors can impact the influence of the persuasory appraisal (Bandura, 1994; Bandura, 1997; Karl et al., 1993).

Firstly, the impact of social persuasion is strongly influenced by the level of expertise, credibility, and appeal of the source supplying the feedback (Bandura, 1994; Bandura, 1997). Individuals experience higher boosts in perceived self-efficacy if the provider of the feedback is knowledgeable on the topic of interest, trustworthy, and reputable (Bandura, 1994; Bandura, 1997; Maddux & Stanley, 1986; Strecher et al., 1986). For example, a student enrolled in a statistics course is more likely to experience increases in self-efficacy beliefs by receiving performance evaluations from his or her statistics professor, an individual who is knowledgeable on the topic, credible, and ultimately more convincing, than his or her peer in the same class.

Next, the believability of the social appraisal is a factor that influences changes in an individual’s sense of self-efficacy following feedback (Bandura, 1994; Bandura, 1997). While unrealistic and disingenuous social persuasion encourages failure and weakens an individual’s confidence in his or her skills, realistic and sincere performance feedback invites success and enhances perceived self-efficacy (Bandura, 1994; Bandura, 1997; Maddux & Stanley, 1986). Providing a friend with unrealistic feedback regarding

his or her performance during a hockey game by declaring he or she performed better than an NHL athlete may weaken the individual's self-efficacy beliefs. However, realistic and sincere performance feedback, such as highlighting particular hockey plays that were executed successfully by the individual, may enhance self-efficacy beliefs.

The strength of one's self-appraisal also moderates the effect of performance feedback from others on self-efficacy (Bandura, 1994; Bandura, 1997). If individuals are more confident in their judgments of their own capabilities compared to the feedback of others, social persuasion has little or no effect on self-efficacy (Bandura, 1997; Maddux & Stanley, 1986). However, if the social appraisal is moderately beyond what the individual believes he or she is already capable of, perceived self-efficacy is expected to increase (Bandura, 1997).

Finally, a social appraisal can exert a more powerful influence on self-efficacy beliefs if multiple types of performance feedback are utilized (Bandura, 1994). Providing verbal and non-verbal forms of performance feedback simultaneously is more likely to influence the recipient's self-efficacy beliefs concerning that particular task (Bandura, 1994). For example, a teacher providing both verbal encouragement, such as praise, and non-verbal encouragement, such as written comments or a graph demonstrating academic progress, is more likely to influence a student's self-efficacy beliefs than a teacher providing verbal encouragement alone.

Fostering a robust sense of self-efficacy through social persuasion thus requires a constructive balance of credible, realistic, and optimistic feedback of capabilities (Bandura, 1994; Bandura, 1997; Karl et al., 1993; Lamarche, Gammage, & Adkin, 2011). However, perceived self-efficacy can equally be weakened through social persuasion. In

fact, it is more difficult to boost perceived self-efficacy through social persuasion than it is to undermine it (Bandura, 1994; Bandura, 1997). Receiving unrealistic or exaggerated feedback promotes false hope, high expectations, and inflated self-beliefs, and is quickly invalidated upon recognizing one's actual potential (Bandura, 1997). Consequently, self-efficacy is weakened as one's capabilities are inaccurately perceived to be insufficient or lacking, devaluing and underestimating actual skills (Bandura, 1997).

The final source of self-efficacy involves the perception and interpretation of one's physiological and emotional states during a given task (Bandura, 1994; Bandura & Adams, 1977). Aversive emotional and physiological states experienced during the task, including negative mood, fatigue, and pain, generally lower an individual's confidence in his or her ability to accomplish the task (Bandura, 1994; Bandura & Adams, 1977; Maddux & Stanley, 1986). However, Bandura (1994) stressed that affective and physiological arousal can be perceived and interpreted as a facilitator or a debilitator, depending on the individual. For example, prior to an exam, a student may interpret an elevated heart rate as a positive reaction, indicative of excitement and readiness. However, prior to the same exam, another student may interpret an elevated heart rate as detrimental to his or her performance, representing anxiety and unpreparedness. Recalling past physiological or emotional arousal experienced during a given task may influence an individual's self-efficacy beliefs during a similar situation, positively or negatively (Bandura, 1994).

### **Dimensions of Self-Efficacy**

Perceptions of self-efficacy can vary in terms of generality, strength, and magnitude (Maddux & Stanley, 1986). The dimension of generality describes the extent

to which enhancing or undermining self-efficacy can generalize to other similar situations (Maddux & Stanley, 1986; Strecher et al., 1986). Successful performance on a math test may not only boost one's confidence in the ability to perform well in that particular subject, but increase an individual's confidence in the ability to succeed on a science test as well, for example (Bandura, 1994; Strecher et al., 1986). Strength of self-efficacy is the level of confidence and robustness in the belief to attain a specified level of performance (Maddux & Stanley, 1986; O'Leary, 1985; Strecher et al., 1986). Asking individuals to rate their level of confidence, from 0% to 100%, on attaining an "A" on a test measures the dimension of strength. Finally, the dimension of magnitude involves the level of difficulty that a person feels he or she can perform at successfully (Maddux & Stanley, 1986; Strecher et al., 1986). Magnitude of self-efficacy can be measured in French class, for example, by asking individuals to indicate the level at which they feel they can speak and understand successfully when conversing with their friends, the French instructor, or a native French speaker (i.e., situations of increasing difficulty or challenge).

### **Outcomes of Self-Efficacy**

As a significant determinant of self-development, self-efficacy has been shown to influence various areas of human performance (Bandura, 1997). Cognitive functioning, including all mental thoughts and processes, is strongly influenced by self-efficacy (Bandura, 1994). Individuals with strong beliefs in their capabilities employ positive analytical thinking, have a robust sense of control, visualize achievement, focus on opportunities, and set challenging goals (Bandura, 1994; Conner & Norman, 2005; Dawson & Brawley, 2000; Escarti & Guzman, 1999; Kass, Rotunda, & Schneider, 2006).

Self-efficacy has been shown to predict how individuals perceive and define what constitutes opportunity, obstruction, and achievement (Conner & Norman, 2005; Escarti & Guzman, 1999).

It has been shown that self-efficacy regulates affective processes as well (Bandura, 1994). In particular, the belief in the ability to cope with stressful situations is an important predictor in regulating negative affect (Bandura, 1994). Individuals who are confident in their coping capabilities demonstrate lower levels of anxiety and distress when confronted with threatening stimuli (Bandura, 1994; Hutchinson, Sherman, & Martinovic, 2008; Strecher et al., 1986).

Self-efficacy also plays a key role in the behavioural choices that people make, including career path, types of activities in which to engage and behavioural environments (Bandura, 1994; Escarti & Guzman, 1999; O'Leary, 1985; Strecher et al., 1986). In general, people tend to opt for situations and activities that are perceived to be within their scope of ability, while avoiding situations and activities that are perceived to underplay or exceed their level of competence (Bandura, 1994). Therefore, efficacious individuals, with a higher level of confidence in their capabilities, are more likely to select activities of a greater challenge than inefficacious individuals (Bandura, 1994).

Perceived self-efficacy has been shown to influence an individual's commitment patterns (Bandura, 1994). Individuals with a higher level of confidence in their ability to reach their goals will demonstrate a higher level of persistence and commitment, continuing a behaviour even in the face of adversity or failure (Bandura, 1994; Escarti & Guzman, 1999).

Finally, self-efficacy has been reported as a powerful predictor of behavioural intention (Conner & Norman, 2005; Maddux, Brawley, & Boykin, 1995). Intention is defined as the perceived likelihood of engaging in a given behaviour, reflecting what people aim to do or bring about (Hensel, Leshner, & Logan, 2010). An efficacious individual, confident in his or her ability to perform a specified behaviour, is more likely to plan to engage in that behaviour than an individual with minimal beliefs in his or her capabilities. In addition to self-efficacy beliefs, intentions to execute a particular behaviour are shaped by the attitude toward the current behaviour, the attitude toward the new behaviour, and the perceived social norms concerning the behaviour itself (Maddux et al., 1995; Rodgers & Brawley, 1991). Consistent with the Theory of Planned Behaviour (TPB), behavioural intention is the most important predictor of actual behaviour (Conner & Norman, 2005; Maddux et al., 1995).

### **Self-Efficacy as a Predictor of Behaviour**

The aforementioned cognitive, affective, selection, and motivational processes regulated by self-efficacy along with self-efficacy itself are all ultimately linked to behaviour change (Bandura, 1994; McAuley & Blissmer, 2000). Self-efficacy has been shown to consistently predict all aspects of behaviour, particularly the adoption and maintenance phases (Bandura, 1997; Maddux, Norton, & Stoltenberg, 1986; Strecher et al., 1986). According to Bandura (1977), any changes in behaviour are mediated by changes in self-efficacy. For example, the relapse rate among former smokers, pain experience and tolerance, weight management and eating behaviour, all aspects of physical activity participation, myocardial infarction recovery rate, and commitment to health programs have all been reliably predicted by perceived self-efficacy (Bandura,



1977; Bandura, 1997; Bray, Gyurcsik, Culos-Reed, Dawson, & Martin, 2001). Bandura (1986) asserts that a given behaviour is not predicted by an individual's skills and capabilities, but by an individual's belief in his or her skills and capabilities.

### **Self-Efficacy as a Predictor of Exercise**

As a situation-specific characteristic, self-efficacy applies to a specific behaviour in a specific context (Bandura, 1994). Therefore, when considering exercise behaviour, self-efficacy involves the belief in one's ability to execute the exercise-related behaviours conducive to the successful performance of the exercise task in question (Simonavice & Wiggins, 2008; Strecher et al., 1986). As an intricate and dynamic behaviour, exercise has been reliably predicted by perceived self-efficacy, even when controlling for biological and behavioural differences (Bandura, 1997; Bray et al., 2001; McAuley, 1993). For example, 51 previously sedentary middle-aged adults who had recently completed a 5-month exercise program were recruited for a 4-month follow-up study examining the association between physiological, behavioural, and psychological factors and the maintenance of exercise (McAuley, 1993). Self-efficacy was measured by questionnaires assessing the participant's belief in his or her ability to exercise three times per week when confronted with barriers as well as the participant's belief in his or her ability to exercise over a 3-month period (McAuley, 1993). Hierarchical regression analyses revealed that self-efficacy predicted exercise participation during the 4-month follow-up period, even after statistically controlling for previous exercise behaviour, assessed by frequency and intensity of exercise reported during the 5-month exercise program, and aerobic capacity, assessed by estimating  $\text{VO}_2$  max based on demographic characteristics (McAuley, 1993).

Altering one's behaviour is not an all-or-none phenomenon, in that there are different stages of progression that ultimately culminate in behaviour-change (Marcus, Selby, Niaura, & Rossi, 1992; Rodgers, Wilson, Hall, Fraser, & Murray, 2008). This phenomenon is readily observed when examining exercise behaviour, in that non-exercisers progress through the behaviour-change process and become exercisers through a series of stages, as opposed to an all-or-none fashion. In addition, different cognitive, behavioural, motivational and psychological processes are relevant to each of these distinct stages of behaviour-change (Rodgers, Wilson et al., 2008). Therefore, although self-efficacy has commonly been reported as a significant psychosocial determinant of exercise as a whole, different types of self-efficacy exist that have been shown to influence exercise variably at different stages of the behaviour-change process. Studies have shown that self-efficacy is not only a behaviour-specific construct, but a phase-specific one as well (Maddux et al., 1995; Marquez, Jerome, McAuley, Snook, & Canaklisova, 2002; Rodgers et al., 2002; Rodgers, Murray, Courneya, Bell, & Harber, 2009).

Many studies have examined the influence of different types of self-efficacy during different phases and for varying aspects of exercise (Maddux et al., 1995; Marquez et al., 2002; McAuley & Blissmer, 2000; Rodgers et al., 2002; Rodgers et al., 2009; Simonavice & Wiggins, 2008). Generally, exercise has been shown to be predicted by key variations of exercise-related self-efficacy (Bray et al., 2001; Maddux et al., 1995; Rodgers et al., 2002; Rodgers, Wilson et al., 2008). The next section will review the exercise-related outcomes of three common types of exercise-related self-efficacy: task-specific self-efficacy, self-regulatory self-efficacy, and perceived behavioural control.

### **Task-Specific Self-Efficacy as a Predictor of Exercise Initiation**

Task-specific or exercise self-efficacy reflects the confidence in one's ability to execute the fundamental behaviours that constitute the act of exercise (Bray et al., 2001; Maddux et al., 1995; Poag-DuCharme & Brawley, 1993). Usually, task-specific self-efficacy is assessed by asking participants to rate their level of confidence in their ability to perform the behaviours that collectively amount to the act of exercise on a 100-point scale, ranging from 0% (*not at all confident*) to 100% (*completely confident*; Bray et al., 2001; Poag-DuCharme & Brawley, 1993; Rodgers et al., 2002). However, the “act of exercise”, and thus task-specific self-efficacy as well, can be measured variably by using different dimensions. First, task-specific self-efficacy can assess the strength of an individual's belief in his or her ability to perform the basic physical movements of the exercise task, such as the ability to keep upright on an elliptical machine, the ability to lower one's body into a squat position, or the ability to dribble a basketball (Rodgers et al., 2002). Task-specific self-efficacy can also be assessed by magnitude, involving measuring an individual's belief in the ability to perform the exercise task at different levels of difficulty (Rodgers et al., 2002). For example, an individual's confidence in the ability to run on a treadmill at a moderate pace for different increments of time (i.e., 10 minutes, 20 minutes, 30 minutes, etc.) measures task-specific self-efficacy by magnitude. Finally, task-specific self-efficacy can reflect belief in the ability to perform exercise-related behaviours, including monitoring one's level of exertion by heart rate or intensity level, using a pedometer or other exercise-related devices, or following directions from an instructor or trainer (Tayama et al., 2012).

In general, it has been found that task-specific self-efficacy is the most potent type of self-efficacy during the initiation phase of exercise (Maddux et al., 1995; McAuley & Blissmer, 2000; Rodgers et al., 2002; Rodgers & Sullivan, 2001). It has been found that individuals who have a high level of confidence in their ability to execute the elemental behaviours of the exercise task are more likely to adopt that behaviour than individuals who have a low sense of task-specific self-efficacy (Rodgers et al., 2002). Rodgers et al. (2002) conducted a prospective study among 144 male and 97 female participants recruited from exercise classes and programs ( $M_{age} = 30$  years), examining the association between two different types of exercise-related self-efficacy and exercise intentions and behaviour. Task-specific self-efficacy was measured by 5-items, each rated on 100-point scales that assessed the participants' level of confidence in their ability to perform the exercise movements, monitor perceived exertion, follow directions from an instructor, endure the activity for the planned duration, and avoid over-exertion (Rodgers et al., 2002). A significant correlation was found between task-specific self-efficacy and the motivational processes and behavioural intentions that precede exercise initiation, as measured by the participants' self-reported intent to engage in physical activity over the next four weeks (Rodgers et al., 2002). Task-specific self-efficacy is most important during the initiation phase of exercise, as it is during the novel adoption stage of exercise that cognitions exert substantial control over the complex behaviour (McAuley & Blissmer, 2000). As a cognitive appraisal, self-efficacy largely determines the initiation and acquisition of exercise behaviours (Hutchinson et al., 2008; Strecher et al., 1986).

### **Self-Regulatory Self-Efficacy as a Predictor of Exercise Adherence and Coping**

The act of exercise emphasizes regular performance as opposed to a one-time or intermittent behaviour (Bandura, 1997; Rodgers et al., 2002; Rodgers & Sullivan, 2001; Rodgers, Wilson et al., 2008). Therefore, confidence in one's ability to plan and manage exercise regularly is crucial in order to effectively perform and benefit from the behaviour (Bandura, 1997; Rodgers et al., 2002; Rodgers & Sullivan, 2001). The type of self-efficacy that relates to the belief in the ability to cope with any impediments or scheduling conflicts associated with exercise participation is self-regulatory self-efficacy, representing the most relevant type of self-efficacy to exercise adherence (Bandura, 1994; Bray et al., 2001; Krueger Jr. & Dickson, 1993; Maddux et al., 1995; Maddux & Stanley, 1986; McAuley, 1993; O'Leary, 1985; Rodgers et al., 2002; Rodgers & Sullivan, 2001; Rodgers, Wilson et al., 2008). It is most often assessed by asking participants' confidence on a 100-point scale, ranging from 0% (*not at all confident*) to 100% (*completely confident*), in their ability to overcome specific exercise barriers and potential scheduling conflicts (Brawley, Martin, & Gyurcsik, 1998; Bray et al., 2001; Poag-DuCharme & Brawley, 1995).

Generally, there are two types of self-regulatory self-efficacy that are relevant in exercise settings: scheduling self-efficacy and coping self-efficacy (Conner & Norman, 2005; Rodgers, Wilson et al., 2008). Scheduling self-efficacy, reflecting confidence in the ability to effectively schedule and plan exercise behaviour, and coping self-efficacy, representing the belief in the ability to manage and cope with exercise-related obstacles, can be impacted by the presence of any real or imagined issues that limit participation (Conner & Norman, 2005; Simonavice & Wiggins, 2008). Barriers to exercise can be

classified as situational, environmental, emotional, physical, or involving time constraints, and have been found to be one of the most reliable predictors of continued exercise behaviour (Simonavice & Wiggins, 2008). For example, feeling tired, being busy at work, or going on vacation are all common barriers to exercise (Simonavice & Wiggins, 2008). Individuals with a high sense of self-regulatory self-efficacy are persistent when confronted with challenging situations and multiple obstacles (Hutchinson et al., 2008; Kass et al., 2006; Maddux & Stanley, 1986; Simonavice & Wiggins, 2008). In addition, people with a high sense of self-regulatory self-efficacy are confident in their ability to control and overcome potential threats, are better able to allocate necessary resources to reduce anxiety, and have minimal anxiety and emotional arousal during high-risk situations (Bandura, 1994; Motl, Konopack, Hu, & McAuley, 2006; Simonavice & Wiggins, 2008). As a result, individuals high in self-regulatory self-efficacy develop resilience to setbacks and remain focused when demanding circumstances arise (Bandura, 1994).

Studies have shown that exercise adherence, referring to consistent exercise participation, inherently requires confidence in the ability to maintain the behaviour through effective scheduling and to overcome any challenges that may hinder exercise involvement (Rodgers & Sullivan, 2001). Scheduling and coping self-efficacy were found to reliably predict the attrition rate, represented by regular exercise behaviour, in numerous exercise programs (Escarti & Guzman, 1999; McAuley, 1993; McAuley & Blissmer, 2000; Rodgers et al., 2002; Rodgers, Wilson et al., 2008; Simonavice & Wiggins, 2008). Rodgers, Wilson et al. (2008) conducted a series of studies examining task-specific, coping, and scheduling self-efficacy as separate constructs relevant to

different stages of exercise among 282 undergraduate students volunteering for course credit. Participants completed a series of questionnaires assessing task-specific, coping, and scheduling self-efficacy, as measured by the Multidimensional Self-Efficacy Scale (MSES), behavioural intention, as measured by the participants' intent to exercise at least three times per week over the next month, and exercise behaviour, calculated in the form of metabolic equivalents (METs) using weighted scores from the Leisure Time Exercise Questionnaire (LTEQ; Rodgers, Wilson et al., 2008). Following exploratory factor analysis, confirmatory factor analysis revealed that coping self-efficacy and scheduling self-efficacy were distinct types of self-efficacy more relevant to actual exercise behaviour than task-specific self-efficacy (Rodgers, Wilson et al., 2008). In particular, scheduling self-efficacy was found to be the strongest type of self-efficacy predictive of actual exercise behaviour, accounting for 54% of the variance in MET scores, followed by coping self-efficacy, accounting for 43% of the variance in MET scores (Rodgers, Wilson et al., 2008).

A similar finding was reported by Poag-DuCharme and Brawley (1993), who conducted a 16-week prospective study examining the relationship between coping and scheduling self-efficacy and regular exercise participation among 38 women ( $M_{age} = 26$  years) enrolled at a women's fitness club for the first time. It was found that scheduling self-efficacy, assessed on a 12-item 100-percent confidence scale, was the best predictor of exercise behaviour, assessed by fitness club attendance, from week 9 to week 16 (Poag-DuCharme & Brawley, 1993). Coping self-efficacy did not add any unique variance to the prediction of regular exercise attendance after accounting for that explained by scheduling self-efficacy (Poag-DuCharme & Brawley, 1993). Following the

initiation stages of the exercise program in which a base of skills, experience, and knowledge within the exercise setting is developed, confidence in the ability to schedule and plan regular exercise becomes a central predictor of exercise participation, accounting for increasingly more variance in regular exercise attendance and in intention to exercise as the program progresses (Poag-DuCharme & Brawley, 1993; Poag-DuCharme & Brawley, 1995).

Even with a high level of confidence in one's ability to perform the exercise behaviour (task-specific self-efficacy), a low level of self-regulatory self-efficacy may impede an individual from regular participation (Rodgers et al., 2002; Rodgers, Wilson et al., 2008). A cross-sectional survey was conducted by Rodgers and Sullivan (2001) among 203 middle-aged male and female participants selected via random-digit dialing, evaluating the differential task-specific, coping, and scheduling self-efficacy beliefs between individuals at different levels of exercise participation. It was revealed that coping and scheduling self-efficacy collectively accounted for 21% more variance in self-reported exercise between active and sedentary individuals than task-specific self-efficacy alone (7%; Rodgers & Sullivan, 2001). These results suggest that self-regulatory self-efficacy is a central predictor of regular exercise participation over and above task-specific self-efficacy (Rodgers & Sullivan, 2001). Maddux et al. (1995) and Bandura (1997) emphasize that the belief in one's ability to execute the exercise task and the belief in one's ability to execute the exercise task consistently relate to distinct aspects and phases of exercise.

The reciprocal relationship between self-regulatory self-efficacy and exercise behaviour has been highlighted in several studies, such that exercise behaviour, in turn,



can reinforce self-regulatory self-efficacy (McAuley & Blissmer, 2000; Rodgers et al., 2009; Simonavice & Wiggins, 2008). Simonavice and Wiggins (2008) conducted a study examining self-efficacy beliefs at different levels of exercise involvement among 198 college students. In accordance with the Transtheoretical Model (TTM), participants were classified into contemplation, preparation, action, and maintenance exercise groupings (Marcus et al., 1992; Simonavice & Wiggins, 2008). The inexperienced and beginner exercisers in the contemplation and preparation stages of exercise demonstrated lower levels of coping self-efficacy and perceived more barriers to exercise than the self-reported regular exercisers in the action and maintenance stages of exercise (Simonavice & Wiggins, 2008). Conversely, people who engaged in regular physical activity had gained coping experience and thus perceived fewer barriers to exercise as opposed to the beginner or occasional exercisers (McAuley & Blissmer, 2000; Rodgers et al., 2009; Simonavice & Wiggins, 2008). Ironically, the reciprocal relationship between self-efficacy and exercise behaviour further enhances the level of self-efficacy in highly efficacious individuals, while further reducing the level of self-efficacy in inefficacious individuals (McAuley & Blissmer, 2000).

### **Perceived Behavioural Control as a Predictor of Exercise Intention and Behaviour**

According to the Theory of Planned Behaviour, behavioural intentions are formed by three constructs: attitude toward the behaviour, normative beliefs concerning the behaviour, and perceived behavioural control (PBC). PBC, in particular, is not only a key type of efficacy appraisal relevant to behavioural intention, but behaviour execution as well. Ajzen and Madden (1986) initially defined PBC as an individual's belief regarding the ease or difficulty of performing a given behaviour that is not under complete

volitional (voluntary) control (Ajzen, 1991; Ajzen & Madden, 1986). This conceptualization of PBC reflects an aggregate measure of perceived controllability, concerning an individual's belief that he or she is in control of the execution and performance of the behaviour, as well as perceived presence, strength and power of any internal or external factors believed to influence the difficulty associated with performing the behaviour (Ajzen & Madden, 1986; Kraft, Rise, Sutton, & Roysamb, 2005). Ajzen and Driver (1991) effectively addressed PBC in a 12-month longitudinal study by measuring perceived controllability and perceived presence, strength, and power of factors believed to influence the ease or difficulty associated with the performance of five leisure time activities, including spending time at the beach, jogging or running, mountain climbing, boating, and biking, among 146 college students. The pilot study involved evaluating accessible control beliefs, which were assessed by asking the participants to list internal and external factors that they perceived could make the performance of the activity easier or more difficult (Ajzen & Driver, 1991). For example, weather, proper equipment, living near mountains, and lacking skills and knowledge were the most common factors identified that could influence the performance of mountain climbing (Ajzen & Driver, 1991). Beliefs elicited were categorized as instrumental, reflecting beliefs relevant to costs or benefits of the activity, or affective, reflecting beliefs associated with the perceived pleasure or displeasure of the activity (Ajzen & Driver, 1991). The main study involved administering a series of questionnaires to the participants, assessing perceived strength and power of the internal and external factors recorded in the pilot study (Ajzen & Driver, 1991). The participants were asked to indicate the perceived likelihood of the presence of the particular factor (strength) as well

as the degree to which the presence of the particular factor has the ability to make the performance of the behaviour easier or more difficult (power) on various scale items (Ajzen & Driver, 1991). It was found that participation in certain leisure time activities (i.e., boating) was differentially predicted by instrumental and affective beliefs during the 12-month follow-up period (Ajzen & Driver, 1991). Specifically, while all four affective beliefs significantly predicted boating, only one of the six instrumental beliefs correlated with participation in the activity (Ajzen & Driver, 1991).

In accordance with the Theory of Planned Behaviour (TPB), internal and external control factors of a given behaviour, representing the nonvolitional control components of that behaviour, predict behavioural intentions by prompting the individual to recall on previous experiences (Ajzen, 1991; Ajzen, 2002; Kraft et al., 2005). For example, an individual may be more likely to intend to repeat water skiing if favourable control factors, such as water temperature, are present and evoke a previous positive experience. Furthermore, Ajzen (1991) noted that PBC combined with behavioural intentions can provide a direct prediction of exercise behaviour. However, the PBC-exercise behaviour correlation is dependent on two conditions outlined by Ajzen and Madden (1986): the behaviour in question must involve nonvolitional control components, and an individual's perceived level of control over the behaviour must emulate his or her actual level of control to some extent. According to Ajzen and Madden (1986), if these two conditions are not met, PBC would not contribute to the prediction of the given behaviour (Ajzen & Madden, 1986). Thus, the early conceptualization of PBC, involving perceived control factors and perceived controllability, has been shown to influence both exercise

intentions and actual exercise behaviour (Ajzen, 1991; Ajzen, 2002; Ajzen & Madden, 1986).

Some studies have replicated these findings, reporting the role of PBC in predicting both exercise intentions and behaviour (Dzewaltowski, Noble, & Shaw, 1990; Gatch & Kendzierski, 1990; Godin, Valois, & Lepage, 1993). A study conducted by Godin et al. (1993) examined the associations between attitude, subjective social norm, habit, PBC, exercise intentions and exercise behaviour. The 347 participants selected from the general population via random-digit dialing were visited at home by interviewers who administered questionnaire packages (Godin et al., 1993). PBC was assessed by two items, each rated on a 7-point scale, concerning perceived level of ease or difficulty associated with participating in one or more physical activities during one's free time over the next 6 months, as well as the perceived likelihood of a specified barrier hindering exercise participation (Godin et al., 1993). It was found that PBC significantly predicted exercise intention, measured by two items reflecting perceived probability and perceived success rate of regular participation in one or more physical activities during one's free time over the next 6 months on a 10-point scale and 7-point scale, respectively (Godin et al., 1993). While PBC was not found to directly predict actual exercise behaviour measured during a 6-month follow-up period assessing frequency of participation in one or more physical activities for 20-30 minutes during one's free time, PBC was found to indirectly predict exercise behaviour through exercise intentions (Godin et al., 1993).

Since the preliminary conceptualization of PBC by Ajzen and Madden (1986), PBC has been defined and analyzed variably, generating inconsistencies in the literature.

PBC has commonly been assessed by separate components of perceived difficulty and perceived control, representing an individual's perceived level of difficulty associated with the performance of a given behaviour and perceived level of control he or she has over that behaviour, respectively (Ajzen, 1991; Rodgers, Conner, & Murray, 2008). The construct of self-efficacy, and particularly barrier self-efficacy, has been used synonymously with perceived difficulty, as they both involve elements of control, a source of controversy in the literature (Kraft et al., 2005; Manstead & van Eekelen, 1998; Rodgers, Conner et al., 2008; Tavousi et al., 2009). As well, the construct of controllability has been used interchangeably with perceived behavioural control, as they both involve beliefs with regards to one's control over the performance of a given behaviour (Kraft et al., 2005). Measures of locus of control, reflecting whether an individual perceives his or her behaviour to be controlled by personal decisions and actions or external circumstances, are sometimes incorporated into the measurement of perceived control, generating measurement inconsistencies (Kraft et al., 2005).

Studies that have examined perceived difficulty and perceived control as separate components of PBC have confirmed that perceived difficulty and perceived control differentially contribute to the prediction of exercise intention and behaviour (Kraft et al., 2005; Rhodes & Courneya, 2003; Rodgers, Conner et al., 2008; Trafimow, Sheeran, Conner, & Finlay, 2002). Rodgers, Conner et al. (2008) conducted a study examining the relationship between self-efficacy, perceived difficulty, perceived control and exercise behaviour among 278 college-aged students, participating in exchange for course credit. Participants completed measures of self-efficacy, perceived difficulty, perceived control, attitudes, norms, exercise intentions, and exercise behaviour (Rodgers, Conner et al.,

2008). Through correlational analyses, perceived self-efficacy, as measured by perceived confidence in completing specified bout(s) of exercise, perceived difficulty of completing the specified bout(s) of exercise, and perceived control over completing the specified bout(s) of exercise, were reported as three separate constructs (Rodgers, Conner et al., 2008). Regarding actual exercise behaviour, it was found that self-efficacy was the strongest predictor, while neither perceived difficulty nor perceived control significantly correlated with actual exercise behaviour (Rodgers, Conner et al., 2008). Regarding exercise intentions, significant correlations were reported between perceived difficulty and exercise intentions, as well as perceived control and exercise intentions (Rodgers, Conner et al., 2008). Furthermore, perceived difficulty was found to add unique variance to the prediction of exercise intentions above that explained by self-efficacy (Rodgers, Conner et al., 2008). Similar findings have been reported among studies examining the separate roles of perceived difficulty and perceived control in the prediction of exercise intention and behaviour (Kraft et al., 2005; Trafimow et al., 2002). More research is required in order to accurately conceptualize and isolate the precise role of PBC in predicting exercise intentions and behaviour.

### **Body Image**

Body image is a multi-dimensional concept that spans many disciplines, representing the inner picture of one's outer appearance (Morrison, Morrison, & Hopkins, 2003). This subjective image of physical appearance not only encompasses the perceptions, evaluations, and attitudes pertaining to one's body, but also the behaviours that result from these cognitions (Kyrejtó, Mosewich, Kowalski, Mack, & Crocker, 2008;

Morrison et al., 2003). Negative body image evolves in large part as a result of the sociocultural pressure to achieve the ideal body, along with the ensuing discrepancy perceived between one's current and ideal body (Davis, Karvinen, & McCreary, 2005). Attempts to minimize this perceived gap and reduce negative body image have become normative behaviour across gender, age-groups, special populations, and ethnicities (Blood, 2005; Davis & Cowles, 1991).

The experience of negative body image is associated with a multitude of psychological and behavioural health issues in both men and women, including decreased self-esteem, increased anxiety, emotional distress, depression, obesity, smoking, eating disorders, and other unhealthy weight management behaviours (Campbell & Hausenblas, 2009; Crocker, Kowalski, & Kowalski, 2001; Hausenblas & Fallon, 2006; Krane, Stiles-Shipley, Waldron, & Michalenok, 2001; Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006; Nowell & Ricciardelli, 2008; Silberstein, Striegel-Moore, Timko, & Rodin, 1988). Studies exploring body image have predominantly focused on college-aged women, as this group is more highly exposed and vulnerable to sociocultural pressures when compared to men or other age categories, consistently demonstrating misperceptions of weight, intense body image investment behaviours, negative body image evaluation, and elevated self-objectifying tendencies (Hausenblas & Fallon, 2002). As a result, the vast majority of measures designed to assess body image concerns are tailored toward college-aged women.

Body image has been conceptualized and assessed from varying perspectives, giving rise to various body image constructs. Social physique anxiety (SPA) is one of the most commonly studied dimensions of body image, reflecting the worry or concern

experienced as a result of the perception that one's physique is being evaluated by others (Hart, Leary, & Rejeski, 1989). Studies exploring SPA have predominantly focused on women, as it has been found that women consistently score higher on SPA than men (Bowden, Rust, Dunsmore, & Briggs, 2005; Reel et al., 2007). A vast range of personality, cognitive, affective, and behavioural correlates have been identified among women with high levels of SPA, including perfectionism, an overall fixation with the cultural ideal and appearing attractive, low confidence in one's physical appearance, low self-esteem, stress, general avoidance behaviour, exercise, and eating disorder symptoms (Crocker et al., 2001; Gammage, Hall, & Martin Ginis, 2004; Krane et al., 2001; Lantz & Hardy, 1997; Marquez & McAuley, 2001; McCreary & Saucier, 2009; Reel et al., 2007; Russell & Cox, 2003; Walton & Finkenbergh, 2002).

### **Exercise and Body Image**

In general, it has been found that physical activity is positively related to positive body image (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006; Reel et al., 2007). In a meta-analysis examining the relationship between exercise-based interventions and body image, it was found that individuals who participated in exercise interventions in which exercise was the only treatment implemented exhibited more positive body image upon completing the study as opposed to the control group (Campbell & Hausenblas, 2009). Hausenblas and Fallon (2006) similarly found through meta-analytic review that participants assigned to an exercise intervention demonstrated improvements in body image throughout the program as well as more positive body image than control group participants upon completion. Furthermore, it was reported that



in general, exercisers had more positive body image than non-exercisers (Hausenblas & Fallon, 2006).

As a common strategy linked to improvements in body weight, muscularity, physical fitness, and overall well-being, exercise may promote body image improvements by altering actual physical appearance and competence, perceptions of physical appearance and competence, or self-efficacy for physical competence (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006). Therefore, while an objective evaluation of one's physique may remain unchanged, the subjective evaluation of one's physique may improve as a result of recognizing and appreciating exercise-related benefits that complement positive body image (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006).

### **Exercise and SPA**

While SPA has been linked with general correlates as noted previously, the vast majority of studies examining SPA have focused on exercise behaviour as a correlate. A variable relationship between SPA and exercise behaviour has been documented, with positive, negative, and non-significant relationships reported (Crocker et al., 2001; Frederick & Morrison, 1996; Lantz & Hardy, 1997). Firstly, a positive relationship between SPA and exercise behaviour has been reported, such that individuals with higher levels of SPA have also reported higher levels of exercise behaviour. Frederick and Morrison (1996) recruited 127 men and 199 women from a college fitness center and found that individuals who reported high levels of SPA, as measured by the Social Physique Anxiety Scale, were also high exercise adherers, as measured by the number of days per week engaged in exercise. However, Frederick and Morrison (1996) noted that

any exercise behaviour triggered by body anxiety may be short-lived, as the participants who reported high levels of SPA tended to report high levels of extrinsic motivation for exercise as well. Extrinsic motives, involving any factors that arise from outside the individual as the task itself lacks satisfaction and free choice, are generally insufficient on their own to bring about permanent behaviour change (Frederick & Morrison, 1996).

Other studies have reported that heightened SPA is linked to excessive and maladaptive exercise behaviour as opposed to healthy exercise participation (Hausenblas, Brewer, & Van Raalte, 2004). Individuals with high SPA have been shown to exhibit similar tendencies as addicts, putting high pressure on themselves to exercise and exercising primarily for appearance-related gains (Frederick & Morrison, 1996; Hausenblas et al., 2004; Krane et al., 2001; Marquez & McAuley, 2001). Concern and worry experienced due to the perception that one's physique is being evaluated by others may stem from a preoccupation with physical appearance, promoting exercise extrinsically as a strategy to maintain or achieve a desired physique (Bowden et al., 2005; Frederick & Morrison, 1996; Hart et al., 1989).

Conversely, although positive correlations between SPA and exercise behaviour have been documented, high levels of SPA have also been shown to inhibit exercise participation. Lantz and Hardy (1997) recruited 120 male and 180 female volunteers, ages 18 to 60 years, to complete a series of questionnaires concerning SPA and exercise behaviour. Correlational analyses revealed a negative relationship between SPA and self-reported physical activity, such that individuals who reported higher SPA tended to report lower levels of exercise participation (Lantz & Hardy, 1997). High SPA has been shown to predict exercise withdrawal and avoidance behaviours by promoting increased stress,

lower perceived physical competence and self-efficacy, preoccupation with the evaluation of one's body, and recurring negative thoughts regarding physical appearance (Crocker et al., 2001; Frederick & Morrison, 1996; Hausenblas et al., 2004; Lantz & Hardy, 1997; Marquez & McAuley, 2001).

Finally, a non-significant relationship between SPA and exercise behaviour has been documented. Among 168 college-aged females, Russell and Cox (2003) reported that SPA was not correlated with exercise frequency, defined as days per week engaged in any aerobic exercise or resistance training for 20 minutes or more. Similarly through administering questionnaires, Crocker et al. (2001) found that self-reported SPA was not significantly associated with leisure-time physical activity over a 7-day period among 354 college female students. The motivation to engage or not engage in physical activity may suppress or override any concern or worry due to a perception that one's physique is being evaluated by others in an exercise environment (Crocker et al., 2001).

### **Body Image and Self-Efficacy**

While the relationship between body image and exercise behaviour has been extensively documented, the relationship between body image and self-efficacy is an area less explored. Marquez and McCauley (2001) investigated the relationship between SPA, self-efficacy, and outcome expectations with state anxiety in various physical activity environments among 103 undergraduate students. Self-efficacy, measured by The Physical Attractiveness Self-Efficacy Scale, was found to be the strongest predictor of state anxiety in exercise situations, such that the more efficacious participants reported less state anxiety in these settings (Bane & McAuley, 1996; Marquez & McCauley, 2001). However, the relationship between self-efficacy and anxiety experienced as a

result of the perceived evaluation of one's physique by others (i.e., SPA), as opposed to anxiety experienced under particular circumstances, was not explored (Marquez & McCauley, 2001). Other studies that have assessed body image and self-efficacy variables have analyzed them as independent correlates of eating pathologies, particularly Binge Eating Disorder (BED), or as outcomes of cognitive-behavioural interventions (Cargill, Clark, Pera, Niaura, & Abrams, 1999; Steese et al., 2006; Wolff & Clark, 2001). The relationship between body image and exercise-related self-efficacy (i.e., task-specific self-efficacy, self-regulatory self-efficacy, or perceived behavioural control) has not been investigated.

### **Effects of Verbal Feedback on Self-Efficacy and Performance in Physical Activity**

#### **Settings**

It is well-documented that behavioural intentions and all phases of exercise behaviour are consistently and reliably predicted by self-efficacy (Bandura, 1994; Bandura, 1997; Bray et al., 2001; McAuley, 1993; O'Leary, 1985). Yet the notion that perceived self-efficacy can be effectively manipulated within the exercise environment through the provision of verbal feedback is less recognized in the literature. This type of self-efficacy manipulation involves providing participants with either positive or negative verbal feedback regarding performance on a given behaviour, regardless of actual performance, with the aim to alter subsequent self-efficacy beliefs for that behaviour. The next section will review the effects of manipulated self-efficacy on various exercise-related outcomes.

**Cognitions and perceptions.** Perceived self-efficacy has been shown to influence the way in which people think, interpret and perceive various experiences, including exercise (Bandura, 1994). The perception of pain and discomfort during exercise is a common cognition that can deter people from engaging in exercise. Research focusing on pain tolerance during exercise has shown that self-efficacy beliefs may influence an individual's ability to cope with pain (Hutchinson et al., 2008; Motl et al., 2006; O'Leary, 1985). Using an experimental design, Motl et al. (2006) examined the effects of a self-efficacy manipulation on perceived leg muscle pain during a 30-minute bout of moderate-intensity cycling among 28 college-aged women. Participants were randomly assigned into a high-efficacy condition or low-efficacy condition, completed measures of task-specific self-efficacy assessing confidence in the ability to cycle over incremental durations of time at a moderate to hard intensity without stopping, followed by an incremental exercise test on a cycle ergometer (Motl et al., 2006). After completing the initial exercise test, participants were provided with computer-generated feedback concerning their recent performance, regardless of their actual performance (Motl et al., 2006). Participants in the high-efficacy condition were given positive verbal feedback, such that their performance placed them in the top 20<sup>th</sup> percentile for fitness, based on norms for women of similar age, ethnicity, and physical activity history, while participants in the low-efficacy condition were given negative verbal feedback, such that their performance placed them in the bottom 20<sup>th</sup> percentile for fitness, based on norms for women of similar age, ethnicity, and physical activity history (Motl et al., 2006). After repeating these findings to the researcher to ensure they were understood, participants were asked to complete the task-specific self-efficacy measure a second time

(Motl et al., 2006). The self-efficacy manipulation was successful, in that the low-efficacy condition participants reported decreases in task-specific self-efficacy after the negative verbal feedback was presented (Motl et al., 2006). The high self-efficacy condition participants reported no changes in task-specific self-efficacy beliefs (Motl et al., 2006). Two to three days following the initial exercise test, participants returned to the lab, were reminded of the computer-generated feedback, and completed a 30-minute bout of moderate-intensity cycling (Motl et al., 2006). During this second exercise test, ratings of perceived leg muscle pain, assessed on a 10-point scale ranging from 0 (no pain at all) to 10 (extremely intense pain), perceived exertion (RPE), as per Borg's 6-20 category scale, and work rate, measured by the cycle ergometer in watts, were documented every 5 minutes (Motl et al., 2006). It was found that the individuals who reported high task-specific self-efficacy prior to the self-efficacy manipulation at baseline, representing high confidence in the ability to cycle over incremental durations of time at a moderate to hard intensity without stopping, also reported lower perceived leg muscle pain during the preliminary phases of the second exercise test at 2-3 days follow-up (Motl et al., 2006). However, the high-efficacy and low-efficacy groups did not differ with regards to perceived leg muscle pain during this final exercise test (Motl et al., 2006). Additionally, it was found that the self-efficacy manipulation did not significantly influence pain intensity ratings during the second exercise test (Motl et al., 2006).

Conversely, in a performance feedback study conducted by Lamarche et al. (2011), a significant influence of self-efficacy on cognitions and perceptions was revealed pertaining to stability during a balance-related task. Sixty-one college-aged men and women were randomly assigned into a high balance efficacy condition, low balance

efficacy condition, or control group, and completed a series of balance-related measures and tasks throughout the experimental session (Lamarche et al., 2011). Participants in the high and low balance efficacy conditions were provided with positive and negative performance feedback, respectively, pertaining to an initial attempt on a balance task (Lamarche et al., 2011). Following the provision of verbal feedback, it was found that balance efficacy, assessed on a 9-item 100-point confidence scale representing confidence in the ability to complete a balance task successfully over incremental durations of time, was successfully manipulated as a function of the performance feedback. Specifically, participants in the low balance efficacy group demonstrated decreases in balance efficacy. No significant changes to balance efficacy were found for the high balance efficacy or control groups (Lamarche et al., 2011). Changes in perceived stability, assessed on a single item 100-point confidence scale representing overall feeling of stability, were also reported pre- to post-feedback, such that participants in the high balance efficacy group demonstrated increases in perceived stability (Lamarche et al., 2011). No significant changes to perceived stability were found for the low balance efficacy or control groups (Lamarche et al., 2011).

**Affect.** Self-efficacy also plays an important role in the experience of positive affect, particularly enjoyment, during exercise (Hu, Motl, McAuley, & Konopack, 2007; Marquez et al., 2002; McAuley & Courneya, 1992; McAuley, Talbot, & Martinez, 1999). Hu et al. (2007) conducted an experimental study among 28 low to moderately active college-aged women, investigating the effects of manipulated self-efficacy on physical activity enjoyment. The participants completed measures of task-specific self-efficacy, involving six items assessing beliefs in the ability to cycle for specified durations at a

moderate to hard intensity without stopping (Hu et al., 2007). Then, after completing an initial maximal incremental exercise test, participants were randomly assigned into a high-efficacy or low-efficacy condition, and verbal performance feedback was provided by a computer (Hu et al., 2007). Similar to the previous studies, those in the high-efficacy condition were provided with positive verbal feedback, and those in the low-efficacy condition were provided with negative verbal feedback (Hu et al., 2007). After repeating the feedback to the researcher, participants completed the task-specific self-efficacy questionnaire for a second time, along with a measure of enjoyment (Hu et al., 2007). Following the self-efficacy manipulation, it was found that those in the low-efficacy condition reported subsequent decreases in task-specific self-efficacy beliefs, while those in the high-efficacy condition reported no changes in task-specific self-efficacy beliefs (Hu et al., 2007). It was also found following the self-efficacy manipulation that a higher level of enjoyment was reported among those in the high-efficacy condition compared to those in the low-efficacy condition (Hu et al., 2007). Participants returned to the lab 2-3 days following the initial exercise test, were reminded of the verbal feedback, and completed a final submaximal exercise test on a cycle ergometer (Hu et al., 2007). The task-specific self-efficacy questionnaire was completed a third time following a 5-minute warm-up on the cycle ergometer, as well as a fourth time after the final exercise bout along with the measure of enjoyment (Hu et al., 2007). During this second session 2-3 days following the self-efficacy manipulation, level of enjoyment reported during the submaximal exercise test did not significantly differ between the high-efficacy and low-efficacy conditions (Hu et al., 2007).



Using a similar experimental design and sample, Marquez et al. (2002) examined the effects of manipulated self-efficacy through performance feedback on negative affect, specifically state anxiety, in an exercise setting. Fifty-nine low to moderately active college-aged females were randomly assigned into a high- or low-efficacy condition, and completed measures of state anxiety along with self-efficacy measures, assessing confidence in one's ability to jog or run over incremental durations of time at a moderate to hard intensity without stopping, at various time points throughout an initial and follow-up session (Marquez et al., 2002). Participants completed a graded exercise test on a treadmill followed by a self-efficacy manipulation through performance feedback (Marquez et al., 2002). It was found that post-manipulation, the low-efficacy condition reported decreases in self-efficacy beliefs, while the high-efficacy condition reported no changes in self-efficacy beliefs (Marquez et al., 2002). The follow-up session 3-5 days later, consisted of a 20-minute bout of exercise on a treadmill (Marquez et al., 2002). It was found that the individuals in the high-efficacy condition reported lower state anxiety throughout the various time points following the manipulation when compared to the low-efficacy condition (Marquez et al., 2002).

Positive and negative affect were examined concurrently in a performance feedback study conducted by McAuley et al. (1999) among 26 college-aged females. Participants were randomly assigned into a high-efficacy or low-efficacy condition, and completed measures of self-efficacy, representing belief in the ability to walk or jog over incremental distances and durations at a moderate to hard intensity, and exercise-related affect at various time points throughout two experimental sessions (McAuley et al., 1999). Following a submaximal graded exercise test on a cycle ergometer during the first

session, participants in the high- and low-efficacy conditions were provided with positive and negative performance feedback, respectively (McAuley et al., 1999). Post-manipulation, the high-efficacy group demonstrated increases in self-efficacy beliefs, while the low-efficacy group demonstrated no changes to self-efficacy beliefs (McAuley et al., 1999). The self-efficacy manipulation also successfully altered subsequent affective responses during and following a second exercise bout on a Stairmaster during the second session (McAuley et al., 1999). Participants in the high-efficacy group reported more positive well-being and less fatigue than the low-efficacy group throughout the various time points following the manipulation, while the low-efficacy group demonstrated increased psychological distress (McAuley et al., 1999).

**Performance and task choice.** Perceived self-efficacy has also been shown to predict performance level achieved and task choice in an exercise setting (Escarti & Guzman, 1999; Hutchinson et al., 2008; Strecher et al., 1986). Self-efficacy has been found to predict performance on a given task equivalent to that of general skill level, such that self-efficacy predicts future performance more reliably than past performance predicts future performance (Escarti & Guzman, 1999; Litt, 1988; Marcus et al., 1992). Escarti and Guzman (1999) conducted an experimental study among 69 college-aged students examining the effects of manipulated self-efficacy on performance of a hurdles task, measured by time results and motor capacity, and on hurdles task choice. During an initial session, participants provided an estimate of time self-efficacy, the time in which they anticipated to complete the task, and motor capacity self-efficacy, the score they anticipated achieving from an expert in track and field on a 100-point scale (Escarti & Guzman, 1999). After reporting self-efficacy expectancies, the participants completed a

70m run over 7 hurdles (Escarti & Guzman, 1999). The participants then returned one week later for a second session, were randomly assigned into a high-efficacy condition or a low-efficacy condition, and were provided with performance feedback (Escarti & Guzman, 1999). The high-efficacy condition participants were provided with a table demonstrating that their hurdles time and motor performance was 0.5s lower and 10 points higher than their estimates, respectively, while the low-efficacy condition participants were provided with a table demonstrating that their hurdles time and motor performance was 0.5s higher and 10 points lower than their estimates, respectively (Escarti & Guzman, 1999). Following the provision of the performance feedback, time and motor capacity self-efficacy were assessed a second time, followed by a second hurdles performance (Escarti & Guzman, 1999). The self-efficacy manipulation successfully altered subsequent efficacy expectancies, such that the high-efficacy condition individuals demonstrated higher time and motor capacity self-efficacy beliefs following the positive feedback, and the low-efficacy condition individuals demonstrated lower time and motor capacity self-efficacy beliefs following negative feedback (Escarti & Guzman, 1999). The final session took place the following day, in which the participants were presented with three separate hurdles tasks and asked to select the most difficult task they believed they could perform (Escarti & Guzman, 1999). It was found that the high-efficacy group demonstrated a higher level of performance achieved during the second session and selected more difficult hurdles tasks during the third session than the low-efficacy group (Escarti & Guzman, 1999).

**Effort and tolerance.** In an exercise setting, verbal feedback has also been used to alter perceptions of effort expenditure and tolerance. It has been found that people who

have a robust sense of self-efficacy expend more effort during exercise (Bandura, 1994). An experimental study conducted by Hutchinson et al. (2008) examined the effects of manipulated self-efficacy by performance feedback on perceived and sustained effort during exercise. For this study, 72 college students recruited from physical education classes were randomly assigned into a high-efficacy, low-efficacy, or control condition (Hutchinson et al., 2008). Task-specific self-efficacy, concerning belief in the physical ability to tolerate the discomfort associated with the performance of a handgrip dynamometer task, was first assessed (Hutchinson et al., 2008). An initial handgrip test followed, requiring participants to squeeze a dynamometer's handbar and endure for as long as possible, vocally reporting perceptions of muscle aches, determination and affect, and exertion every 15 seconds (Hutchinson et al., 2008). Performance feedback was then given to participants in the high-efficacy and low-efficacy conditions, indicating that their performance placed them in the top 10<sup>th</sup> or bottom 10<sup>th</sup> percentile for grip strength and endurance, respectively (Hutchinson et al., 2008). A 15-minute follow-up session assessed task-specific self-efficacy for a second time, followed by a final handgrip test (Hutchinson et al., 2008). The self-efficacy manipulation was successful, in that the high-efficacy condition experienced subsequent increases in task-specific self-efficacy, the low-efficacy condition group experienced subsequent decreases in task-specific self-efficacy, and the control group demonstrated no changes in task-specific self-efficacy (Hutchinson et al., 2008). It was also found post-manipulation that the individuals in the high-efficacy condition reported lower perceived exertion during the final handgrip test and were able to tolerate the task for a longer duration than the individuals in the low-efficacy or control conditions (Hutchinson et al., 2008). Therefore, individuals with a

high sense of task-specific self-efficacy were better able to endure tasks that entail high effort expenditure, leading to a greater standard of performance (Hutchinson et al., 2008).

Evidence suggests that the provision of performance feedback can effectively manipulate subsequent self-efficacy beliefs and various cognitive, affective, and behavioural outcomes in a physical activity setting. Regardless of actual performance, providing verbal feedback pertaining to a given task in an exercise context has been shown to successfully manipulate balance-related cognitions and perceptions, enjoyment of a cycle task immediately post-manipulation, well-being, fatigue, and psychological distress prior to, during and following a Stairmaster task, state anxiety prior to and following a treadmill task, performance level achieved and difficulty level selected during a hurdles task, and perceived exertion and tolerance during a handgrip task (Escarti & Guzman, 1999; Hu et al., 2007; Hutchinson et al., 2008; Lamarche et al., 2011; Marquez et al., 2002; McAuley et al., 1999; Motl et al., 2006). However, self-efficacy manipulations through performance feedback did not have an effect on perceived leg muscle pain during a cycle task, or enjoyment experienced during a cycle task at a 2-3 day follow-up session (Hu et al., 2007; Motl et al., 2006).

### **Body Image as a Moderator of the Relationship between Verbal Feedback and Exercise-Related Outcomes**

The impact of verbal feedback on exercise-related outcomes (i.e., cognitions, behaviours) is not constant for all individuals across all situations (Baron & Kenny, 1986). Individual and contextual differences can be measured as potential moderator variables, identified as a third variable that changes the magnitude or direction of the

relationship between two other variables (Baron & Kenny, 1986). As a correlate of exercise behaviour, body image is a variable that may influence the strength or direction of the relationship between verbal feedback and particular exercise-related outcome variables. If body image, as measured by SPA, moderates the relationship between verbal feedback and exercise-related outcomes, a significant interaction between body image and verbal feedback will occur.

## CHAPTER 2: RATIONALE, PURPOSE, & HYPOTHESES

### Rationale

Thus far, the literature has documented and reinforced the powerful role of social persuasion in shaping and transforming self-efficacy (Bandura, 1994). Concerning prior performance or physical capability, positive performance feedback has been shown to enhance subsequent self-efficacy beliefs by exceeding initial efficacy expectancies and emphasizing personal skills, while negative performance feedback has been shown to weaken subsequent self-efficacy beliefs by falling short of initial efficacy expectancies and undermining perceptions of personal capabilities (Bandura, 1997; Escarti & Guzman, 1999; Karl et al., 1993; Marquez et al., 2002; Strecher et al., 1986). By providing an individual with information on prior performance or physical capability regarding a given behaviour, beliefs in the ability to successfully perform that behaviour on subsequent attempts are constructed and shaped (Karl et al., 1993). As a result, subsequent performance is affected (Bandura, 1997; Escarti & Guzman, 1999). In fact, it has been found that self-efficacy is a causal predictor of performance level achieved above that predicted by actual skill (Bandura, 1997; Litt, 1988). Performance accomplishments on novel, complex behaviours, such as exercise behaviour, have been shown to be best predicted by cognitions, notably, perceived self-efficacy (Escarri & Guzman, 1999; Maddux et al., 1995; McAuley & Blissmer, 2000).

It has also been found that self-efficacy can be effectively manipulated through performance feedback, and, in turn, it can influence various cognitions and behaviours within the physical activity environment that predict future performance (Escarri &

Guzman, 1999; Hu et al., 2007; Hutchinson et al., 2008; Litt, 1988; Motl et al., 2006). In general, experimental studies examining the effects of manipulated self-efficacy in a physical activity context have employed similar designs. First, participants are randomly assigned to a high-efficacy or low-efficacy condition, with sometimes a third control condition included in the design. Following performance or assessment of the exercise task of interest, regardless of actual performance or physical capability, participants in the high-efficacy condition are provided with feedback indicating that they rank superiorly to others based on norms constructed for that task, while participants in the low-efficacy condition are provided with feedback indicating that they rank inferiorly to others based on norms constructed for that task. Although participants in the high-efficacy condition do not differ from participants in the low-efficacy condition prior to the provision of verbal feedback in terms of demographic or physiological variables, following the provision of verbal feedback, subsequent self-efficacy scores differentiate experimental conditions (Lamarche et al., 2011; Marquez et al., 2002; McAuley et al., 1999; Strecher et al., 1986). This discrepancy in self-efficacy scores observed between conditions stems from either post-manipulation decreases in self-efficacy documented among the low-efficacy condition participants, subsequent increases in self-efficacy reported among the high-efficacy condition participants, or a combination of the two (Escarti & Guzman, 1999; Hu et al., 2007; Hutchinson et al., 2008; Lamarche et al., 2011; Marquez et al., 2002; McAuley et al., 1999; Motl et al., 2006). Control group participants show no changes in self-efficacy scores (Hutchinson et al., 2008; Lamarche et al., 2011).

Post-manipulation decreases in self-efficacy beliefs among participants assigned to a low-efficacy condition were observed in studies that utilized combinations of



computer-generated feedback, computer-printout feedback (i.e., table or graph), and verbal feedback by the researcher, along with manipulation checks, such as asking the participant to repeat the feedback, and reviewing the feedback with the participant prior to a second session (Hu et al., 2007; Lamarche et al., 2011; Marquez et al., 2002; Motl et al., 2006). Post-manipulation increases in self-efficacy beliefs to walk or jog at a moderate to hard intensity among participants assigned to a high-efficacy condition were observed in a study in which participants were provided with computer-printout feedback and verbal feedback during an initial session, followed by a review of the feedback prior to the second session (McAuley et al., 1999). Post-manipulation decreases in task-specific self-efficacy among low-efficacy condition participants combined with increases in task-specific self-efficacy among high-efficacy condition participants were observed when participants were only presented with computer-printout feedback depicting performance level of a hurdles task, or when participants were provided with verbal feedback based on information in a nearby textbook, followed by re-emphasis of feedback of a handgrip task (Escarti & Guzman, 1999; Hutchinson et al., 2008). Furthermore, it has been reported that self-efficacy can be effectively manipulated among individuals with high or low levels of pre-existing self-efficacy beliefs (Weinberg, Hughes, Critelli, England, & Jackson, 1984).

The changes observed in self-efficacy as a result of performance feedback have been shown to influence subsequent exercise-related cognitions and behaviours (Escarti & Guzman, 1999; Hu et al., 2007; Hutchinson et al., 2008; Lamarche et al., 2011; Marquez et al., 2002; McAuley et al., 1999; Motl et al., 2006). It has been reported that manipulating self-efficacy through performance feedback may predict future exercise

behaviour by enhancing cognitions and perceptions, increasing feelings of enjoyment and well-being, decreasing sensations of fatigue, psychological distress, and state anxiety, or increasing level of persistence and performance achieved (Escarti & Guzman, 1999; Hu et al., 2007; Hutchinson et al., 2008; Lamarche et al., 2011; Marquez et al., 2002; McAuley et al., 1999; Motl et al., 2006).

The majority of studies examining the effects of manipulated self-efficacy in physical activity settings have focused on cognitive and affective outcomes as opposed to behavioural outcomes (Lamarche et al., 2011). Among the few studies that have explored behavioural outcomes associated with manipulated self-efficacy within a physical activity setting, measurement of these behaviour-related variables has been accomplished by experimentally controlling behaviour execution. In other words, in order to assess any changes related to the behaviour, the behaviour being measured was induced in a lab setting as opposed to an ecologically valid context (Escarti & Guzman, 1999; Hu et al., 2007; Motl et al., 2006). Assessing unprompted and natural changes to physical activity intentions and behaviour as a result of performance feedback has not been explored. As well, self-efficacy manipulation studies examining physical activity-related outcomes have predominantly focused on task-specific self-efficacy, concerning confidence in the ability to execute the fundamental behaviours that constitute the given physical activity task (Bandura, 1994; Bray et al., 2001). However, in order to effectively perform and benefit from physical activity, regular participation is essential, suggesting the need to incorporate and feature self-regulatory self-efficacy, concerning confidence in the ability to plan and manage physical activity regularly (Bandura, 1994; Bandura, 1997; Rodgers et al., 2002; Rodgers & Sullivan, 2001). Given the effectiveness of physical activity-

based self-efficacy manipulation studies in altering subsequent task-specific self-efficacy beliefs and components of physical activity performance, as well as the direct link between self-efficacy and physical activity-related behaviours and cognitions, it is possible that manipulated self-efficacy may ultimately influence physical activity behaviour.

### **Purpose Statement**

The purpose of the present study was to examine the effects of verbal feedback on self-regulatory self-efficacy and exercise intention, as well as exercise behaviour during a 4-week follow-up period among low-active college-aged females. In addition, this study investigated the role of SPA as a moderator in the relationships stated above.

### **Hypotheses**

1. It was hypothesized that there would be a significant interaction between type of feedback provided and self-regulatory self-efficacy:

- a. The provision of *positive verbal feedback* would raise subsequent self-regulatory self-efficacy beliefs.

*Rationale:* Self-efficacy manipulation studies examining behaviour-related outcomes in exercise settings among college-aged participants have successfully boosted perceived self-efficacy through positive verbal feedback (Escarti & Guzman, 1999; Hutchinson et al., 2008).

- b. The provision of *negative verbal feedback* would lower subsequent self-regulatory self-efficacy beliefs.

*Rationale:* Self-efficacy manipulation studies examining cognitive, affective, and behavioural outcomes in exercise settings among college-

aged participants have successfully lowered perceived self-efficacy through negative verbal feedback (Escarti & Guzman, 1999; Hu et al., 2007; Hutchinson et al., 2008; Motl et al., 2006)

- c. *No feedback* would result in no changes to subsequent self-regulatory self-efficacy beliefs.

*Rationale:* Self-efficacy manipulation studies examining behaviour-related outcomes among college-aged participants have reported that without provision of verbal feedback, no changes to self-efficacy beliefs are observed during follow-up sessions (Hutchinson et al., 2008).

2. It was hypothesized that manipulated self-regulatory self-efficacy would affect exercise intention. Specifically:

- a. Experimentally *raising* self-regulatory self-efficacy beliefs would predict an increased intention to exercise following positive verbal feedback provision, at baseline.

*Rationale:* Higher levels of performance on exercise-related tasks were achieved among the individuals who received positive verbal feedback in self-efficacy manipulation studies assessing college-aged participants (Escarti & Guzman, 1999; Hutchinson et al., 2008). As the most important predictor of actual behaviour, intention to engage in exercise is often reflected when exercise behaviour is exhibited (Conner & Norman, 2005; Maddux et al., 1995).

- b. Experimentally *decreasing* self-regulatory self-efficacy beliefs would predict no change in exercise intention following negative verbal feedback, at baseline.

*Rationale:* Performance-based self-efficacy manipulation studies have reported no changes to level of performance achieved among the college-aged participants who received negative verbal feedback (Escarti & Guzman, 1999; Hutchinson et al., 2008). No changes in actual exercise behaviour suggest no changes in intent to engage in that behaviour (Conner & Norman, 2005; Maddux et al., 1995).

- c. No changes in exercise intention would be observed when self-regulatory self-efficacy beliefs are unaltered.

*Rationale:* Self-efficacy manipulation studies examining exercise-related performance among college-aged participants have reported no changes to level of performance achieved among the individuals who did not receive performance feedback (Hutchinson et al., 2008). No changes in behavioural performance are often predicted by no changes in intention to engage in that behaviour (Conner & Norman, 2005; Maddux et al., 1995).

- 3. It was hypothesized that manipulated self-regulatory self-efficacy would affect exercise behaviour. Specifically:

- a. Experimentally *raising* self-regulatory self-efficacy beliefs would predict an increased frequency of exercise behaviour, reported at the 4-week follow-up period.

*Rationale:* Self-efficacy manipulation studies examining behaviour-related outcomes in exercise settings among college-aged participants have reported that higher levels of performance were achieved among the individuals who received positive verbal feedback (Escarti & Guzman, 1999; Hutchinson et al., 2008).

- b. Experimentally *decreasing* self-regulatory self-efficacy beliefs would predict no change in frequency of exercise behaviour, reported at the 4-week follow-up period.

*Rationale:* Performance-based self-efficacy manipulation studies conducted in exercise settings among college-aged participants have reported no changes to level of performance achieved among the individuals who received negative verbal feedback (Escarti & Guzman, 1999; Hutchinson et al., 2008).

- c. No changes in frequency of exercise behaviour reported at the 4-week follow-up period would be observed when self-regulatory self-efficacy beliefs are unaltered.

*Rationale:* Performance-based self-efficacy manipulation studies conducted in exercise settings among college-aged participants have reported no changes to level of performance achieved among the individuals who did not receive performance feedback (Hutchinson et al., 2008).

- 4. It was hypothesized that participants high in SPA would be more receptive and susceptible to the provision of verbal feedback. Specifically:

- a. Participants high in SPA would display *larger decreases* in self-regulatory self-efficacy beliefs following the provision of *negative* verbal feedback at baseline than participants low in SPA in the same experimental condition.

*Rationale:* High levels of SPA have been associated with low confidence in physical appearance and competence, low self-esteem, anxiety, and increased body comparisons (Chittester & Hausenblas, 2009; Crocker et al., 2001; Kyrejto et al., 2008; Marquez & McAuley, 2001; McCreary & Saucier, 2009). In turn, individuals with low confidence and doubt in their capabilities are more likely to accept performance feedback as true (Bandura, 1994; Karl et al., 1993).

- b. Participants high in SPA would report a *lower intention* to exercise following the provision of *negative* verbal feedback at baseline than participants low in SPA in the same experimental condition.

*Rationale:* As a significant correlate of high SPA, low confidence in physical competence coincides with low levels of perceived self-efficacy (Bandura, 1994; Crocker et al., 2001; Karl et al., 1993). In turn, it has been shown that individuals with low self-efficacy beliefs demonstrate a higher acceptance of performance feedback along with lower intentions to exercise (Bandura, 1994; Conner & Norman, 2005; Karl et al., 1993; Maddux et al., 1995).

- c. Participants high in SPA provided with *negative* verbal feedback would report a *lower frequency of exercise behaviour* during the 4-week follow-

up period than participants low in SPA in the same experimental condition.

*Rationale:* High levels of SPA correlate with low confidence in physical competence and low corresponding levels of perceived self-efficacy (Bandura, 1994; Crocker et al., 2001; Karl et al., 1993). In turn, it has been reported that low self-efficacy beliefs predict a higher acceptance of performance feedback along with a lower frequency of exercise behaviour (Bandura, 1994; Conner & Norman, 2005; Karl et al., 1993; Maddux et al., 1995).



## CHAPTER 3: METHODOLOGY

### Participants

Recruitment for the present study occurred at Brock University by means of undergraduate class announcements and poster advertisements. Based on previous literature, a large effect size was expected with Cohen's  $d$  values ranging from .82 to .88 (Hu et al., 2007; Hutchinson et al., 2008). With an alpha of .05 and power of .80, the total required sample size for the present study was 63 participants (Cohen, 1992). However, in order to account for any unanticipated measurement errors or incidents of dropout, this study aimed to recruit a total of 70 participants. This study sought female participants due to the prevalence of body image concerns documented among this population, and consequently, due to the prevalence of body image measures and body image research tailored toward college-aged women (Hausenblas & Fallon, 2002).

The inclusion criteria also consisted of “infrequent exercisers”, as individuals with this exercise status have been found to be more susceptible to an exercise-based self-efficacy manipulation than regular exercisers (Hu et al., 2007). For the purposes of the present study, “infrequent exercisers” were defined as those who engage in physical activity, on average, 2 or fewer times per week, as it has been found that in order to gain the physical and psychological exercise-related benefits, regular exercise patterns, consisting of a minimum of 30 minutes per day of exercise for 3 or more days per week for one month, are essential (American College of Sports Medicine [ACSM], 2012). Furthermore, it has been found that individuals who exercise 3 or more times per week differ from those who exercise 2 or fewer times per week on numerous aspects of psychological and mental health, including SPA, confidence, and well-being (Gammage

et al., 2004). Exclusion criteria consisted of inactive individuals (those who did not engage in any physical activity), varsity athletes, and individuals with a history of an eating disorder due to possibly abnormal exercise patterns or body image perceptions (Blood, 2005; Krane, Choi, Baird, Aimar, & Kauer, 2004).

The final sample consisted of 66 participants, with the majority reporting their race as Caucasian as their race and Kinesiology as their undergraduate major. Participant retention was adequate, as only one participant was lost to follow-up. Initially, 83 participants were recruited; however, 17 were removed as they all reported engaging in exercise behaviour more than 2 times per week, failing to meet the eligibility criteria related to physical activity behaviour. Descriptive statistics for demographic variables were calculated for the high efficacy (HE) condition, low efficacy (LE) condition, and control condition participants and are shown below (see Table 1). No group differences were found in age, weight, height, or BMI (all  $p$ -values > .05).

Table 1

*Means and Standard Deviations (SD) by Condition*

Variable	<u>HE Condition (<math>n = 21</math>)</u>		<u>LE Condition (<math>n = 22</math>)</u>		<u>CON Condition (<math>n = 23</math>)</u>	
	Mean	SD	Mean	SD	Mean	SD
Age (years)	20.84	1.96	20.68	1.43	20.87	1.66
Weight (lbs)	145.48	26.33	145.18	27.47	142.71	21.47
Height (inches)	65.90	2.93	66.18	3.69	65.65	2.95
BMI	23.67	4.67	23.18	2.54	23.35	3.70

## Materials

A series of questionnaires were completed by the participants during the initial and follow-up sessions in order to assess the following constructs (see *Appendix A*).

**Demographics.** Self-reported demographic variables, including age, height, weight, race, undergraduate major, varsity athlete status, eating disorder history, and average number of days per week engaged in a minimum of 30 minutes of exercise, were collected.

**Behavioural Intention Scale (BIS).** Items assessing behavioural intention, the perceived likelihood of intending to engage in a given behaviour, were developed consistent with recommendations for measuring TPB constructs (Ajzen, 2002; Francis et al., 2004). In line with the recommendations for physical activity provided by the ACSM (2012), behavioural intention was assessed for regular exercise behaviour, consisting of a minimum of 30 minutes per day of exercise for 3 or more days per week for one month (Maddux et al., 1995). Exercise was furthermore described as any planned or structured bodily activity, requiring physical effort and associated with an increased heart rate (Caspersen, Powell, & Christenson, 1985).

Participants were asked to respond to the following three items, each on 7-point scales, used to measure behavioural intention: “I intend to exercise at least 30 minutes per day 3 days per week over the next month” (1 = *extremely unlikely*, 7 = *extremely likely*), “I will try to exercise at least 30 minutes per day 3 days per week over the next month” (1 = *definitely true*, 7 = *definitely false*), and “I plan to exercise at least 30 minutes per day 3 days per week over the next month” (1 = *strongly disagree*, 7 = *strongly agree*). A score of 1 on the first and third item, and a score of 7 on the second item denote low intent to

exercise for the specified frequency and time, and a score of 7 on the first and third item, along with a score of 1 on the second item denote a high intent to exercise for the specified frequency and time. A behavioural intention score was calculated for each participant after reverse coding the second item and taking the mean of all three items.

**Godin Leisure-Time Exercise Questionnaire (GLTEQ;** Godin & Shephard, 1997). The GLTEQ was used to measure exercise behaviour, consisting of 3-items concerning leisure-time exercise habits. Exercise behaviour was assessed by asking participants how many times, on average, they engage in strenuous (heart beats rapidly), moderate (not exhausting), and mild (minimal effort) exercise during a typical 7-day period (one week) for more than 15 minutes during their spare time. For each level of exercise intensity, several example activities were provided, reflecting that intensity of exercise. A total activity leisure score was calculated by summing strenuous, moderate, and mild exercise scores weighted by 9, 5, and 3 METs respectively. Adequate validity and reliability for the GLTEQ has been demonstrated (Godin & Shephard, 1985; Jacobs, Ainsworth, Hartman, & Leon, 1993; Sallis, Buono, Roby, Micale, & Nelson, 1993).

**Self-Regulatory Self-Efficacy Scale (SRSES).** As a highly situation-specific construct, measures of self-regulatory self-efficacy must be customized to the given context of interest (Bandura, 2006). Therefore, in order to assess self-regulatory self-efficacy beliefs for the behaviour of interest (i.e., exercise), three items were constructed to reflect perceived confidence in the ability to exercise 30 minutes per day for 3 times per week for one month. The stems of each statement have been previously used and validated. Participants were asked to respond to the following three items reflecting self-regulatory self-efficacy beliefs: “I can find the means to exercise 30 minutes per day for 3

times per week for one month”, “I am able to schedule 30 minutes per day of exercise, 3 times per week for one month”, and “I can manage to exercise regularly, 30 minutes per day for 3 times per week for one month”, each on 100-point confidence scales, ranging from 0 (*not at all confident*) to 100 (*completely confident*; Bandura, 2006). A low score denotes low confidence in the ability to exercise 30 minutes per day for 3 times per week for one month, and a high score denotes high confidence in the ability to exercise for the specified duration and frequency. A self-regulatory self-efficacy score was calculated for each participant by taking the mean of all three items.

**Social Physique Anxiety Scale (SPAS;** Hart et al., 1989; Martin Ginis, Rejeski, Leary, McAuley, & Bane, 1997). The SPAS is a 9-item scale measuring concern associated with evaluations of the body. Participants were asked to indicate the degree to which each statement is characteristic of them on a 5-point scale ranging from 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*). A score of 1 denotes a low level of SPA and a score of 5 denotes a high level of SPA. A SPA score was calculated for each participant after reverse coding the fifth and eighth item and taking the mean of all nine SPA items used in the questionnaire. Evidence of validity and reliability in male and female undergraduate students has been provided (Petrie, Diehl, Rogers, & Johnson, 1996; Martin Ginis et al., 1997).

**Deception Bogus Item Questionnaire (DBIQ).** Participants were asked to complete several “bogus” measures as a means to fabricate an exercise adherence likelihood score and to reinforce the self-efficacy manipulation. The following measures have demonstrated acceptable validity and reliability in male and female university populations.

*Perceived barriers.* Perceived barriers to exercise were assessed by the following two items: “Physical activity is boring” and “I don’t have time for physical activity”.

Participants were asked to indicate the degree to which each statement is true of them on a 5-point scale, ranging from 1 (*definitely true*) to 7 (*definitely false*; Dishman et al., 2005).

*Physical activity enjoyment.* Enjoyment experienced during physical activity was assessed by two items derived from the Physical Activity Enjoyment Scale (PACES; Kendzierski & DeCarlo, 1991). Participants were asked to indicate the degree to which the following statements are true of them on a 7-point scale, from 1 (*definitely true*) to 7 (*definitely false*): “I find exercise energizing versus tiring” and “I find exercise pleasurable versus unpleasurable”.

*Screen time.* Screen time was assessed by a single item derived from the Adolescent Sedentary Activity Questionnaire (ASAQ; Hardy, Booth, & Okely, 2007): “During a typical 7-day period during the school term, how often do you engage in non-study (not school-related) screen time, including watching television, videos, movies, and playing computer and video games?” Participants were asked to select one of the following four options reflecting screen time: “less than 1 hour per day”, “1-3 hours per day”, “3-5 hours per day”, or “more than 5 hours per day”.

*Peer and family behaviour.* Finally, peer and family behaviour was assessed by the following two items each on 4-point scales, ranging from 1 (*very little*) to 4 (*very much*): “How often do your three closest friends engage in physical activity?” and “How often do your family members engage in physical activity?”.

The data collected from these “bogus” measures was not included in the analysis, as the deception questionnaires were solely used to convince the participants that the calculation of an exercise adherence likelihood score was conceivable.

**Manipulation Check.** In order to ensure that the participants believed the verbal feedback, participants in the HE and LE groups were asked if they believed the feedback they were given about their likelihood of exercising at the 4-week follow-up period.

## **Procedures**

Ethics clearance from the University Research Ethics Board was obtained prior to study commencement (see *Appendix B*). Participants for the present study were recruited by means of undergraduate class announcements and poster advertisements within Brock University. A brief outline of the purpose and conditions of the research project was communicated to the students during the announcement and illustrated on the posters (see *Appendix C and D*). Students were asked to contact the researcher by email if they were interested in participating in the study. After screening potential participants by email to ensure a low-active status (consisting of those who engage in physical activity 2 or fewer times per week), a specified time slot was confirmed with each student via email, as well as the location of the private lab where the study was conducted. Prior to the initial session, participants who confirmed their participation were randomly assigned into one of three experimental groups without their knowledge: HE condition, LE condition, or control group.

Prior to the initial session, participants were emailed a Letter of Invitation, stating that the purpose of the research project was to investigate the relationship between self-efficacy, body image, and exercise intention and behaviour (see *Appendix E*). Upon

arrival at the lab, all participants were asked to provide Informed Consent (see *Appendix F*). After the Informed Consent was reviewed by the researcher in order to ensure full understanding, an initial set of questionnaires was administered to each participant. The initial questionnaire package measured the following constructs: demographics, behavioural intention, exercise behaviour, task-specific self-efficacy, self-regulatory self-efficacy, SPA, and the deception or “bogus” items. The order of the questionnaires was randomized in order to prevent any order effects. The completed questionnaires were returned directly to the researcher. The researcher then informed the participants assigned to the HE condition and LE condition that an exercise adherence likelihood score, representing one’s likelihood of adhering to an exercise program for 30 minutes per day for 3 times per week for one month, could be derived from inputting items from the completed questionnaire package into a formula. The researcher advised the participant that this formula was calculated on the computer in the lab where the study was conducted. After receiving approval from the participant to compute her exercise adherence likelihood score, the researcher recorded items from the completed questionnaire package into the SPSS Statistical Software program open on the computer, exposed for the participant to observe (see *Appendix G* for verbal script). While calculating the exercise adherence likelihood score, the researcher gave the participant the Cover Story (see *Appendix H*). The purpose of the Cover Story was to support the feasibility of the exercise adherence likelihood score by providing credible sources and informing the participants that the questionnaire items had all been shown to reliably predict future exercise behaviour among individuals of all ages. The researcher then generated a graph for each participant, representing her exercise adherence likelihood



score (see *Appendix I*). Participants randomly assigned to the HE condition were provided with positive verbal feedback, informed that their likelihood of adhering to an exercise program for 30 minutes per day three times per week for one month was around 80% based on the results computed by the formula. The graph revealed on the computer screen to the participants in the HE condition group was reviewed and explained by the researcher, depicting the participant's exercise adherence likelihood score as an "above average" score on the downward slope of the histogram. Participants randomly assigned to the LE condition were provided with negative verbal feedback, informed that their likelihood of adhering to an exercise program for 30 minutes per day three times per week for one month was around 20% based on the results computed by the formula. The graph revealed on the computer screen to the LE condition group was reviewed and explained by the researcher, depicting the participant's exercise adherence likelihood score as a "below average" score on the upward slope of the histogram. After providing the participants in the HE condition and LE condition groups with the verbal feedback, they were asked by the researcher if they understood the information provided to them and if they had any questions pertaining to their score. Participants assigned to the control group were not provided with any type of verbal feedback nor were they offered an exercise adherence likelihood score. Next, during the same session, all participants were asked to complete a second questionnaire package, consisting of the self-regulatory self-efficacy and the behavioural intention measures. Upon completion, all participants returned the second questionnaire package directly to the researcher. Before leaving the lab, the researcher scheduled a second session with each participant four weeks later. The researcher also advised the participant of the three-week follow-up email that would be

sent as a reminder of the final session date, time, and location. The researcher then thanked the individual for participating.

At the three-week follow-up from the initial session, an email was sent to all participants, serving as a reminder of their final session one week thereafter (see *Appendix J*). The scheduled date, time, and location of the final session were included in the email. It was anticipated that the email also served as a booster for the participants in the HE and LE conditions, evoking the verbal feedback previously provided and reinforcing the self-efficacy manipulation.

Upon arrival at the private lab for the second session, participants were asked to complete the three items on the GLTEQ and return it directly to the researcher. The three questionnaire packages completed at separate time points by each individual participant were given a common ID number.

Next, after full completion of the study, in order to ensure that the participants believed the verbal feedback, participants in the HE and LE groups were asked if they believed the feedback they were given about their likelihood of exercising. The ‘yes’ or ‘no’ response was recorded on the first page of each participant’s questionnaire package. Finally, a Debriefing Form, including post-debrief consent, was given to each participant (see *Appendix K*). The Debriefing Form was reviewed by the researcher to ensure each participant was aware of the true purpose of the study along with the deception that was involved. Participants were also asked to provide post-debrief consent, as they had the right to withdraw their data from the sample due to the nature of the study (see *Appendix L*). Finally, a Feedback Request Form was offered to each participant (see *Appendix M*) if she was interested in receiving a summary of the results of the study after the study was

completed. Any questions posed by the participants pertaining to the study procedures were answered thoroughly and honestly by the researcher. Finally, the researcher thanked each participant for her participation in the study and advised her that her name had been entered into a draw to win one of five \$20.00 Tim Horton's gift cards. Tim Horton's gift cards have been found to be an effective means for recruitment in previous studies conducted at Brock University due to the on-campus Tim Horton's stores.

## CHAPTER 4: RESULTS

### Treatment of Missing Data

After data collection was complete, the data were entered into SPSS PSAW 19.0 and screened for any missing values. Any items left unanswered were inspected by the researcher to ensure any incident of missing data was random in nature. A total of 7 items were randomly missing, comprising less than 5% of the dataset. Under these circumstances, the missing items took on the sample mean value for that particular item.

### Subscale Scoring

**BIS.** A behavioural intention score was calculated for each participant pre- and post-feedback after reverse coding the second item and taking the mean of all three behavioural intention items used in the questionnaire. Internal consistency reliability for this study was adequate ( $\alpha = .851$ ).

**GLTEQ.** Weekly frequencies of strenuous, moderate, and light activities reported by each participant were multiplied by nine, five, and three, respectively. A weekly leisure activity score in METs was calculated for each participant at baseline and at the 4-week follow-up by summing the products of the separate components:

$$\text{Weekly leisure activity score} = (9 \times \text{Strenuous}) + (5 \times \text{Moderate}) + (3 \times \text{Light})$$

**SRSES.** A self-regulatory self-efficacy score was calculated for each participant pre- and post-feedback by calculating the mean of all three self-regulatory self-efficacy items used in the questionnaire. Internal consistency reliability for this study was adequate ( $\alpha = .843$ ).

**SPAS.** A SPA score was calculated for each participant after reverse coding the fifth and eighth item and taking the mean of all nine SPA items used in the questionnaire. Internal consistency reliability for this study was adequate ( $\alpha = .920$ ).

### **Assumptions**

***Independent random sampling.*** Participants were sampled by means of undergraduate class announcements and poster advertisements within Brock University. This assumption was violated due to the heavy dependence on volunteers.

***Equal sample sizes among groups.*** In order to ensure approximately equal sample sizes within the HE condition, the LE condition, and the control condition, each recruited participant was randomly assigned into one of the three conditions (HE, LE, control). The order of group assignment was determined prior to recruitment and generated using random selection. This assumption was met as the HE condition, the LE condition, and the control condition consist of approximately equal sample sizes (21, 22, and 23 participants, respectively).

***Univariate Outliers.*** For the purposes of the present study, a univariate outlier was defined as any value that is greater or less than 3 standard deviations from the mean value of a given variable. In order to identify any outliers, z-scores were calculated. Any z-score value above +3.29 or below -3.29 was flagged as a potential outlier, and inspected accordingly. A total of 3 outliers were identified (within the variables of age, moderate exercise behaviour, and light exercise behaviour) and changed to a score that was one standard deviation from the next most extreme score.

***Multivariate Outliers.*** Testing for multivariate outliers involved checking whether any participants reported any unusual combinations of scores of our (continuous)

15 measures. In order to ensure a consistent logic across our dataset, multivariate normality was tested by obtaining a critical value from a chi squared table based on 15 degrees of freedom (the number of items measured) and generating a Mahalanobis' Distance (MAH) value for each participant. Multivariate outliers are absent if none of the MAH values surpassed our critical value. This assumption was met as there were no MAH values identified that were higher than our critical value of 37.70,  $p = .001$ .

***Normality.*** For each continuous variable assessed in the present study, including age, height, weight, behavioural intention, task-specific self-efficacy, self-regulatory self-efficacy, exercise behaviour and SPA, univariate normality of distributions was checked. Key characteristics of a normal distribution were checked using SPSS PSAW 19.0 Statistical Software. Mean, median, and mode values of each measure were assessed and compared to ensure they were similar, values of skewness and kurtosis were calculated for each variable to ensure they were close to 0, and data for each measure were plotted in a histogram to ensure a symmetrical bell curve pattern. It was revealed that the mean, median, and mode values for each variable were very similar, and values of skewness and kurtosis were predominantly below 2.0 (see Table 2). Three kurtosis values of 2.50, 5.26, and 2.10 (behavioural intention pre-feedback among control condition participants, GLTEQ pre-feedback among control condition participants, and GLTEQ post-feedback among LE condition participants, respectively) were above 2.0. However, as there is no transformation to fix kurtosis, these values were not altered. Histograms showed that, overall, the assumption of univariate normality was met.

***Homogeneity of variances.*** In order to ensure that the variance between each experimental condition is equal, Levene's Statistic was calculated for each dependent

variable. A Levene Statistic  $p$ -value above .05 (a non-significant value) suggests homogeneity in variance between conditions. This assumption was met, as the Levene Statistic  $p$ -values for each dependent variable were all reported above .05.

**Sphericity.** A series of Mauchly's Tests of Sphericity were conducted in order to ensure that the variance in the differences between the three experimental conditions was equal for each dependent variable assessed. With  $p$ -values above .05 for each dependent variable, this assumption was met.

### **Manipulation Check**

A total of three participants (all assigned to the HE condition) did not believe the verbal feedback provided. These cases were removed from the dataset. Furthermore, these participants reported engaging in exercise for more than 2 days per week for a minimum of 30 minutes.

### **Hypotheses Testing**

Prior to conducting the principal analyses, a series of one-way analyses of variance (ANOVAs) were conducted in order to ensure the HE condition, LE condition, and control (CON) condition did not significantly differ in baseline self-regulatory self-efficacy, behavioural intention, and exercise behaviour (prior to the manipulation). No group differences were found in self-regulatory self-efficacy,  $F(2, 63) = .448, p = .641$ , behavioural intention,  $F(2, 63) = .307, p = .737$ , or exercise behaviour at baseline,  $F(2, 63) = .334, p = .717$ . See Table 2 for means and standard deviations pertaining to self-regulatory self-efficacy, behavioural intention, and exercise behaviour scores at baseline.

Table 2

*Means and Standard Deviations (SD) for Pre- and Post-Feedback by Condition*

Variable	<u>HE Condition (n = 21)</u>				<u>LE Condition (n = 22)</u>				<u>CON Condition (n = 23)</u>			
	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis	Mean	SD	Skewness	Kurtosis
SRSE pre-FB	77.22	16.84	-.71	1.00	81.52	18.08	-.81	-.24	80.99	13.43	-.35	-.77
SRSE post-FB	82.70	13.15	-.41	.22	82.73	16.92	-.84	-.26	81.81	12.90	-.44	-.78
BI pre-FB	5.35	1.38	-.17	-1.26	5.56	1.49	-.89	.01	5.23	1.40	-1.34	2.50
BI post-FB	5.43	1.24	.10	-1.63	5.82	1.14	-.26	-1.46	5.44	1.25	-.55	-.49
GLTEQ pre-FB	39.00	18.90	.83	-.75	34.47	19.65	1.18	1.37	38.91	23.88	1.81	5.26
GLTEQ post-FB	54.66	20.32	-.73	.11	49.88	19.19	1.14	2.10	43.91	19.68	.69	.99

*Note.* HE = high efficacy, LE = low efficacy, CON = control. FB = feedback. SRSE = self-regulatory self-efficacy and measured on 100-point confidence scale. BI = behavioural intention and ranges from 1 (*extremely unlikely*) to 7 (*extremely likely*). GLTEQ = Godin Leisure-Time Exercise Questionnaire and measured in METs.



**Hypothesis 1.** *It was hypothesized that there would be a significant interaction between type of feedback provided and self-regulatory self-efficacy.* In order to test the first hypothesis to determine if self-regulatory self-efficacy was effectively manipulated as a function of type of feedback provided, a 3 (experimental condition: HE condition, LE condition, and control condition) by 2 (time: pre-feedback, and post-feedback) repeated measures ANOVA with *experimental condition* and *time* as the independent variables and *self-regulatory self-efficacy* as the dependent variable was conducted with time as the repeated factor. The results revealed a statistically significant main effect for time,  $F(1, 63) = 8.635, p = .005, \eta^2 = .121$ , a condition-by-time interaction approaching significance for self-regulatory self-efficacy,  $F(2, 63) = 2.993, p = .057, \eta^2 = .087$ , and a non-significant main effect for group,  $F(2, 63) = .116, p = .891, \eta^2 = .004$ . Follow-up comparisons were then conducted using a series of one-way ANOVAs in order to determine which condition(s) (HE condition, LE condition, or control condition) demonstrated significant changes in self-regulatory self-efficacy over time (from pre- to post-feedback). The results revealed that the participants assigned to the HE condition demonstrated significantly higher self-regulatory self-efficacy from pre- to post-feedback,  $F(1, 20) = 9.56, p = .006, \eta^2 = .323$ . No significant changes in self-regulatory self-efficacy were reported among the LE condition participants,  $F(1, 21) = 1.07, p = .313, \eta^2 = .048$ , or the control group participants,  $F(1, 22) = .32, p = .575, \eta^2 = .015$ , from pre- to post-feedback. See Table 2 for pre- and post-feedback descriptives for self-regulatory self-efficacy.

**Hypothesis 2.** *It was hypothesized that manipulated self-regulatory self-efficacy would*

***affect exercise intention.*** In order to examine the effects of the manipulation on behavioural intention, a 3 (experimental condition: HE condition, LE condition, and control condition) by 2 (time: pre-feedback, and post-feedback) repeated measures ANOVA with *experimental condition* and *time* as the independent variables and *behavioural intention* as the dependent variable was conducted with time as the repeated factor. A statistically significant condition-by-time interaction for behavioural intention was not revealed,  $F(2, 63) = .279, p = .758, \eta^2 = .009$ , along with a non-significant main effect for group,  $F(2, 63) = .513, p = .601, \eta^2 = .016$ , and a non-significant main effect for time,  $F(1, 63) = 3.332, p = .073, \eta^2 = .050$ . Therefore, the behavioural intentions of the participants did not change from pre- to post-feedback as a function of the manipulation through its impact on self-regulatory self-efficacy. See Table 2 for pre- and post-feedback descriptives for behavioural intention.

***Hypothesis 3. It was hypothesized that manipulated self-regulatory self-efficacy would affect exercise behaviour.*** In order to examine the effects of the manipulation on exercise behaviour, a 3 (experimental condition: HE condition, LE condition, and control condition) by 2 (time: pre-feedback, and post-feedback) repeated measures ANOVA with *experimental condition* and *time* as the independent variables and *exercise behaviour* as the dependent variable was conducted with time as the repeated factor. The results revealed a statistically significant main effect for time,  $F(1, 60) = 32.208, p < .001, \eta^2 = .349$ , a condition-by-time interaction approaching significance for exercise behaviour,  $F(2, 60) = 2.780, p = .070, \eta^2 = .085$ , and a non-significant main effect for group,  $F(2, 60) = .439, p = .647, \eta^2 = .014$ . Follow-up main comparisons were then conducted using a series of one-way ANOVAs in order to determine which condition(s) (HE condition, LE

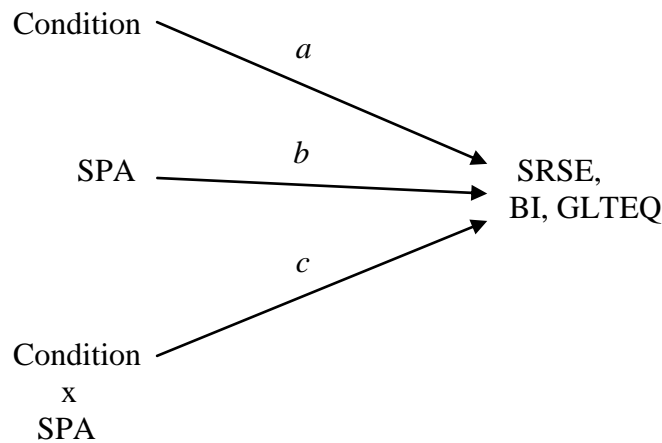
condition, or control condition) demonstrated significant changes in exercise behaviour from baseline (pre-feedback) to the 4-week follow-up period (post-feedback). Significant increases in exercise behaviour were reported from pre- to post-feedback among participants assigned to the HE condition,  $F(1, 18) = 12.895, p = .002, \eta^2 = .417$ , and among participants assigned to the LE condition,  $F(1, 20) = 16.980, p = .001, \eta^2 = .459$ . No significant changes in exercise behaviour were reported among the control group participants from pre- to post-feedback,  $F(1, 22) = 2.992, p = .098, \eta^2 = .120$ . See Table 2 for pre- and post-feedback descriptives for exercise behaviour.

***Hypothesis 4. It was hypothesized that participants high in***

***SPA would be more receptive and susceptible to the provision of negative verbal***

***feedback.*** Finally, the role of SPA was examined as a moderator in the relationships between condition and self-regulatory self-efficacy post-feedback, condition and behavioural intention post-feedback, and condition and exercise behaviour post-feedback (at the 4-week follow-up period). Three separate hierarchical multiple linear regression analyses were conducted in order to examine whether any of the relationships specified above depend on level of SPA. This analysis was consistent with the framework for testing moderator effects developed by Baron and Kenny (1986):

Figure 1. Moderator model proposed by Baron and Kenny (1986)



The outcome variable in the above diagram is impacted by the predictor (condition; path *a*), the moderator (SPA; path *b*), and the product of the predictor and moderator (condition x SPA; path *c*). While significant main effects may be revealed for the predictor (path *a*) and moderator (path *b*), the moderator hypothesis is supported by a significant interaction between the predictor and moderator (path *c*).

The values of SPA reported by the participants were typical ( $M = 3.22$ ,  $SD = .90$ ) and no group differences were found. After centering the variable of SPA (i.e., by subtracting the mean from each score in order to reduce correlation with the interaction term) and computing the condition-by-SPA interaction term (i.e., by multiplying condition and SPA for each participant), the two predictor variables (Block 1: condition and SPA) and the interaction term (Block 2: condition-by-SPA) were entered into a series of hierarchical multiple linear regression models. The first model involved entering self-regulatory self-efficacy as the dependent variable. Results indicated that SPA did not correlate with self-regulatory self-efficacy scores post-feedback,  $\beta = -.113$ ,  $t = -.902$ ,  $p =$

.371. The interaction between condition and SPA was also non-significant,  $\beta = -.010$ ,  $t = -.027$ ,  $p = .979$ , suggesting that the effect of condition on self-regulatory self-efficacy does not depend on level of SPA reported.

The second model involved entering behavioural intention as the dependent variable, with condition, SPA, and their interaction entered as above. Results indicated that SPA did not correlate with behavioural intention scores post-feedback,  $\beta = .027$ ,  $t = .216$ ,  $p = .829$ . The interaction between condition and SPA was also non-significant,  $\beta = .012$ ,  $t = .033$ ,  $p = .974$ , suggesting that the effect of condition on behavioural intention does not depend on level of SPA reported. The final model involved entering exercise behaviour assessed at the 4-week follow-up as the dependent variable. Results indicated that SPA did not correlate with exercise behaviour post-feedback,  $\beta = -.159$ ,  $t = -1.278$ ,  $p = .206$ . The interaction between condition and SPA was also non-significant,  $\beta = -.291$ ,  $t = -.776$ ,  $p = .441$ , suggesting that the effect of condition on exercise behaviour at the 4-week follow-up period did not depend on level of SPA reported.

## CHAPTER 5: DISCUSSION

The purpose of the present study was to examine the effects of verbal feedback on self-regulatory self-efficacy and exercise intention, as well as exercise behaviour reported at a 4-week follow-up period, among low-active college women. In addition, this study investigated the role of SPA as a moderator in the relationships stated above.

### **Hypothesis 1: Verbal Feedback and Self-Regulatory Self-Efficacy**

It was first hypothesized that a significant interaction between type of feedback provided and time on self-regulatory self-efficacy would be revealed. More specifically, it was hypothesized that the provision of *positive verbal feedback* would raise subsequent self-regulatory self-efficacy beliefs, the provision of *negative verbal feedback* would lower subsequent self-regulatory self-efficacy beliefs, and *no feedback* would result in no changes to self-regulatory self-efficacy beliefs. Our results revealed that the positive verbal feedback effectively manipulated self-regulatory self-efficacy, as increases in self-regulatory self-efficacy beliefs were reported from pre- to post-feedback among participants assigned to the HE condition. However, LE condition participants who were given negative verbal feedback and control group participants who were not provided with any type of feedback did not report any changes to self-regulatory self-efficacy beliefs from pre- to post-feedback.

Overall, these findings are consistent with the literature, as the majority of studies that have manipulated self-efficacy within a physical activity context have reported changes to self-efficacy among one of the two experimental groups that were provided with verbal feedback (Hu et al., 2007; Lamarche et al., 2011; McAuley et al., 1999; Marquez et al., 2002; Motl et al., 2006). For the most part, the existing literature has

documented *either* post-manipulation increases in self-efficacy following positive feedback *or* post-manipulation decreases in self-efficacy following negative feedback. The variation in methodology utilized throughout the different self-efficacy manipulation studies, including the different methods of feedback delivery (i.e., verbal, computer-generated, computer-printout), physical activity behaviours measured (i.e., cycling, treadmill, stairmaster, balance), tasks designed (i.e., submaximal, maximal, single bout, multiple bout), and types of self-efficacy under investigation (i.e., task-specific, self-regulatory), may account for why changes in self-efficacy are not consistently observed among the same experimental group from one study to the next (Hu et al., 2007; Lamarche et al., 2011; Marquez et al., 2002; McAuley et al., 1999; Motl et al., 2006).

The level of expertise, credibility, and appeal of the researcher providing the feedback was equally reinforced to the HE and LE participants through email signatures and by stating the researcher's background as a personal trainer and fitness instructor during the first session. Therefore, as the format, method of delivery, and thus, the believability of the verbal feedback were identical for both the HE and LE participants, our findings suggest that the content of the verbal feedback (i.e., positive versus negative) differentially impacted subsequent self-regulatory self-efficacy beliefs. The following section will review possible explanations for the differential effects exerted by these two types of verbal feedback.

**Conditions of the verbal feedback that promote increases in self-regulatory self-efficacy following positive feedback.** Prior to receiving positive verbal feedback, the HE condition participants reported an initial mean confidence level of 77.22% in their capabilities to exercise regularly for one month. Therefore, the “above average” exercise

adherence likelihood score of 80% given to the HE condition participants may have supported and boosted their existing self-regulatory self-efficacy beliefs, serving as confidence reinforcement (Bandura, 1994; Bandura, 1997). Furthermore, this “above average” exercise adherence likelihood score reflected an exercise prescription slightly above the self-reported exercise status of the HE condition participants (i.e., currently exercising 1-2 times per week). As a result, these participants may have interpreted the positive verbal feedback as a realistic and believable score, moderately beyond their current capabilities, as subsequent increases in self-regulatory self-efficacy were documented (Bandura, 1986; Bandura, 1997).

**Conditions of the verbal feedback that failed to decrease self-regulatory self-efficacy following negative feedback.** According to Bandura, individuals high in self-efficacy who are confident in their judgments of their own capabilities (i.e., high self-efficacy) likely reject any negative information or failures, attributing these events to factors external to their control (i.e., bad luck, temporary occurrence; Bandura, 1994; Bandura, 1997). Prior to receiving negative verbal feedback, the LE condition participants reported a mean confidence level of 81.52% in their capabilities to exercise regularly for one month. As a result, the “below average” exercise adherence likelihood score of 20% given to the LE condition participants may not have had an impact on self-regulatory self-efficacy, due to the large discrepancy between this verbal feedback and their pre-existing beliefs. Furthermore, as only a single instance of negative feedback was provided, this was likely insufficient to counteract any experiences that led the LE condition participants to their current high levels of self-regulatory self-efficacy (Bandura, 1997; Gammage, Martin Ginis, & Hall, 2004; Rohleder, Chen, Wolf, & Miller,



2008). Therefore, high pre-existing beliefs may have protected the LE condition participants against any decreases to their self-regulatory self-efficacy beliefs following the single incident of negative feedback, thus sustaining their current beliefs (Bandura, 1994; Bandura, 1997).

The process of self-presentation affirms that situations promoting increased self-awareness prompt individuals to make comparisons between themselves and the ideal that is relevant to the circumstances (Gammage, Martin Ginis et al., 2004). As a result, people may try to portray themselves in a manner that they believe is socially desirable (Gammage, Martin Ginis et al., 2004). In the present study, the verbal feedback provided to the HE and LE condition participants may have structured a situation of increased self-awareness by drawing attention to exercise behaviour and body image (Blood, 2005). Consequently, even if self-regulatory self-efficacy beliefs were altered in actuality, the participants in the LE condition may have been reluctant to report any changes, as doing so would portray themselves in a manner that would emphasize deficits in capabilities in comparison to the ideal, conflicting with societal standards (Gammage, Martin Ginis, et al., 2004). Therefore, in order to refrain from being seen negatively by the researcher, the LE condition participants may have reported high levels of self-regulatory self-efficacy following feedback in order to self-present in a socially desirable fashion (Bandura, 1997; Gammage, Martin Ginis et al., 2004).

Although we acknowledge from a statistical standpoint that our condition-by-time interaction was approaching significance for self-regulatory self-efficacy in the hypothesized direction, given that this was the first study to attempt to manipulate self-

regulatory self-efficacy, and the first to look at a longer-term follow-up of exercise behaviour, these trends were further explored.

### **Hypothesis 2: Verbal Feedback and Behavioural Intention**

Next, it was hypothesized that the impact of the manipulation on self-regulatory self-efficacy would consequently affect exercise intention. More specifically, it was hypothesized that the provision of *positive verbal feedback* would predict an increased intention to exercise, while the provision of *negative verbal feedback* and *no feedback* would predict no change in intention to exercise. Our results revealed that there were no changes in exercise intentions from pre- to post-feedback in any group, supporting two of our three predictions. Although behavioural intention has not been measured in a study of similar design, as the LE and control conditions did not report any changes to self-regulatory self-efficacy following the manipulation, it is fitting that no changes in exercise intention were observed among these conditions. However, contrary to our hypothesis, there are several potential reasons as to why no changes in exercise intention were observed from pre- to post-feedback among the HE condition.

According to the Theory of Planned Behaviour (TPB), behavioural intentions are shaped by normative beliefs concerning the behaviour, attitudes toward the behaviour, and perceived behavioural control (PBC; Ajzen, 1991; Ajzen & Madden, 1986). Of these three variables, PBC has been found to play the largest role in shaping behavioural intentions (Ajzen, 1991; Ajzen & Madden, 1986; Hausenblas, Carron, & Mack, 1997). PBC reflects an individual's belief concerning any internal and external control factors believed to influence the difficulty, and thus, the execution and performance of a given

behaviour (Ajzen & Madden, 1986; Kraft et al., 2005). As a result, PBC has often been operationalized as barrier self-efficacy, reflecting the nonvolitional control components of that behaviour (Ajzen, 1991; Ajzen, 2002; Kraft et al., 2005). Therefore, as the exercise adherence likelihood score given to the HE condition participants did not directly tap into or expose any control factors or barriers related to exercise participation (i.e., aspects of PBC), behavioural intentions would likely remain unchanged.

Although behavioural intentions are the most important predictor of actual behaviour, they do not exist in isolation (Conner & Norman, 2005; Maddux et al., 1995; Nigg, 2005). Experiencing increases in behavioural intentions involves input and collaboration from additional constructs that shape and correlate with intentions (Nigg, 2005). For example, experiencing increases in behavioural intentions coincides with the planning and coordination of the specified behaviour, involving the mental preparation of the “when”, “where”, and “how” of behaviour execution (Sniehotta, Scholz, & Schwarzer, 2005). Therefore, the increases in self-regulatory self-efficacy observed among the HE condition participants may have been insufficient on their own to subsequently raise exercise intentions. Furthermore, as exercise intentions were reported almost simultaneously with self-regulatory self-efficacy beliefs (i.e., immediately following verbal feedback provision), there may not have been sufficient time for the HE condition participants to reflect on the implications of the verbal feedback on their self-regulatory self-efficacy beliefs and, consequently, their exercise intentions for any overt increases in exercise intentions to occur.

### **Hypothesis 3: Verbal Feedback and Exercise Behaviour**

It was hypothesized that the self-regulatory self-efficacy manipulation at baseline would affect exercise behaviour reported at the 4-week follow-up period. Specifically, it was hypothesized that the HE condition participants who were given *positive verbal feedback* would report a higher frequency of exercise behaviour at the 4-week follow-up period, while the LE condition participants who were given *negative verbal feedback* and the control condition participants who were given *no feedback* would report no changes in frequency of exercise behaviour at the 4-week follow-up period. Both the HE and LE condition participants reported increases in exercise frequency, while the control condition participants reported no changes in exercise frequency, supporting two of our three hypothesized outcomes. As no baseline group differences in exercise behaviour were found between the three experimental conditions, our results suggest that the changes in exercise frequency observed among the HE and LE condition participants at the 4-week follow-up period are attributable to the verbal feedback.

**Higher self-efficacy promotes increased exercise behaviour.** Throughout the literature, any changes in exercise behaviour have been reliably predicted, directly and indirectly, by changes in self-efficacy beliefs (Bandura, 1977; Bandura, 1997; Bray et al., 2001; McAuley, 1993). As an influential source of self-efficacy, verbal feedback that highlights one's personal ability to perform a given behaviour has been found to boost self-efficacy beliefs and, in turn, impact behaviour by promoting skill development through enhanced and sustained effort (Bandura, 1997). Our findings for the HE group are thus consistent with self-efficacy theory, along with previous literature examining

behavioural outcomes in a physical activity context (Escarti & Guzman, 1999; Hutchinson et al., 2008).

In the present study, the increases in exercise frequency documented among the HE condition participants at the 4-week follow-up period can be attributed to the increases in self-regulatory self-efficacy reported following feedback. As a function of the positive verbal feedback provided, the enhanced self-regulatory self-efficacy beliefs of the HE condition participants effectively increased exercise behaviour directly and indirectly through self-regulating behavioural and cognitive processes. Self-regulatory behaviours and cognitions associated with a higher sense of self-efficacy include a robust sense of control, a strong belief in the ability to cope with stressful situations, a high level of persistence and commitment, along with the tendencies to visualize achievement, focus on opportunities, and set challenging goals (Bandura, 1994; Conner & Norman, 2005; Dawson & Brawley, 2000; Escarti & Guzman, 1999; Kass et al., 2006). In addition to self-regulatory self-efficacy itself, these characteristics that typify a highly efficacious individual all may ultimately have affected the increase in exercise behaviour observed at the 4-week follow-up period (Bandura, 1994; McAuley & Blissmer, 2000).

**Negative verbal feedback promotes increased exercise behaviour.** Although the increases in exercise frequency documented among the LE condition participants are contrary to our hypothesis and inconsistent with previous studies reporting no changes in performance among individuals following negative verbal feedback, there are several explanations that can be offered (Escarti & Guzman, 1999; Hutchinson et al., 2008).

The observed increase in exercise frequency documented among the LE condition participants may ultimately stem from the initial high self-regulatory self-efficacy beliefs

reported by this group. As previously stated, the LE condition participants reported an average confidence level of 81.52% in the ability to exercise regularly for one month at baseline. These high pre-existing beliefs in capabilities may have shielded them against any harmful effects of the negative verbal feedback. However, this protection afforded to the LE condition participants may have not only served to merely preserve their high pre-existing beliefs, but to actively validate them as well (Bandura, 1997; Maddux & Stanley, 1986). These highly confident participants may have refuted the negative verbal feedback by increasing their exercise behaviour, ultimately defending and asserting their self-regulatory self-efficacy beliefs. Therefore, this safeguard response (i.e., increased exercise behaviour) was essentially derived from the robust pre-existing beliefs in regulating exercise behaviour among the LE condition participants.

Social self-preservation theory (SSPT) complements the above reasoning, affirming that situations that present a threat or challenge to an individual's social status may lead to the experience of shame (Dickerson, Gruenewald, & Kemeny, 2004; Rohleder et al., 2008). The experience of this emotion, in turn, has been found to initiate cognitive and behavioural coping strategies to preserve one's social standing (Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998; Rohleder et al., 2008). It may be that the "below average" exercise adherence likelihood score given to the LE condition participants was interpreted as a threat or challenge to her social status by emphasizing lack of capabilities (Bandura, 1997). This perceived threat or challenge may have activated social self-preservation tendencies and motivated the LE condition participants to cope with this information by increasing their exercise behaviour as a form of

appeasement. Furthermore, often recognized as an individually driven and controllable action, exercise behaviour is one that can directly counteract the social evaluative threat.

**Mismatched intentions and behaviour.** The present study's findings are inconsistent with previous literature that has affirmed that behavioural intention is the most important predictor of actual behaviour, suggesting any changes to a given behaviour are predicted by changes to behavioural intention (Ajzen, 1991; Ajzen & Madden, 1986; Conner & Norman, 2005; Maddux et al., 1995). Although both the HE and LE groups reported increases in exercise behaviour at the 4-week follow-up period, neither group reported changes in exercise intention at baseline post-feedback. There are a few explanations as to why exercise intention was not affected, yet exercise behaviour was.

One reason may be due to the time at which the variables were assessed. In order for intentions to reliably predict the associated behaviour, the time interval between the measurements of these variables should be minimal (Sutton, 1998). As exercise intentions are constantly shaped by environmental, behavioural, and psychological variables, the longer the time period between the measurements of intention and behaviour, the lower the correlation between these two variables (Conner & Norman, 2005; Maddux et al., 1995; Sutton, 1998). Although initial exercise intentions and exercise behaviour were assessed pre-feedback at baseline, the post-feedback measurements were conducted at two separate time points, 4 weeks apart. As a result, exercise intentions reported at baseline may not have directly reflected exercise behaviour reported 4-weeks thereafter.

As well, as a direct predictor of exercise behaviour, self-efficacy does not need to operate indirectly through exercise intentions (Bandura, 1997). It is possible that the “above average” and “below average” exercise adherence likelihood scores, while opposite, were equally effective in manipulating subsequent exercise behaviour due to the high pre-existing self-regulatory self-efficacy beliefs of the participants. Furthermore, often conceptualized as barrier self-efficacy, a type of self-regulatory self-efficacy, PBC has been found to exert a direct influence on behaviour (Ajzen, 1991). Therefore, the pre-existing self-regulatory or barrier self-efficacy beliefs of both the HE and LE condition participants may have directly impacted behaviour without operating through exercise intentions.

#### **Hypothesis 4: SPA as a Moderator**

It was hypothesized that SPA would be revealed as a moderator in the relationships between condition and self-regulatory self-efficacy post-feedback, condition and behavioural intention post-feedback, and condition and exercise behaviour post-feedback (at the 4-week follow-up period). More specifically, it was predicted that participants high in SPA would display *larger decreases* in self-regulatory self-efficacy beliefs, a *lower* intention to exercise, and a *lower* frequency of exercise behaviour following negative feedback than participants low in SPA in the same experimental condition. Main analyses revealed that the overall effects of condition on self-regulatory self-efficacy, exercise intention, and exercise behaviour did not depend on the level of SPA reported. Therefore, any post-feedback changes in self-regulatory self-efficacy, exercise intention, and exercise behaviour documented between and within each condition were consistent across participants with high and low SPA. As a result,



contrary to our hypothesis, the LE condition participants high in SPA did not differentiate from the LE condition participants low in SPA regarding post-feedback self-regulatory self-efficacy, exercise intention, or exercise behaviour.

Although SPA has not been examined as a moderator in previous studies of similar design, there are several explanations for the present study's findings. First, the high mean confidence level of 81.52% reported by the LE condition participants may have served as a protective factor, overriding any negative interacting effects between high SPA and negative feedback on self-regulatory self-efficacy, exercise intention, or exercise behaviour. As a result of having high pre-existing self-regulatory self-efficacy beliefs, the negative feedback may have been dismissed by the LE condition participants due to its incompatible and temporary nature. Therefore, SPA may not have added any unique variance to predicting post-feedback self-regulatory self-efficacy, exercise intention, or exercise behaviour as these scores may ultimately have been derived from the initial high confidence levels reported among this condition.

Although it may be that SPA was suppressed by high pre-existing self-efficacy, alternatively, it may be that SPA was irrelevant in the situation. It is possible that LE condition participants high in SPA and LE condition participants low in SPA did not differ in post-feedback self-regulatory self-efficacy, exercise intention, or exercise behaviour scores as they may have used different coping strategies for SPA. In other words, participants high and low in SPA may have achieved the same outcome (i.e., increased exercise behaviour) through different means. Experiencing feelings of concern or worry due to the perception that one's physique is being evaluated by others has been found to influence motives, types of activities, locations, or attire pertaining to exercise

behaviour (Crocker et al., 2001; Frederick & Morrison, 1996; Lantz & Hardy, 1997; Spink, 1992). Therefore, an individual high in SPA may opt for individual activities, maintaining the same levels of confidence, intention, and behaviour as an individual low in SPA who participates in group activities in public settings.

Finally, positive, negative, and non-significant relationships have been documented between SPA and exercise behaviour (Crocker et al., 2001). As significant predictors of exercise behaviour, it is possible that self-regulatory self-efficacy and exercise intention also correlate variably with SPA. For example, while a given participant high in SPA may have reported high confidence in the ability to exercise, high intentions to engage in exercise, and a high frequency of exercise behaviour post-feedback, another participant equally high in SPA may have reported opposite scores. Therefore, the variable nature of the SPA-exercise behaviour relationship may extend to predictors of exercise behaviour (i.e., self-regulatory self-efficacy, exercise intention), suggesting any given outcome (i.e., high self-regulatory self-efficacy) would not distinguish between high SPA and low SPA LE condition participants.

### **Extending the Current Literature**

It is important to note the differences between the present study's methodology and that of previous self-efficacy manipulation studies in order to extend the existing literature and knowledge. First, confidence in the ability to regularly perform a physical activity task (i.e., self-regulatory self-efficacy) reflects a temporal dimension (concerning repeated and consistent behaviour over time), eliciting beliefs that are separate from confidence in the mere ability to perform that task (i.e., task-specific self-efficacy;

Bandura, 1997; Rodgers et al., 2002; Rodgers & Sullivan, 2011). Therefore, as separate dimensions representing separate beliefs, it is important to recognize that a self-regulatory self-efficacy manipulation may impact behaviour differently than a task-specific self-efficacy manipulation.

Furthermore, among the few studies that have examined behavioural outcomes following a self-efficacy manipulation, the behaviours being examined were measured at 15-minute and 1-day follow-up periods (Escarti & Guzman, 1999; Hutchinson et al., 2008). The 4-week time period between the initial and follow-up sessions was essential to the purpose of the present study, designed to assess any natural changes to exercise behaviour resulting from the feedback over an extended period of time. Therefore, any changes in behaviour observed at 15-minute or 1-day follow-up periods following a task-specific self-efficacy manipulation would not fully elucidate changes in behaviour observed at a 4-week follow-up period following a self-regulatory self-efficacy manipulation.

Finally, the present study confirms that lab-induced changes in exercise-related self-efficacy can translate to real-life situations by impacting behaviour outside of the lab. Previous studies examining the outcomes of a self-efficacy manipulation have experimentally controlled and monitored all aspects of behaviour execution within a lab setting (Escarti & Guzman, 1999; Hu et al., 2007; Hutchinson et al., 2008; Lamarche et al., 2011; Marquez et al., 2002; McAuley et al., 1999; Motl et al., 2006). This was the first study to examine the effects of an exercise-related self-efficacy manipulation within an ecologically valid setting by measuring unprompted and natural changes to exercise behaviour.

**Limitations**

While the present study has advanced the existing literature and our current knowledge, there are several limitations that need to be acknowledged. Only specific dimensions of body image and self-efficacy were measured, limiting the generalizability of the results to those particular dimensions. The generalizability of the results is also limited as the sample recruited reported high pre-existing levels of self-regulatory self-efficacy prior to the manipulation, at baseline. Ensuring honest and accurate answers to the questionnaire items is also a limitation in the present study, as honesty and accuracy in questionnaire-based designs cannot be controlled or enforced. Also, from baseline to the 4-week follow-up period, participants may have encountered other sources of self-efficacy or engaged in discussion with other participants concerning the feedback or aspects of the deception. Finally, it is also important to acknowledge the homogeneous sample recruited in the present study (i.e., college-aged infrequent exercisers), limiting the external validity of the study results.

**Future Directions**

Consistent with previous literature, the present study confirms that verbal feedback can effectively manipulate self-efficacy and behaviour in a physical activity setting. More specifically, the present study contends that it is possible to induce changes in exercise-related self-regulatory self-efficacy and exercise behaviour in highly confident people through verbal persuasion outside of a laboratory setting. In order to progress this area of study, future research should attempt to replicate these results among other samples of infrequent exercisers (e.g., adolescents and adults of the general population), and using other potential moderators (e.g., measures of positive body image,

motives for exercise behaviour). It would also be very informative to design a longitudinal study, incorporating booster sessions and examining changes in exercise behaviour over a 6-month period. Finally, the role of other exercise-related cognitions, such as exercise intentions and SPA, need to be discerned, in order to best structure and tailor exercise programs.

### **Implications**

As the central focus in the literature, increasing exercise participation and maintenance levels amongst Canadians was the driving force in the present study. As a cost-effective and simple means of promoting exercise behaviour, positive and negative verbal feedback, as evidenced by the present study, can effectively increase exercise behaviour. However, it is important to note the ethical issues surrounding negative feedback provision, as negative information has the potential to be destructive or harmful to the recipient. While the increased frequency of exercise behaviour observed was equally triggered by positive and negative verbal feedback, the key component ultimately effecting this outcome was self-efficacy. Therefore, instilling and sustaining a high level of confidence in one's abilities is fundamental, which can be boosted and reinforced by positive verbal feedback. In turn, a high level of confidence can protect individuals from failures and negative information, suppress maladaptive cognitions, and prime the individual for positive change.

## References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I. (2002). Constructing a TpB questionnaire: Conceptual and methodological considerations, Retrieved from <http://www.people.mass.edu/aizen/tpb.html>
- Ajzen, I., & Driver, B. L. (1991). Prediction of leisure participation from behavioral, normative, and control beliefs: An application of the theory of planned behavior. *Leisure Sciences*, 13, 185-204.
- Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology*, 22, 453-474.
- American College of Sports Medicine (2012). ACSM issues new recommendations on quantity and quality of exercise. Retrieved from <http://www.acsm.org/>
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology*, 4, 359-373.
- Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71-81). New York, NY: Academic Press.
- Bandura, A. (1997). Sources of self-efficacy. In A. Bandura (Ed.), *Self-efficacy: The exercise of control* (pp. 79-115). New York, NY: W. H. Freeman and Company.

- Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Self-Efficacy Beliefs of Adolescents* (pp. 307–337). Greenwich, CT: Information Age Publishing.
- Bandura, A., & Adams, N. E. (1977). Analysis of self-efficacy theory of behavioral change. *Cognitive Therapy and Research*, 1, 287-310.
- Bane, S., & McAuley, E. (1996). The role of efficacy cognitions in reducing physique anxiety in college females. *Medicine and Science in Sport and Exercise*, 28, S85.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Blood, S. K. (2005). Experimental body image research. *Body work: The social construction of women's body image* (pp. 5-22). Florence, KY: Routledge.
- Bowden, R. G., Rust, D. M., Dunsmore, S., & Briggs, J. (2005). Changes in social physique anxiety during 16-week physical activity courses. *Psychological Reports*, 96, 690-692.
- Brawley, L. R., Martin, K. A., & Gyurcsik, N. C. (1998). Problems in assessing perceived barriers in exercise: Confusing obstacles with attributions and excuses. In J. L. Duda (Ed.), *Advancements in sport and exercise psychology measurement* (pp. 337-350). Morgantown, WV: Fitness Information Technology.
- Bray, S. A., Gyurcsik, N. C., Culos-Reed, S. N., Dawson, K. A., & Martin, K. A. (2001). An exploratory investigation of the relationship between proxy efficacy, self-efficacy and exercise attendance. *Journal of Health Psychology*, 6, 425-434.

- Campbell, A., & Hausenblas, H. A. (2009). Effects of exercise interventions on body image: A meta-analysis. *Journal of Health Psychology, 14*, 780-793.
- Cargill, B. R., Clark, M. M., Pera, V., Niaura, R. S., & Abrams, D. B. (1999). Binge eating, body image, depression, and self-efficacy in an obese clinical population. *Obesity Research, 7*, 379-386.
- Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports, 100*, 126-131.
- Chittester, N. I., & Hausenblas, H. A. (2009). Correlates of drive for muscularity: The role of anthropometric measures and psychological factors. *Journal of Health Psychology, 14*, 872-877.
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155-159.
- Conner, M., & Norman, P. (Eds.). (2005). *Predicting health behaviour*. New York, NY: Open University Press.
- Crocker, P. R. E., Kowalski, K. C., & Kowalski, N. P. (2001). Physical self and physical activity relationships in college women: Does social physique anxiety moderate effects? *Research Quarterly for Exercise and Sport, 72*, 55-67.
- Davis, C., & Cowles, M. (1991). Body image and exercise: A study of relationships and comparisons between physically active men and women. *Sex Roles, 25*, 33-44.
- Davis, C., Karvinen, K., & McCreary, D. R. (2005). Personality correlates of a drive for muscularity in young men. *Personality and Individual Differences, 39*, 349-359.



- Dawson, K. A., & Brawley, L. R. (2000). Examining the relationship between exercise goals, self-efficacy, and overt behavior with beginning exercisers. *Journal of Applied Social Psychology, 30*, 315-329.
- Dickerson, S. S., Gruenewald, T. L., & Kemeny, M. E. (2004). When the social self is threatened: Shame, physiology, and health. *Journal of Personality, 72*, 1191-1216.
- Dishman, R. K., Motl, R. W., Sallis, J. F., Dunn, A. L., Birnbaum, A. S., Welk, G. J., . . . Jobe, J. B. (2005). Self-management strategies mediate self-efficacy and physical activity. *American Journal of Preventive Medicine, 29*, 10-18.
- Dishman, R. K., & Sallis, J. F. (1994). Determinants and interventions for physical activity and exercise. In C. Bouchard, R. J. Shephard, & T. Stephens (Eds.), *Physical activity, fitness, and health: International proceedings and consensus statement* (pp. 214-238). Champaign, IL: Human Kinetics.
- Dzewaltowski, D. A., Noble, J. M., & Shaw, J. M. (1990). Physical activity participation: Social cognitive theory versus the theories of reasoned action and planned behavior. *Journal of Sport and Exercise Psychology, 12*, 388-405.
- Escarti, A., & Guzman, J. F. (1999). Effects of feedback on self-efficacy, performance, and choice in an athletic task. *Journal of Applied Sport Psychology, 11*, 83-96.
- Francis, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., . . . Bonetti, D. (2004). Constructing questionnaires based on the theory of planned behaviour: A manual for health services researchers. Centre for Health Services Research, University of Newcastle, Newcastle upon Tyne, UK.

- Frederick, C. M., & Morrison, C. S. (1996). Social physique anxiety: Personality constructs, motivations, exercise attitudes, and behaviors. *Perceptual and Motor Skills*, 82, 963-972.
- Fredrickson, B. L., Roberts, T.-A., Noll, S. M., Quinn, D. M., & Twenge, J. M. (1998). That swimsuit because you: Sex differences in self-objectification, restrained eating, and math performance. *Journal of Personality and Social Psychology*, 75, 269-284.
- Gammage, K. L., Hall, C. R., & Martin Ginis, K. A. (2004). Self-presentation in exercise contexts: Differences between high and low frequency exercisers. *Journal of Applied Social Psychology*, 34, 1638-1651.
- Gammage, K. L., Martin Ginis, K. A., & Hall, C. R. (2004). Self-presentational efficacy: It's influence on social anxiety in an exercise context. *Journal of Sport and Exercise Psychology*, 26, 179-190.
- Gatch, C. L., & Kendzierski, D. (1990). Predicting exercise intentions: The theory of planned behavior. *Research Quarterly for Exercise and Sport*, 61, 100-102.
- Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sports Sciences*, 10, 141-146.
- Godin, G., & Shephard, R. J. (1997). Godin leisure-time exercise questionnaire. *Medicine and Science in Sports and Exercise*, 29, 36-38.
- Godin, G., Valois, P., & Lepage, L. (1993). The pattern of influence of perceived behavioral control upon exercising behavior: An application of Ajzen's theory of planned behavior. *Journal of Behavioral Medicine*, 16, 81-102.

- Hardy, L. L., Booth, M. L., & Okely, A. D. (2007). The reliability of the adolescent sedentary activity questionnaire (ASAQ). *Preventive Medicine, 45*, 71-74.
- Hart, E. A., Leary, M. R., & Rejeski, W. J. (1989). The measurement of social physique anxiety. *Journal of Sport and Exercise Psychology, 11*, 94-104.
- Hausenblas, H. A., Brewer, B. W., & Van Raalte, J. L. (2004). Self-presentation and exercise. *Journal of Applied Sport Psychology, 16*, 3-18.
- Hausenblas, H. A., Carron, A. V., & Mack, D. E. (1997). Application of the theories of reasoned action and planned behavior to exercise behavior: A meta-analysis. *Journal of Sport & Exercise Psychology, 19*, 36-51.
- Hausenblas, H. A., & Fallon, E. A. (2002). Relationship among body image, exercise behavior, and exercise dependence symptoms. *International Journal of Eating Disorders, 32*, 179-185.
- Hausenblas, H. A., & Fallon, E. A. (2006). Exercise and body image: A meta-analysis. *Psychology and Health, 21*, 33-47.
- Hensel, B. K., Leshner, G., & Logan, R. A. (2010). CHIRr: Consumer health informatics research resource. Retrieved from <http://chirr.nlm.nih.gov/>
- Hu, L., Motl, R. W., McAuley, E., & Konopack, J. F. (2007). Effects of self-efficacy on physical activity enjoyment in college-aged women. *International Journal of Behavioral Medicine, 14*, 92-96.
- Hutchinson, J. C., Sherman, T., & Martinovic, N. (2008). The effect of manipulated self-efficacy on perceived and sustained effort. *Journal of Applied Sport Psychology, 20*, 457-472.

- Jacobs, D. R. Jr., Ainsworth, B. E., Hartman, T. J., & Leon, A. S. (1993). A simultaneous evaluation of 10 commonly used physical activity questionnaires. *Medicine and Science in Sports and Exercise*, 25, 81-91.
- Karl, K. A., O'Leary-Kelly, A. M., & Martocchio, J. J. (1993). The impact of feedback and self-efficacy on performance in training. *Journal of Organizational Behavior*, 14, 379-394.
- Kass, S. J., Rotunda, R. J., & Schneider, S. K. (2006). If at first you don't succeed: Effects of failure on general and task-specific self-efficacy and performance. *North American Journal of Psychology*, 8, 171-182.
- Kendzierski, D., & DeCarlo, K. (1991). Physical activity enjoyment scale: Two validation studies. *Journal of Sport and Exercise Psychology*, 13, 50-64.
- Kraft, P., Rise, J., Sutton, S., & Roysamb, E. (2005). Perceived difficulty in the theory of planned behaviour: Perceived behavioural control or affective attitude? *British Journal of Social Psychology*, 44, 479-496.
- Krane, V., Choi, P. Y. L., Baird, S. M., Aimar, C. M., & Kauer, K. J. (2004). Living the paradox: Female athletes negotiate femininity and muscularity. *Sex Roles*, 50, 315-329.
- Krane, V., Stiles-ShIPLEY, J. A., Waldron, J., & Michalenok, J. (2001). Relationships among body satisfaction, social physique anxiety, and eating behaviors in female athletes and exercisers. *Journal of Sport Behavior*, 24, 247-265.
- Krueger, N. F. Jr., & Dickson, P. R. (1993). Perceived self-efficacy and perceptions of opportunity and threat. *Psychological Reports*, 72, 1235-1240.

- Kyrestad, J. W., Mosewich, A. D., Kowalski, K. C., Mack, D. E., & Crocker, P. R. E. (2008). Men's and women's drive for muscularity: Gender differences and cognitive and behavioral correlates. *International Journal of Sport and Exercise Psychology, 6*, 69-84.
- Lamarche, L., Gammage, K. L., & Adkin, A. L. (2011). Can balance efficacy be manipulated using verbal feedback? *Canadian Journal of Experimental Psychology, 65*, 277-284.
- Lantz, C. D., & Hardy, C. J. (1997). Social physique anxiety and perceived exercise behavior. *Journal of Sport Behavior, 20*, 83-94.
- Litt, M. D. (1988). Self-efficacy and perceived control: Cognitive mediators of pain tolerance. *Journal of Personality and Social Psychology, 54*, 149-160.
- Maddux, J. E., Brawley, L., & Boykin, A. (1995). Self-efficacy and healthy behavior: Prevention, promotion, and detection. In J. E. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment: Theory, research, and application* (pp. 173-202). New York, NY: Plenum Press.
- Maddux, J. E., Norton, L. W., & Stoltenberg, C. D. (1986). Self-efficacy expectancy, outcome expectancy, and outcome value: Relative effects on behavioral intentions. *Journal of Personality and Social Psychology, 51*, 783-789.
- Maddux, J. E., & Stanley, M. A. (1986). Self-efficacy theory in contemporary psychology: An overview. *Journal of Social and Clinical Psychology, 4*, 249-255.
- Manstead, A. S. R., & van Eekelen, S. A. M. (1998). Distinguishing between perceived behavioral control and self-efficacy in the domain of academic achievement intentions and behaviors. *Journal of Applied Social Psychology, 28*, 1375-1392.

- Marcus, B. H., Forsyth, L. H., Stone, E. J., Dubbert, P. M., McKenzie, T. L., Dunn, A. L., . . . Blair, S. N. (2000). Physical activity behavior change: Issues in adoption and maintenance. *Health Psychology, 19*, 32-41.
- Marcus, B. H., Selby, V. C., Niaura, R. S., & Rossi, J. S. (1992). Self-efficacy and the stages of exercise behavior change. *Research Quarterly for Exercise and Sport, 63*, 60-66.
- Marquez, D. X., Jerome, G. J., McAuley, E., Snook, E. M., & Canaklisova, S. (2002). Self-efficacy manipulation and state anxiety responses to exercise in low active women. *Psychology and Health, 17*, 783-791.
- Marquez, D. X., & McAuley, E. (2001). Physique anxiety and self-efficacy influences on perceptions of physical evaluation. *Social Behavior and Personality, 29*, 649-660.
- Martin Ginis, K. A., Rejeski, W. J., Leary, M. R., McAuley, E., & Bane, S. (1997). Is the social physique anxiety scale really multidimensional? Conceptual and statistical arguments for a unidimensional model. *Journal of Sport and Exercise Psychology, 19*, 359-367.
- McAuley, E. (1993). Self-efficacy and the maintenance of exercise participation in older adults. *Journal of Behavioral Medicine, 16*, 103-113.
- McAuley, E., & Blissmer, B. (2000). Self-efficacy determinants and consequences of physical activity. *Exercise and Sport Sciences Reviews, 28*, 85-88.
- McAuley, E., & Courneya, K. S. (1992). Self-efficacy relationships with affective and exertion responses to exercise. *Journal of Applied Social Psychology, 22*, 312-326.

- McAuley, E., Talbot, H.-M., & Martinez, S. (1999). Manipulating self-efficacy in the exercise environment in women: Influences on affective responses. *Health Psychology, 18*, 288-294.
- McCreary, D. R., & Saucier, D. M. (2009). Drive for muscularity, body comparison, and social physique anxiety in men and women. *Body Image, 6*, 24-30.
- Morrison, T. G., Morrison, M. A., & Hopkins, C. (2003). Striving for bodily perfection? An exploration of the drive for muscularity in Canadian men. *Psychology of Men and Masculinity, 4*, 111-120.
- Motl, R. W., Konopack, J. F., Hu, L., & McAuley, E. (2006). Does self-efficacy influence leg muscle pain during cycling exercise? *The Journal of Pain, 7*, 301-307.
- Neumark-Sztainer, D., Paxton, S. J., Hannan, P. J., Haines, J., & Story, M. (2006). Does body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males. *Journal of Adolescent Health, 39*, 244-251.
- Nigg, C. R. (2005). There is more to stages of exercise than just exercise. *Exercise and Sport Sciences Reviews, 33*, 32-35.
- Nowell, C., & Ricciardelli, L. A. (2008). Appearance-based comments, body dissatisfaction and drive for muscularity in males. *Body Image, 5*, 337-345.
- O'Leary, A. (1985). Self-efficacy and health. *Behaviour Research and Therapy, 23*, 437-451.

- Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: A review of mental and physical health benefits associated with physical activity. *Behavioural Medicine, 18*, 189-193.
- Petrie, T. A., Diehl, N., Rogers, R. L., & Johnson, C. L. (1996). The social physique anxiety scale: Reliability and construct validity. *Journal of Sport and Exercise Psychology, 18*, 420-425.
- Poag-DuCharme, K. A., & Brawley, L. R. (1993). Self-efficacy theory: Use in the prediction of exercise behavior in the community setting. *Journal of Applied Sport Psychology, 5*, 178-194.
- Poag-DuCharme, K. A., & Brawley, L. R. (1995). Predicting the intentions and behavior of exercise initiates using two forms of self-efficacy. *Journal of Behavioral Medicine, 18*, 479-497.
- Public Health Agency of Canada (2011, May 23). PHAC: Physical activity. Retrieved from <http://www.phac-aspc.gc.ca/>
- Reel, J. J., Greenleaf, C., Baker, W. K., Aragon, S., Bishop, D., Cachaper, C., . . . Hattie, J. (2007). Relations of body concerns and exercise behavior: A meta-analysis. *Psychological Reports, 101*, 927-942.
- Rhodes, R. E., & Courneya, K. S. (2003). Investigating multiple components of attitude, subjective norm, and perceived control: An examination of the theory of planned behaviour in the exercise domain. *British Journal of Social Psychology, 42*, 129-146.
- Robison, J. I., & Rogers, M. A. (1994). Adherence to exercise programmes: Recommendations. *Sports Medicine, 17*, 39-52.



- Rodgers, W. M., & Brawley, L. R. (1991). The role of outcome expectancies in participation motivation. *Journal of Sport and Exercise Psychology, 13*, 411-427.
- Rodgers, W. M., Conner, M., & Murray, T. C. (2008). Distinguishing among perceived control, perceived difficulty, and self-efficacy as determinants of intentions and behaviours. *British Journal of Social Psychology, 47*, 607-630.
- Rodgers, W. M., Hall, C. R., Blanchard, C. M., McAuley, E., & Munroe, K. J. (2002). Task and scheduling self-efficacy as predictors of exercise behavior. *Psychology and Health, 17*, 405-416.
- Rodgers, W. M., Murray, T. C., Courneya, K. S., Bell, G. J., & Harber, V. J. (2009). The specificity of self-efficacy over the course of a progressive exercise programme. *Applied Psychology: Health and Well-Being, 1*, 211-232.
- Rodgers, W. M., & Sullivan, M. J. L. (2001). Task, coping, and scheduling self-efficacy in relation to frequency of physical activity. *Journal of Applied Social Psychology, 31*, 741-753.
- Rodgers, W. M., Wilson, P. M., Hall, C. R., Fraser, S. N., & Murray, T. C. (2008). Evidence for a multidimensional self-efficacy for exercise scale. *Research Quarterly for Exercise and Sport, 79*, 222-234.
- Rohleder, N., Chen, E., Wolf, J. M., & Miller, G. E. (2008). The psychobiology of trait shame in young women: Extending the social self preservation theory. *Health Psychology, 27*, 523-532.
- Russell, W. D., & Cox, R. H. (2003). Social physique anxiety, body dissatisfaction, and self esteem in college females of differing exercise frequency, perceived weight discrepancy, and race. *Journal of Sport Behavior, 26*, 298-318.

- Sallis, J. F., Buono, M. J., Roby, J. J., Micale, F. G., & Nelson, J. A. (1993). Seven-day recall and other physical activity self-reports in children and adolescents. *Medicine and Science in Sports and Exercise*, 25, 99-108.
- Silberstein, L. R., Striegel-Moore, R. H., Timko, C., & Rodin, J. (1988). Behavioral and psychological implications of body dissatisfaction: Do men and women differ? *Sex Roles*, 19, 219-232.
- Simonavice, E. M., & Wiggins, M. S. (2008). Exercise barriers, self-efficacy, and stages of change. *Perceptual and Motor Skills*, 107, 946-950.
- Sniehotta, F. F., Scholz, U., & Schwarzer, R. (2005). Bridging the intention-behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology and Health*, 20, 143-160.
- Spink, K. S. (1992). Relation of anxiety about social physique to location of participation in physical activity. *Perceptual and Motor Skills*, 74, 1075-1078.
- Steese, S., Dollette, M., Phillips, W., Hossfeld, E., Matthews, G., & Taormina, G. (2006). Understanding girls' circle as an intervention on perceived social support, body image, self-efficacy, locus of control, and self-esteem. *Adolescence*, 41, 55-74.
- Stephens, T. (1988). Physical activity and mental health in the United States and Canada: Evidence from four population surveys. *Preventive Medicine*, 7, 35-47.
- Strecher, V. J., McEvoy DeVellis, B., Becker, M. H., & Rosenstock, I. M. (1986). The role of self-efficacy in achieving health behavior change. *Health Education Quarterly*, 13, 73-91.
- Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing? *Journal of Applied Social Psychology*, 28, 1317-1338.

- Tavousi, M., Hidarnia, A. R., Montazeri, A., Hajizadeh, E., Taremain, F., & Ghofranipour, F. (2009). Are perceived behavioral control and self-efficacy distinct constructs? *European Journal of Scientific Research*, 30, 146-152.
- Tayama, J., Yamasaki, H., Tamai, M., Hayashida, M., Shirabe, S., Nishiura, K., . . . Nakaya, N. (2012). Effect of baseline self-efficacy on physical activity and psychological stress after a one-week pedometer intervention. *Perceptual and Motor Skills*, 114, 407-418.
- Trafimow, D., Sheeran, P., Conner, M., & Finlay, K. A. (2002). Evidence that perceive behavioural control is a multidimensional construct: Perceived control and perceived difficulty. *British Journal of Social Psychology*, 41, 101-121.
- Vancouver, J. B., Thompson, C. M., Tischner, E. C., & Putka, D. J. (2002). Two studies examining the negative effect of self-efficacy on performance. *Journal of Applied Psychology*, 87, 506-516.
- Walton, V. R., & Finkenberg, M. E. (2002). Women's anxiety about social and exercise settings. *Perceptual and Motor Skills*, 94, 700-702.
- Weinberg, R. S., Hughes, H. H., Critelli, J. W., England, R., & Jackson, A. (1984). Effects of preexisting and manipulated self-efficacy on weight loss in a self-control program. *Journal of Research in Personality*, 18, 352-358.
- Wolff, G. E., & Clark, M. M. (2001). Changes in eating self-efficacy and body image following cognitive-behavioral group therapy for binge eating disorder: A clinical study. *Eating Behaviors*, 2, 97-104.

Appendix A  
Questionnaires**Demographic Information**

Please complete the following information:

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

Height: \_\_\_\_\_

Weight: \_\_\_\_\_

Race: \_\_\_\_\_

Major: \_\_\_\_\_

Have you ever been diagnosed or treated for an eating disorder? (*please circle*)  
YES NO

Are you a varsity athlete? (*please circle*) YES NO

How many days per week, on average, do you engage in a minimum of 30 minutes of exercise (any planned or structured bodily activity, requiring physical effort and associated with an increased heart rate)?

---

**BIS (Behavioural Intention Scale)**

Please read each of the following statements **carefully** and indicate the extent to which each statement **pertains to you personally**. (*please check the box that applies*)

For the purposes of this questionnaire, exercise is any planned or structured bodily activity, requiring physical effort and associated with an increased heart rate.

< I intend to exercise at least 30 minutes per day 3 days per week over the next month >

Extremely unlikely :\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_: Extremely likely

< I will try to exercise at least 30 minutes per day 3 days per week over the next month >

Definitely true :\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_: Definitely false

< I plan to exercise at least 30 minutes per day 3 days per week over the next month >

Strongly disagree :\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_: Strongly agree

**GLTEQ (Godin Leisure-Time Exercise Questionnaire)**

1. During a typical **7-Day period** (a week), how many times on the average do you do the following kinds of exercise for **more than 15 minutes** during your free time?  
(write on each line the appropriate number)

**Times Per  
Week**

**a) STRENUOUS EXERCISE****(HEART BEATS RAPIDLY)**

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

\_\_\_\_\_

**b) MODERATE EXERCISE****(NOT EXHAUSTING)**

(i.e., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

\_\_\_\_\_

**c) MILD EXERCISE****(MINIMAL EFFORT)**

(i.e., yoga, archery, fishing from river bank, horseshoes, golf, snow-mobiling, easy walking)

\_\_\_\_\_

**SRSES (Self-Regulatory Self-Efficacy Scale)**

Please read each of the following statements **carefully** and indicate how confident you are that the statement **pertains to you personally**.

*Rate your degree of confidence by recording a number from 0 to 100 in the blanks provided using the scale given below:*

**0%**----10%----20%----30%----40%----**50%**-----60%-----70%-----80%-----90%-----**100%**  
 Not at all Completely  
 Confident Confident

**How confident are you that...**

1. I can find the means to exercise 30 minutes per day for 3 times per week for one month	
2. I am able to schedule 30 minutes per day of exercise, 3 times per week for one month	
3. I can manage to exercise regularly, 30 minutes per day for 3 times per week for one month	

**SPAS (Social Physique Anxiety Scale)**

Please read each of the following statements **carefully** and indicate the degree to which the statement is **characteristic or true of you**. Using the following scale, circle the appropriate value for each statement.

- 1 = Not at all characteristic of me  
 2 = Slightly characteristic of me  
 3 = Moderately characteristic of me  
 4 = Very characteristic of me  
 5 = Extremely characteristic of me

	Not At All	Slightly	Moderately	Very	Extremely
1. I wish I wasn't so uptight about my physique/figure	1	2	3	4	5
2. There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively	1	2	3	4	5
3. Unattractive features of my physique make me nervous in certain social settings	1	2	3	4	5
4. In the presence of others, I feel apprehensive about my physique/figure	1	2	3	4	5
5. I am comfortable with how fit my body appears to others	1	2	3	4	5
6. It would make me uncomfortable to know others were evaluating my physique/figure	1	2	3	4	5
7. When it comes to displaying my physique/figure to others, I am a shy person	1	2	3	4	5
8. I usually feel relaxed when it is obvious that others are looking at my physique/figure	1	2	3	4	5
9. When in a bathing suit, I often feel nervous about the shape of my body	1	2	3	4	5



**DBIQ (Deception Bogus Item Questionnaire)**

1. Please read each of the following statements **carefully** and indicate the degree to which the statement is **true of you**. (*please check the box that applies*)

< Physical activity is boring >

Definitely true : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : Definitely false

< I don't have time for physical activity >

Definitely true : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : Definitely false

< I find exercise energizing versus tiring >

Definitely true : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : Definitely false

< I find exercise pleasurable versus unpleasurable >

Definitely true : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : \_\_\_\_ : Definitely false

2. During a typical **7-Day period** (a week) during school term, how often do you engage in non-study (**not school-related**) screen time, including watching television, videos, movies, and playing computer and video games? (*please check the box that applies*)

**Less than 1 hr**  
per day  
□

**1 – 3 hrs**  
per day  
□

**3 – 5 hrs**  
per day  
□

**More than 5 hrs**  
per day  
□

3. Please read each of the following questions **carefully** and circle the number that best describes your **peer and family behaviour** using the following scale.

1 = Rarely  
 2 = Sometimes  
 3 = Regularly  
 4 = Very Often

	Rarely	Sometimes	Regularly	Often
1. During a typical 7-Day period (one week), how often do your three closest friends engage in physical activity?	1	2	3	4
2. During a typical 7-Day period (one week), how often do your family members engage in physical activity?	1	2	3	4

Appendix B  
REB: Certificate of ethics clearance



Brock University  
Research Ethics Office  
Tel: 905-688-5550 ext. 3035  
Email: reb@brocku.ca

Bioscience Research Ethics Board

Certificate of Ethics Clearance for Human Participant Research

DATE: 1/16/2013  
PRINCIPAL INVESTIGATOR: GAMMAGE, Kimberley - Kinesiology  
FILE: 12-142 - GAMMAGE  
TYPE: Masters Thesis/Project STUDENT: Christyn Oda  
SUPERVISOR: Kimberley Gammage  
TITLE: The Effects of False Feedback on Self-Efficacy, Exercise Intention, and Exercise Behaviour among Low-Active College-Aged Men and Women

**ETHICS CLEARANCE GRANTED**

Type of Clearance: NEW

Expiry Date: 1/31/2014

The Brock University Bioscience Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement. Clearance granted from 1/16/2013 to 1/31/2014.

The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before 1/31/2014. Continued clearance is contingent on timely submission of reports.

To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page at <http://www.brocku.ca/research/policies-and-forms/research-forms>.

In addition, throughout your research, you must report promptly to the REB:

- a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
- c) New information that may adversely affect the safety of the participants or the conduct of the study;
- d) Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.

Approved:

\_\_\_\_\_  
Brian Roy, Chair  
Bioscience Research Ethics Board

**Note:** Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.

Appendix C  
Verbal script: Class announcement

My name is Christyn Oda and I am currently a second year Master's student under the supervision of Dr. Kimberley Gammage, conducting a study examining the relationships between self-efficacy, body-image, exercise intention, and exercise behaviour.

To participate in this study, you must be a female Brock University student who engages in exercise, on average, two or fewer days per week. Participation will require approximately 30-45 minutes of your time, consisting of a series of questionnaires administered during two separate sessions conducted in a private lab.

If you would like to participate in this study, please contact either Dr. Kimberley Gammage at [kgammage@brocku.ca](mailto:kgammage@brocku.ca) or myself, at [col1sw@brocku.ca](mailto:col1sw@brocku.ca).

Thank you for your time.

Appendix D  
Poster advertisement

# **Self-Efficacy, Body Image, & Exercise Research Study**

## **PURPOSE**

To examine the relationships between self-efficacy, body image, exercise intention, and exercise behaviour

## **PARTICIPANTS**

Female Brock University students who exercise, on average, two or fewer days per week

## **WHAT IS INVOLVED?**

Participants will be asked to complete a series of questionnaires during two separate sessions, requiring a total of 30-45 minutes

## **BENEFITS**

Participants are offered the chance to win one of five \$20 gift certificates for Tim Horton's

If interested, please contact:

Dr. Kimberley Gammage  
[kgammage@brocku.ca](mailto:kgammage@brocku.ca) x 3772

Christyn Oda  
[co11sw@brocku.ca](mailto:co11sw@brocku.ca)

This study has been reviewed and received ethics clearance through the **REB (File #12-142)**. For answers to pertinent questions about research participant's rights, please contact the Research Ethics Office at 905-688-5550 ext. 3035, [reb@brocku.ca](mailto:reb@brocku.ca)

## Appendix E Letter of Invitation

### Letter of Invitation

Date

**Title of Study:** The Effects of Self-Efficacy and Body Image on Exercise Intention and Behaviour

**Principal Investigator:** Dr. Kimberley L. Gammage, Associate Professor  
Department of Kinesiology, Brock University

**Student Principal Investigator:** Christyn Oda, M.A Student, Applied Health Sciences

I, Dr. Kimberley L. Gammage, Associate Professor from the Department of Kinesiology, Brock University, invite you to participate in a research project entitled “The Effects of Self-Efficacy and Body Image on Exercise Intention and Behaviour.”

The purpose of this research project is to investigate the relationship between self-efficacy, body image, and exercise intention and behaviour. Should you choose to participate, you will be asked to complete a series of questionnaires at two different time points in a private lab.

The expected duration of this study is approximately 45 minutes, consisting of two sessions lasting 30 minutes and 15 minutes, respectively.

Your participation is greatly appreciated and will help to clarify the relationship between self-efficacy, body image, exercise intention, and exercise behaviour, furthering the scientific knowledge in this domain.

If you have any pertinent questions about your rights as a research participant, please contact the Brock University Research Ethics Officer (905 688-5550 ext 3035, [reb@brocku.ca](mailto:reb@brocku.ca))

If you have any questions, please feel free to contact me.

Thank you,

Dr. Kimberley L. Gammage  
Associate Professor, Brock University  
(905) 688-5550 ext 3772  
[kgammage@brocku.ca](mailto:kgammage@brocku.ca)

Christyn Oda  
M.A Student, Applied Health Sciences  
Brock University  
[col1sw@brocku.ca](mailto:col1sw@brocku.ca)

This study has been reviewed and received ethics clearance through the **REB (File #12-142)**. For answers to pertinent questions about research participant's rights, please contact the Research Ethics Office at 905-688-5550 ext. 3035, [reb@brocku.ca](mailto:reb@brocku.ca)

## Appendix F Informed Consent

### Informed Consent

**Date:** Winter 2013  
**Project Title:** The Effects of Self-Efficacy and Body Image on Exercise Intention and Behaviour

**Principal Investigator:**  
 Dr. Kimberley L. Gammage, Associate Professor  
 Department of Kinesiology  
 Brock University  
 (905) 688-5550 ext 3772, [kgammage@brocku.ca](mailto:kgammage@brocku.ca)

**Student Principal Investigator:**  
 Christyn Oda, M.A Student,  
 Applied Health Sciences  
 Brock University  
[col1sw@brocku.ca](mailto:col1sw@brocku.ca)

#### **INVITATION**

You are invited to participate in a study that involves research. The purpose of this research project is to examine the relationship between self-efficacy, body image, and exercise intention and behaviour.

#### **WHAT'S INVOLVED**

As a participant, you will be asked to complete a series of questionnaires during two separate sessions, four (4) weeks apart. The first session consists of completing several questionnaires in a private lab and will require approximately 30 minutes of your time. The second session consists of completing a single questionnaire in a private lab and will require approximately 15 minutes of your time.

#### **POTENTIAL BENEFITS AND RISKS**

Participants are offered the chance to win one of five \$20 gift certificates for Tim Horton's.

Participants may experience discomfort due to the nature of the questions being asked. In this event, participants are urged to contact Dr. Gammage or student health services (905-688-5550 ext 3243, <http://www.brocku.ca/healthservices>). No known or anticipated physical risks are related to participation in this study.

#### **CONFIDENTIALITY**

Any and all information provided from participants is considered confidential. Please do not include your name or any identifying information on the questionnaires. Data collected during this study will be stored on Brock University campus in a locked cabinet in the office of Dr. Kimberley Gammage. Data will be kept for 3 years following the completion of the study, at which time all data will be shredded. Access to this data will be restricted to the principal investigator and principal student investigator.

#### **VOLUNTARY PARTICIPATION**

Participation in this study is voluntary. If you wish, you may decline to answer any questions or to participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any penalty or loss of benefits to which you are entitled.

#### **PUBLICATION OF RESULTS**

Results of this study may be published in professional journals and presented at conferences. Feedback about this study will be available. At your request, you may receive a summary of results by contacting the principal or student investigator by email.

#### **CONTACT INFORMATION AND ETHICS CLEARANCE**

If you have any questions about this study or require further information, please contact the Principal Investigator using the contact information provided above. This study has been reviewed and received ethics clearance through the Research Ethics Board at Brock University (**REB File #12-142**). If you have any comments or concerns about your rights as a research participant, please contact the Research Ethics Office at (905) 688-5550 ext 3035, [reb@brocku.ca](mailto:reb@brocku.ca). Thank you for your assistance in this research project. Please keep a copy of this form for your records.

#### **CONSENT FORM**

I agree to participate in this study described above. I have made this decision based on the information I have read in the Informed Consent letter. I have had the opportunity to receive any additional details I wanted about the study and I understand that I may ask questions in the future. I understand that I may withdraw this consent at any time.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Appendix G  
Verbal script: Initial session

Thank you for participating in my study. Before you begin, I will give you some background information on the basis of my study. As the student principal investigator of this study, I have been developing and refining the study procedure for about a year and a half now. The ultimate purpose of this study is to discover and understand the different trends and factors linked to exercise behaviour; a passion of mine as a certified fitness instructor and personal trainer for about 6 years now. So please answer all questions honestly and instinctively (do not dwell on a question for too long), as I am only interested in group results. You will be assigned a participant ID number only for the duration of the study. Upon completion of the study, the master list that contains the participant names and ID numbers will be destroyed.

Here is a copy of the informed consent. The informed consent discusses the potential benefits and risks as a participant, the confidentiality and anonymity that you are ensured, the voluntary basis of this study, as well as contact information for further inquiries.

Here is your first questionnaire package.

***Control group participants.*** Please let me know once you have completed it, and I will give you your second questionnaire package.

***HE and LE condition participants.*** Please let me know once you have completed it. (Upon completion) Some of the items that you have completed, including perceived barriers of physical activity, enjoyment of physical activity, screen time



behaviour, and family and peer history, can be inputted into a formula that predicts future exercise behaviour. With your approval, I would like to use this formula to calculate the likelihood of you adhering to an exercise program for 30 minutes per day for 3 times per week for one month. The formula is configured on this computer. Please give me a minute or two to calculate your adherence likelihood score.

## Appendix H Cover Story

It has been shown that exercise behaviour can be predicted by a multitude of factors. Certain combinations of demographic (personal) characteristics, level of enjoyment experienced during and after physical activity, sedentary behaviour patterns, family and peer behaviour, and exercise intentions have all been shown to reliably predict future exercise behaviour among individuals of all ages.

By isolating the factors and features that contribute to higher levels of exercise adherence, we are that much closer to reaching the ultimate goal: to increase exercise participation and maintenance amongst Canadians.

For more information pertaining to predictors of exercise behaviour, please visit the following sites:

[www.participation.com](http://www.participation.com)

[www.cdc.gov](http://www.cdc.gov)

<http://www.phac-aspc.gc.ca>

[www.acsm.org/](http://www.acsm.org/)

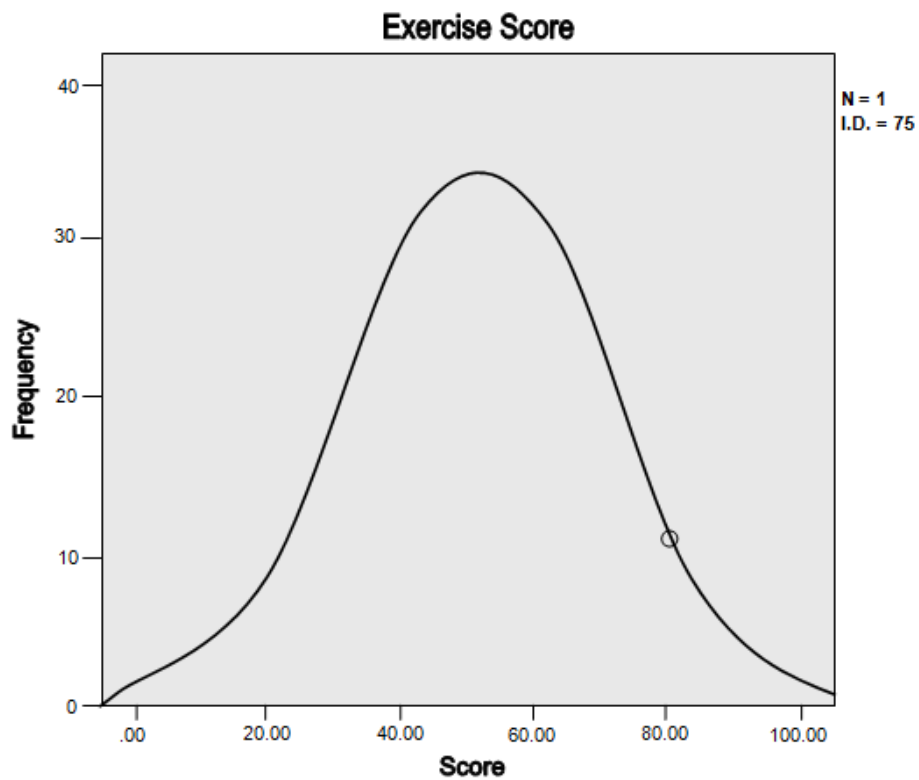
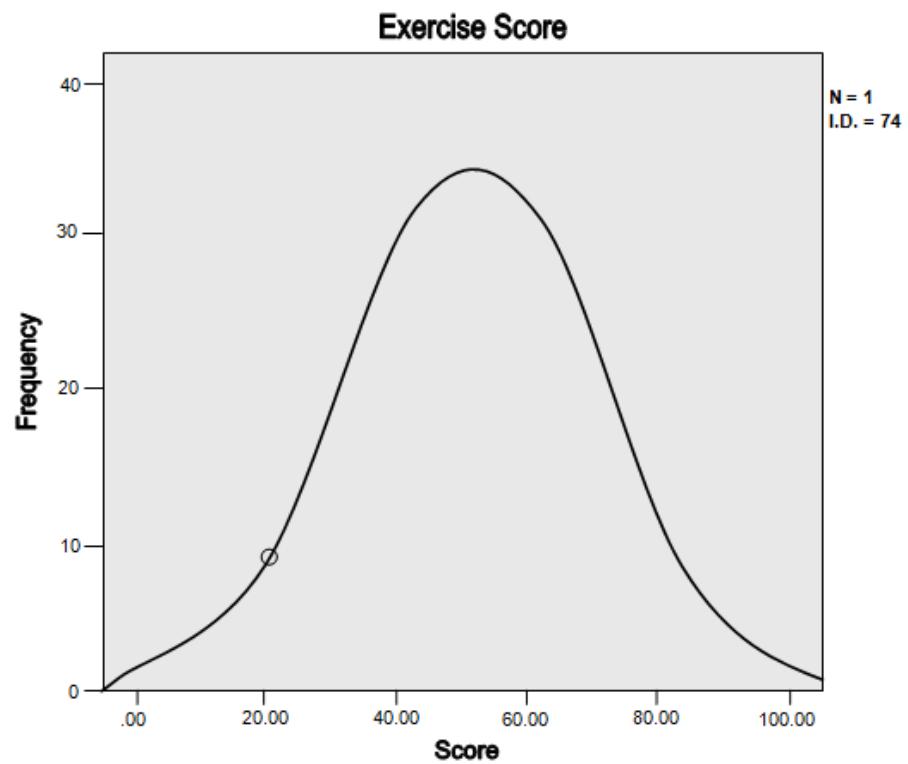
Dr. Kimberley L. Gammage  
Associate Professor, Brock University  
(905) 688-5550 ext 3772  
[kgammage@brocku.ca](mailto:kgammage@brocku.ca)

Christyn Oda  
M.A Student, Applied Health Sciences  
Brock University  
[collsw@brocku.ca](mailto:collsw@brocku.ca)

This study has been reviewed and received ethics clearance through the **REB (File #12-142)**. For answers to pertinent questions about research participant's rights, please contact the Research Ethics Office at 905-688-5550 ext. 3035, [reb@brocku.ca](mailto:reb@brocku.ca)

## Appendix I

Bell-curved graphs: Exercise adherence likelihood score for LE and HE conditions



Appendix J  
Three-week follow-up email: Booster

Hello x,

Thank you once again for participating in my study 3 weeks ago. I just wanted to give you a friendly reminder of your scheduled follow-up session in 1 week from now:

Date:

Time:

Location:

This session will require no more than 15 minutes of your time. Please confirm this time slot at your earliest convenience.

Please let me know if you have any questions or concerns.

Christyn Oda, MA Student  
Faculty of Applied Health Sciences, Brock University  
Canfitpro Personal Trainer Specialist (PTS)  
Canfitpro Fitness Instructor Specialist (FIS)

## Appendix K Debriefing form

### Debriefing Form

**Title of Study:** The Effects of Self-Efficacy and Body Image on Exercise Intention and Behaviour

**Principal Investigator:** Dr. Kimberley L. Gammage, Associate Professor  
Department of Kinesiology, Brock University

**Student Principal:** Christyn Oda, M.A Student, Faculty of Applied Health Sciences  
**Investigator**

**Contact Information:** [kgammage@brocku.ca](mailto:kgammage@brocku.ca) or (905) 688-5550 ext. 3772  
[collsw@brocku.ca](mailto:collsw@brocku.ca)

Your participation in this study was greatly appreciated. The *advertised* purpose of this study was to examine the relationships between self-efficacy, body image, exercise intention, and exercise behaviour. However, the *true* purpose of this study was hidden and deception was used due to the nature of the research question. The following will clarify and justify the deception that was involved.

Providing feedback (i.e., encouragement, support, criticism, etc.) to an individual about their performance or capability concerning a given task has been shown to subsequently influence that individual's confidence in her ability to perform that task. Providing *false* feedback to an individual about their performance or capability pertaining to a given task has revealed a similar effect, subsequently influencing an individual's confidence in her ability to perform that task. False feedback informs the recipient that her performance or skill level is ranked superior (false *positive* feedback) or inferior (false *negative* feedback) to others based on norms constructed for that task, regardless of actual performance or skill level. In other words, false feedback involves providing false information regarding performance or capability concerning a specified task.

The true purpose of this study was to determine if providing false positive feedback, false negative feedback, or no feedback differentially influenced self-beliefs and intention to exercise, as well as average weekly exercise behaviour four weeks thereafter among low-active female Brock University students. Prior to the initial visit, each participant was unknowingly randomly assigned into one of three experimental groups. The participants in the first experimental group (labeled the "high efficacy condition" group) were provided with false *positive* feedback, falsely informed that their likelihood of sticking to an exercise program for 30 minutes per day 3 times per week for one month was 80% based on the results computed by an invented and fake formula. These participants were persuaded to believe that their "exercise adherence likelihood" was superior to others with similar

characteristics. The participants in the second experimental group (labeled the “low efficacy condition” group) were provided with false *negative* feedback, falsely informed that their likelihood of sticking to an exercise program for 30 minutes per day 3 times per week for one month was 20% based on the results computed by an invented and fake formula. These participants were persuaded to believe that their “exercise adherence likelihood” was inferior to others with similar characteristics. A bell-curved graph was also provided to the participants in these two groups in order to further convince them that an “exercise adherence likelihood score” was feasible. The participants in the third group (labeled the “control group”) were not provided with any type of feedback or score.

The true purpose of the study was not disclosed to you until now, as the deception involved was necessary to the proper execution of the study. If the participants were aware that the feedback provided was fabricated, we would not be able to decipher the powerful role that self-beliefs play in an exercise setting. We believe this study is important because it allows us to further understand and isolate characteristics that may promote or inhibit exercise behaviour, advancing us towards the ultimate goal: to increase exercise participation and maintenance amongst Canadians.

Because there are still other students that are currently and will be participating in this study, please do not discuss the deception used in this study. If you have any questions or would like further clarification on the true purpose of this study, do not hesitate to contact any of the researchers below. Thank you for your understanding.

Your results collected are kept in complete confidentiality and are only published as collective group data. However, if you are uncomfortable with having been deceived, you are free to withdraw your data from the sample at any time. If so, there is no penalty and you will still receive full credit for study participation. Furthermore, if you were upset, disturbed or distressed by participation in this study, or found out information about yourself that is upsetting, disturbing, or distressing, we encourage you to make contact with Dr. Gammage or student health services (905-688-5550 ext 3243, <http://www.brocku.ca/healthservices>).

\_\_\_\_\_ I give permission for my data to be used in the analysis for this experiment.

\_\_\_\_\_ I do NOT give my permission for my data to be used in the analysis for this experiment. Please withdraw my data from the study to be destroyed immediately.

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

**You will receive a copy of this form for your records.**

Dr. Kimberley L. Gammage  
Associate Professor, Brock University  
(905) 688-5550 ext 3772  
[kgammage@brocku.ca](mailto:kgammage@brocku.ca)

Christyn Oda  
M.A Student, Applied Health Sciences  
Brock University  
[col1sw@brocku.ca](mailto:col1sw@brocku.ca)

This study has been reviewed and received ethics clearance through the **REB (File #12-142)**. For answers to pertinent questions about research participant’s rights, please contact the Research Ethics Office at 905-688-5550 ext. 3035, [reb@brocku.ca](mailto:reb@brocku.ca)

Appendix L  
Post-debrief consent form

**Post-Debrief Consent Form**

**Title of Study:** The Effects of Self-Efficacy and Body Image on Exercise Intention and Behaviour

**Principal Investigator:** Dr. Kimberley L. Gammage, Associate Professor  
Department of Kinesiology, Brock University

**Student Principal Investigator:** Christyn Oda, M.A Student

**Contact Information:** [kgammage@brocku.ca](mailto:kgammage@brocku.ca) or (905) 688-5550 ext. 3772  
[col1sw@brocku.ca](mailto:col1sw@brocku.ca)

The *advertised* purpose of this study was to examine the relationships between self-efficacy, body image, and exercise behaviour among low-active female Brock University students. However, the *true* purpose of this study was to determine if providing false positive feedback, false negative feedback, or no feedback differentially influenced average weekly exercise behaviour four weeks thereafter among low-active female Brock University students. Please read the **Debriefing Form** provided by the researcher for clarification and justification on the deception that was involved.

Because you were deceived, you have the right to withdraw your data from the sample. If so, there is no penalty and you will still be placed in the draw for a chance to win one of five \$20 Tim Horton's gift cards.

If you have any questions or would like further clarification on the true purpose of this study, do not hesitate to contact any of the researchers below. Thank you for your understanding.

\_\_\_\_ I give permission for my data to be used in the analysis for this experiment.

\_\_\_\_ I do NOT give my permission for my data to be used in the analysis for this experiment. Please withdraw my data from the study to be destroyed immediately.

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

**You will receive a copy of this form for your records.**

Dr. Kimberley L. Gammage  
Associate Professor, Brock University  
(905) 688-5550 ext 3772  
[kgammage@brocku.ca](mailto:kgammage@brocku.ca)

Christyn Oda  
M.A Candidate, Applied Health Sciences  
Brock University  
[col1sw@brocku.ca](mailto:col1sw@brocku.ca)

This study has been reviewed and received ethics clearance through the **REB (File #xx-xxx)**. For answers to pertinent questions about research participant's rights, please contact the Research Ethics Office at 905-688-5550 ext. 3035, [reb@brocku.ca](mailto:reb@brocku.ca)

Appendix M  
Feedback request form

**Brock University, Faculty of Applied Health Sciences  
Feedback Request Form**

**Title of Study:** The Effects of Self-Efficacy and Body Image on Exercise Intention and Behaviour

**Principal Investigator:** Dr. Kimberley L. Gammage, Associate Professor  
Department of Kinesiology, Brock University

**Student Principal:** Christyn Oda, M.A Student, Faculty of Applied Health  
Sciences  
**Investigator**

If you would like to receive a summary of the results of the study, please complete the following:

**If you would like to receive the information by email:**

Name: \_\_\_\_\_

Email Address: \_\_\_\_\_

**If you would like to receive the information by mail:**

Name: \_\_\_\_\_  
(First Name) (Last Name)

Address: \_\_\_\_\_  
(Street Number) (Street)

\_\_\_\_\_  
(City)