

A physical activity possible selves online intervention: A focus on self-regulatory possible selves

by

Mary Meghan Elaine Marcotte

Supervisor: Dr. Shaelyn M. Strachan

Thesis

Submitted to the Faculty of Graduate and Postdoctoral Studies

in partial fulfillment of the requirements for the degree of

Master of Arts in Human Kinetics

School of Human Kinetics

Faculty of Health Sciences

University of Ottawa

April 2013

© Mary Meghan Elaine Marcotte, Ottawa, Canada, 2013

Acknowledgements

I am so happy to have the opportunity to thank the many people who have helped and supported me throughout my Master's program.

First and foremost - a HUGE thank-you to Dr. Shaelyn Strachan, who worked patiently with me throughout every stage of this project. I have learned so much from Shae and have enjoyed working with her, even if our common indecisiveness made decision-making challenging! I could not have completed this project without the help of this very thoughtful and knowledgeable supervisor.

My committee members, Dr. Michelle Fortier and Dr. Bradley Young, also made significant contributions to this project with their expertise, time commitment, and helpful feedback. Their contributions are very much appreciated, and I can't help but to acknowledge my luck at having such great professors oversee my work.

Mélanie Perras deserves a special thank-you for being a wonderful lab-mate. Not only did she answer *hundreds* of questions about all things 'thesis', she provided entertainment, friendship, and comedy. Mélanie is one of the awesome HK graduate students who provided fun and memorable diversions over the course of my Master's.

I also thank Dr. Audrey Giles for her encouragement and administrative help, and Uncle Gerald and Aunt Gisele for kindly welcoming me into their loving home and for helping to enrich my vocabulary. Also, Alex – even though you copied me by using *possible selves* in your thesis, it was wonderful having you to work, relax, and have fun with. Thank you for your support, and for always being there.

PHYSICAL ACTIVITY POSSIBLE SELVES

Finally, last but certainly not least, this is a great chance to thank my wonderful family, who has supported me in all of my endeavours long before I decided to pursue a Master's degree. My immediate family – Mom, Dad, Adam, Emily, and Erin, and the in-laws who now feel like immediate family – Erin and Carmine – thanks for being great role models and for teaching me so much over the years. It pays to be the youngest!

Abstract

Imagining one's physical activity (PA) possible self can lead to increased PA (e.g., Murru & Martin Ginis, 2010). This online experiment examined potential benefits of forming a *self-regulatory* PA possible self, which involves reflection on a PA possible self image and *strategies to pursue this self*. This intervention was compared to a standard PA possible selves intervention and a control condition in terms of impact on motivational, self-regulatory, and PA outcomes. Insufficiently active participants ($n = 247$) completed baseline measures, were exposed to the intervention or control procedures, and then completed outcome measures immediately and at two and four-weeks post-intervention. The mediational roles of action/coping planning in the intervention-PA relationships were explored. Results: ANCOVAs showed no differences on motivational or self-regulatory outcomes; action/coping planning were not mediators. The two intervention conditions, combined, led to significantly greater PA over the four weeks post-intervention than did the control condition ($p = .041$).

Table of Contents

Chapter I: Introduction..... 1

Chapter II: Literature Review and Research Questions 3

Self..... 3

Self and health behaviours..... 3

Possible selves 4

 Possible selves compared to imagery..... 7

 Possible selves compared to identity..... 8

 Possible selves compared to goals 8

Possible selves: a brief review of the literature 8

Physical activity possible selves 10

Self-regulatory possible selves 13

Research questions..... 16

Hypotheses..... 18

Expected contributions 19

Chapter III: Methods 21

Design and participants..... 21

Measures 23

 Eligibility screening 23

 Demographics 23

 Self-reported physical activity levels 23

 Physical activity intentions 24

 Imagery ability 25

 Consideration of future consequences 26

 Physical activity task self-efficacy..... 26

 Self-regulatory efficacy..... 26

 Social desirability..... 27

 Physical activity possible self self-efficacy 27

 Perceived importance of achieving one’s physical activity possible self 27

PHYSICAL ACTIVITY POSSIBLE SELVES

Physical activity possible selves reflection questions	28
Action and coping planning	28
Procedure	29
Ethics approval	29
Recruitment	29
Time 1	29
Eligibility screening	29
Consent	29
Demographic information and select control variables	30
Randomization	30
Time 2	30
Control tasks	31
Physical activity possible selves intervention	31
Outcome measures	31
Follow-up assessment	32
Times 3 and 4	32
Time 5	32
Pilot testing	32
Data analysis	33
Data management	33
Analytical plan	35
Manipulation check	35
Rationale for choosing covariates and moderators	36
Chapter IV: Article	37
Abstract	38
Introduction and literature review	39
Methods	45
Design overview	45
Participants	45
Measures	47

PHYSICAL ACTIVITY POSSIBLE SELVES

Demographics	47
Self-reported physical activity levels.....	47
Physical activity intentions	47
Imagery ability	48
Consideration of future consequences	48
Physical activity task self-efficacy	48
Self-regulatory efficacy	49
Physical activity possible self reflection questions	49
Procedure	50
Follow-up assessment.....	51
Pilot testing	51
Results.....	52
Data management.....	52
Analytic plan	52
Preliminary analyses	53
Manipulation check	53
Main analyses.....	54
Physical activity task self-efficacy	54
Self-regulatory efficacy	54
Intentions to increase physical activity.....	55
Physical activity over the 4 weeks post-intervention	55
Physical activity over the 4 weeks post-intervention with combined interventions conditions	55
Discussion	56
Comparing conditions.....	56
The effects of the intervention on MVPA over the 4 weeks post-intervention ..	58
The effects of the intervention on self-regulatory variables.....	59
Strength, limitations, and future directions.....	61
Conclusions.....	64
Notes	65
References	66

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 1: Means and standards deviations of all outcome variables.....	76
Chapter V: Supplemental Analyses	77
Descriptive Statistics.....	77
Manipulation Check.....	77
Word count	77
Count of action and coping planning strategies	77
Main analyses.....	78
A note about the physical activity intentions measures	78
Research question 1 – Comparison of conditions on immediate and follow-up measures	78
Action planning at 2 and 4 weeks	78
Comparison between the intervention conditions	79
Physical activity possible self self-efficacy	79
Perceived importance of achieving one’s physical activity self	79
Research question 2 – Action and coping planning as potential mediators between participants condition and physical activity at 4 weeks.....	80
Action planning.....	80
Coping planning.....	81
Chapter VI: General Discussion	82
Comparing conditions.....	83
The effects of the intervention on MVPA over the 4 weeks post-intervention	86
The effects of the intervention on self-regulatory variables	88
Self-efficacy	88
Intentions to increase physical activity	90
Perceived importance of and self-efficacy to attain one’s physical activity possible self.....	91
Action and coping planning	92
Strengths, limitations, and future directions	94

PHYSICAL ACTIVITY POSSIBLE SELVES

Conclusions.....	100
Chapter VII: References	102
Chapter VIII: Appendices	120
A. Study flowchart and measures lists	120
B. Eligibility screening questionnaire	123
C. Demographics questionnaire	126
D. Physical activity recall questionnaire (Version A).....	129
E. Physical activity recall questionnaire (Version B)	130
F. Physical activity intentions questionnaire A.....	131
G. Physical activity intentions questionnaire B	132
H. Imagery ability questionnaire.....	134
I. Consideration of future consequences questionnaire	141
J. Physical activity task self-efficacy questionnaire.....	143
K. Self-regulatory efficacy questionnaire	144
L. Social desirability questionnaire.....	148
M. Physical activity possible self self-efficacy and perceived importance of achieving one’s physical activity possible self questionnaire.....	149
N. Physical activity possible self reflection questions.....	150
O. Action and coping planning questionnaire.....	151
P. Recruitment slips	153
Q. Newspaper advertisement	154
R. Recruitment poster	155
S. Facebook recruitment text	157
T. Information sheet.....	159
U. Consent form.....	160
V. Standard physical activity possible selves intervention script	166
W. Self-regulatory physical activity possible selves script.....	167
X. Canadian physical activity guidelines for adults.....	168

PHYSICAL ACTIVITY POSSIBLE SELVES

Z. Debriefing form	169
Chapter IX: Tables and Figures	172
Table 1: Transformed variables	172
Table 2: Descriptive statistics and baseline variables	173
Table 3: Results: Physical activity task self-efficacy.....	174
Table 4: Results: Physical activity self-regulatory efficacy and intentions to increase physical activity	175
Table 5: Results: Physical activity over the 4 weeks post-intervention.....	176
Table 6: Results: Physical activity over the 4 weeks post-intervention (combined intervention conditions)	177
Table 7: Results: Action and Coping Planning.....	178
Table 8: Results: Physical activity possible self self-efficacy, importance of achieving one's physical activity possible self	179
Table 9: Variables used in the mediation analyses	180
Figure 1: Results: Model testing mediation analysis with action planning	181
Table 10: Results: Mediation analysis with action planning	182
Figure 2: Results: Model testing mediation analysis with coping planning	183
Table 11: Results: Mediation analysis with coping planning	184

Chapter I: Introduction

Physical activity (PA) is lauded for its widespread health benefits, including improved bone health, body composition, psychological well-being and mental health, and decreased risks of cardiovascular disease, many cancers and type 2 diabetes (Hardman & Stensel, 2009; Miles, 2007). However, the majority of Canadians fail to engage in, and consequently benefit from, sufficient PA (Colley et al., 2011). It is imperative to understand the factors associated with PA participation and adherence and to develop successful PA interventions (Kahn et al., 2002; Ransdell, Dinger, Huberty, & Miller, 2009; Whaley & Schrider, 2005). Specifically, there has been a call for more research on psychological influences that may increase PA participation (Baranowski, Anderson, & Carmack, 1998; Kahn, et al., 2002). In terms of interventions, while some have proven effective at increasing PA, there is room for improvement (Biddle & Mutrie, 2008; Kahn et al., 2002).

Many psychological factors that warrant greater examination are those related to the *self*, (Fox & Wilson, 2008). Self has been defined as the “psychological apparatus that allows organisms to think consciously about themselves” (Leary & Price Tangney, 2003, p.8), and has been largely acknowledged for its importance as a motivational resource and in regulating behaviour (Leary & Price Tangney, 2003; Oyserman, Bybee & Terry, 2006). One aspect of the self that has received research attention is the construct of *possible selves* (Markus & Nurius, 1986). Possible selves are future-oriented self-representations that can take the form of what individuals expect, want, or fear becoming in the future (Markus & Nurius, 1986; Markus & Ruvolo, 1989). They have been theorized and found to influence one’s motivation, current affect, self-regulation, and behaviour (Hoyle & Sherrill, 2006; Markus & Nurius, 1986; Markus & Ruvolo, 1989). This holds true in the PA domain (e.g., Murru & Martin Ginis, 2010; Ouellette,

PHYSICAL ACTIVITY POSSIBLE SELVES

Hessling, Gibbons, Reis-Bergan & Gerrard, 2005; Whaley, 2003), however, the limited studies examining possible selves in this domain have been mostly correlational in nature, with only two published intervention studies (Murru & Martin Ginis, 2010; Ouellette et al., 2005). Thus, this study sought to determine factors that increase the self-regulatory and behavioural effects of PA possible selves. As it has been suggested that *self-regulatory* possible selves are especially effective, and that planning is an important self-regulatory strategy (Markus & Ruvolo, 1989; Oyserman, Bybee, Terry, & Hart-Johnson, 2004), this study focused on the effects of developing plans to support a PA possible self.

Chapter II: Literature Review

Self

There are a number of variables pertaining to the self (Leary & Price Tangney, 2003; Mischel & Morf, 2003) that can be organized into a self-system (Fox & Wilson, 2008). The self-system is a complex, organized structure housing one's interconnected thoughts, feelings and motives (Mischel & Morf, 2003; Fox & Wilson, 2008). For example, it includes self-related variables such as self-relevant representations, knowledge, goals, beliefs, values, motives, and emotions that influence one's experiences with the social world and behaviour, either directly or indirectly (Dweck, Higgins, & Grant-Pillow, 2003; Fox & Wilson, 2008; Leary & Price Tangney, 2003; Markus & Ruvolo, 1989; Mischel & Morf, 2003).

The self is involved in three key, interrelated processes: attention, cognition, and the regulation of behaviour (Leary & Price Tangney, 2003). Through attentional processes people direct their attention to themselves while cognitive processes allow them to think about and reflect on their roles, traits, memories, and life circumstances (Leary & Price Tangney, 2003, p.9). Through their influence on thoughts, emotions, and behaviour, these first processes allow for the third, self-regulation (Leary & Price Tangney, 2003, p.9), understood as the process of making decisions and adjusting one's behaviour to approach a set goal (Hoyle, 2010). As these three processes of the self are interrelated, they are all important in the study of behaviour.

Self and Health Behaviours

The self is both a determinant and a product of health and of health-related practices (Contrada & Ashmore, 1999). 'Self' variables such as self-efficacy and self-regulatory behaviours (e.g., planning) predict a variety of health behaviours and outcomes, including the use of both dental floss and seat belts, dietary and PA behaviours, and mental health outcomes

PHYSICAL ACTIVITY POSSIBLE SELVES

(Schwarzer, et al, 2007; Taylor & Brown, 1988; Vassallo et al., 2009). Health status and health behaviours also affect the self. For example, illness and disease, specifically visible symptoms such as tremors and gnarled limbs, can negatively impact one's sense of identity and body image (Clarke & Griffin, 2008; Sheppard & Ely, 2008). Intervention research has found that breast cancer survivors who have or who are at risk for having lymphedema can experience improved body image and self-perceptions by engaging in strength training twice weekly (Speck et al., 2009).

The bidirectional relationship between self and health is also evident in the PA domain. For example, in general, the more positive one's PA self-perceptions, such as perceived competence and self-efficacy, the greater their PA behaviour (Brassington et al., 2002; Cramp & Bray, 2009; Sonstroem, Speliotis, & Fava, 1992; Whaley, 2004; Woodgate & Brawley, 2008). In turn, PA participation affects self-perceptions such as physical and global self-esteem, self-efficacy, self-concept, and life satisfaction (Brasington et al., 2002; Elavsky & McAuley, 2005; Stoll & Alfermann, 2002).

Possible Selves

Possible selves are detailed conceptions of one's self in the future in expected, desired, or feared states, respectively known as expected, hoped-for and feared possible selves (Markus & Nurius, 1986). An individual might expect to be an occasional exerciser, but hope to be a regular exerciser, and fear being sedentary. While possible selves are posited to function as self-relevant goals (Erikson, 2007), they are more than *just* goals; they are visual representations and imaginary experiences of possible future actions and of outcomes (e.g., affective, behavioural) associated with what one might become in the future (Markus & Nurius, 1986; Markus &

PHYSICAL ACTIVITY POSSIBLE SELVES

Ruvolo, 1989). For example, a person who has the goal of becoming a physically active person likely does not hold this goal in isolation. Rather, this goal is likely to manifest into a self-relevant form that entails a vivid representation of what being a physically active person would “look like” (e.g., physical appearance, energy level, impact on social relationships etc; Markus & Nurius, 1986). In fact, possible selves are thought to be close representations, in terms of cognitive and affective elements, of what one would experience while engaged in the actual behaviour or once their desired state has been attained (Markus & Ruvolo, 1989).

Markus and Nurius (1986) described two main ways that possible selves influence behaviour: they serve as incentives for behaviour and as an interpretive context for the current self. First, possible selves give self-relevant, cognitive form to goals and thus provide incentive for and energize behaviour (Markus & Nurius, 1986). Specifically, individuals are motivated to engage in behaviours that will bring them closer to their hoped-for selves and distance them from their feared selves, especially if they attach importance to these selves (Markus & Nurius, 1986; Markus & Ruvolo, 1989). The augmented incentive value of goals when they are self-relevant has been acknowledged (Gebhardt, 2006). Secondly, possible selves provide “a context of additional meaning” (Markus & Nurius, 1986, p. 955) and serve as criteria for assessing current behaviour. Current behaviours and circumstances are experienced and interpreted differently depending on one’s possible selves, and this interpretation influences affect (Cross & Markus, 1991; Markus & Nurius, 1986) and in turn, behaviour (Cross & Markus, 1991). For example, an individual with a possible self of being a regular exerciser should feel more negative affect upon engaging in insufficient exercise to deem him or herself a regular exerciser than would an individual without a possible self as an exerciser (or with a possible self as a sedentary person). Consequently, this negative affect should motivate the individual with a possible self as an

PHYSICAL ACTIVITY POSSIBLE SELVES

exerciser to engage in exercise (Cross & Markus, 1991). Thus, possible selves motivate behaviour because they provide images of what to achieve and of what to avoid and because they allow for the assessment of one's current self and behaviours (Markus & Nurius, 1986).

Regardless of the main mechanism by which a possible self leads to behaviour change, it does so by first increasing the use of self-regulatory cognitions and processes (Cross & Markus, 1991). Self-regulatory cognitions and processes (or self-regulation) refer to the one's thoughts and actions that allow him/her to alter their behaviour (Karoly, 1993). Examples are goal-setting, self-monitoring, self-evaluation, and strategy use, which include focusing attention, time management, and organization, among strategies to achieve behaviour change (Zimmerman, 1990, 2000). Among the self-regulatory processes hypothesized to be influenced by possible selves is self-efficacy¹, which is thought to mediate the relationship between possible selves and outcome behaviours (Ruvolo & Markus, 1992; Markus & Nurius, 1986; Markus & Ruvolo, 1989). This has been supported in research (e.g., Murru & Martin Ginis, 2010). That self-efficacy may be increased through imagining a possible self is in line with self-efficacy theory which states that forming mental representations of oneself may constitute an effective form of vicarious experience, which is an important source of self-efficacy (Bandura, 1977; Maddux & Gosselin, 2003). Not only is self-efficacy an important precursor to self-regulatory behaviours (Anderson, Wojcik, Winett & Williams, 2006), it has also been found to be an important predictor of health behaviours (Hooker & Kaus, 1992), making it quite important in the possible selves-behaviour relationship. Other self-regulatory cognitions and behaviours also help to advance people towards their hoped-for possible selves, including the development of action plans (Cross & Markus, 1994), and, specific to health-related possible selves, one's rated

¹ *Self-efficacy* is one's belief in their ability to perform behaviours required to meet a certain outcome (Bandura, 1997).

PHYSICAL ACTIVITY POSSIBLE SELVES

importance of achieving their possible self (Hooker & Kaus, 1992). Also, since possible selves are thought to increase one's motivation for a particular behaviour (Markus & Nurius, 1986), and as intentions have been recognized as a measure of quantity of motivation (Ajzen, 1991; Fortier et al., 2001), it is likely that forming a possible self in a certain domain may help to increase both motivation and intentions for associated behaviour. The present study examined the differential effects of a control condition, a standard possible selves intervention condition, and a self-regulatory possible selves condition on participants' self-reported levels of these self-regulatory cognitions and processes.

Possible selves may be compared to similar psychological constructs, namely imagery, goal-setting, and identity. Reviewing the differences, similarities and relationships between possible selves and these three constructs is helpful to illuminate the factors that make possible selves a unique construct worthy of academic research.

Possible selves compared to imagery. Imagery refers to individuals' mental representations of objects, situations, behaviours, and experiences, and although it uses primarily the visual sensory system, contributions from other sensory systems may add to the richness of the representation (Lang, 1979). Imagery processes are essential for the development of and reflection upon possible selves, as it is through imagery that one can experience his or her possible self (Ruvolo & Markus, 1992). Thus, possible selves are a specific type of mental representation that one can experience through imagery. They must include detailed images of one's self in the future, either as one expects to be, hopes to be, or fears being (Markus & Nurius, 1986). As imagery may be used to such ends as conjuring up images of the past, helping with skill acquisition, or used subconsciously for dreaming (Ronen, 2011), not all imagery leads to the formation of reflection upon one's future, or one's possible selves.

PHYSICAL ACTIVITY POSSIBLE SELVES

Possible selves compared to identity. Identity theory (Burke, 1980; Stryker & Burke, 2000) stipulates that individuals possess multiple identities of the self situated in the context of a role (e.g., self as a mother, a runner, a teacher). Identities pertain to a role one sees oneself inhabiting in the present. Associated with these identities are individuals' identity meanings, or the criteria to be fulfilled in order to maintain the identities. Identities have been described as being conceptually similar to and relevant for the possible selves that one holds (Whaley, 2003), however, the two constructs are not synonymous. Identities are current self-views while possible selves reflect ideas of what one might become in the future.

Possible selves compared to goals. Possible selves often include goals, especially in the cases of hoped-for possible selves or positive expected possible selves (Erikson, 2007). Possible selves are not synonymous with goals for a few reasons; i) feared selves do not represent one's goals, but rather they represent behaviours and states to avoid (Markus & Nurius, 1986), and ii) developing possible selves goes beyond goal-setting as, while goal-setting may vary in degree of elaboration, possible selves must be vivid and include imaginary experiences of one's self in a future state or working towards that self (Erikson, 2007).

Possible Selves: A Brief Review of the Literature.

The possible selves construct has been used to examine behaviour in several domains, including academia (e.g., Oyserman, Brickman, & Rhodes, 2007; Oyserman, Bybee, & Terry, 2006; Oyserman, Bybee, Terry, & Hart-Johnson, 2004), youth delinquency (Oyserman & Markus, 1990), and health (e.g., smoking, alcohol use, exercise, sleeping, stress management; Aloise-Young, Hennigan, & Leong, 2001; Hooker & Kaus, 1992; 1994). The majority of this research has been correlational. Some descriptive research has examined the content and

PHYSICAL ACTIVITY POSSIBLE SELVES

categories of people's possible selves (Cross & Markus, 1991; Oyserman & Fryberg, 2006; Oyserman & Markus, 1990). Cross and Markus (1991), for example, found that among adults' commonly hoped-for and feared possible selves are those in the family, occupation, personal, and physical domains, among others.

Researchers have also examined characteristics of possible selves that make them most facilitative to the self-regulation of behaviour. Possible selves are more motivating if they feel close as opposed to distant (Strahan & Wilson, 2006), important as opposed to unimportant (Harju & Reed, 2003), and well-elaborated in terms of the processes to attain/avoid them (i.e. action strategies) as opposed to only well-elaborated only in terms of expected outcomes (Markus & Ruvolo, 1989). Further, availability and accessibility of, and perceived control over possible selves are all positively related to motivation to achieve/avoid them (Norman & Aron, 2003). Having balanced possible selves (a positive expected or hoped-for self and a feared self in the same domain) has also been proposed to be especially motivating, but findings have shown mixed results with respect to this as well as which of these valences (positive or negative possible selves) has a stronger influence on motivation (Aloise-Young et al., 2001; Oyserman & Markus, 1990). Finally, the formation, content, quantity, effectiveness of and the self-efficacy to attain/avoid possible selves are influenced by personal characteristics such as age (Aloise-Young et al., 2001; Cross & Markus, 1991), race and ethnicity (Oyserman & Fryberg, 2006), and gender (Oyserman & Fryberg, 2006). As Markus (2004) stated in a brief review of the possible selves construct, these future self-representations show promise for their ability to enhance motivation and the use of self-regulatory strategies, and for their role in shaping behaviour in several domains, such as health and education.

PHYSICAL ACTIVITY POSSIBLE SELVES

Given the promising findings from correlational research, researchers have begun to determine whether behaviour (or variables that have implications for behaviour) could be influenced through possible selves interventions. These interventions have focused mainly on improving youths' academic behaviour (e.g., Hock, Schumaker, & Deshler, 2003, as cited in Hock, Deshler, & Schumaker, 2006; Oyserman et al., 2006; 2007; Oyserman, Terry & Bybee, 2002). Common protocols include having students develop academic possible selves and strategies to attain them, and specifying and making connections between childhood and adult possible selves and goals (Hock et al., 2006; Oyserman et al., 2002; 2006). The interventions have shown many positive results, including the development of a greater number of elaborate and domain-specific possible selves, increased motivation for academic behaviours, superior self-regulation of the behaviour (e.g., greater school attendance, participation in class, and time spent doing homework), and ultimately more positive behaviour change and academic outcomes.

Physical activity possible selves. PA researchers acknowledging the potential role that possible selves may play in understanding and leading to increased PA have begun to examine PA possible selves. A correlational study by Harju and Reed (2003) examined the content of and some self-regulatory mechanisms associated with exercise possible selves. They asked a sample of university students to identify hoped-for and feared, active and inactive possible selves. The importance that participants placed on attaining or maintaining a hoped-for exercise self over two years was a determinant of the desire and likelihood to achieve that self. Additionally, the more that the participants viewed themselves as exercisers already, the greater their self-efficacy and perceived likelihood to exercise, exercise participation, and fitness levels. Those who viewed themselves as having attained their feared nonexerciser selves were less fit and were more likely

PHYSICAL ACTIVITY POSSIBLE SELVES

to spend time thinking about avoiding this feared self, but were less likely to believe in their ability or the likelihood that they could avoid this self than those with self-views as exercisers.

Whaley (2003) examined the content of possible selves (not only those related to exercise) and self-regulatory variables associated with them among a sample of middle-aged women who varied in terms of exercise. Inactive participants reported more hoped-for and feared possible selves related to body image, while long-term exercisers reported more physical- and health- related possible selves. Further, long-term exercisers had more detailed possible selves, higher self-efficacy, and greater outcome expectations, and attributed more importance to possible selves than those who exercised less.

Researchers have started to develop and empirically test interventions aimed at increasing exercise participation (Murru & Martin Ginis, 2010; Ouellette et al., 2005). In the first of two such studies, Ouellette et al. (2005) examined the effects of imaging an exercise-related prototype (one's representation of a typical exerciser) versus an exercise-related possible self on subsequent exercise behaviour in a sample of university students. They also examined whether two individual difference variables, social comparison (comparing oneself to the image one has of others; Gibbons & Gerrard, 1995) and consideration of future consequences (CFC; the consideration of future outcomes stemming from present behaviour; Stratham, Gleicher, Boninger, & Edwards, 1994) would moderate these effects (Ouellette et al., 2005). Participants were randomly assigned to one of four conditions, whereby they either reflected on an individual 10-20 years from now who is 1) a prototype of a regular exerciser, 2) a prototype of a nonexerciser, 3) themselves as a regular exerciser (exerciser possible self), or 4) themselves as a nonexerciser (nonexerciser possible self). The participants were then asked to describe their images in writing and, as a manipulation check, to answer eight questions pertaining to the

PHYSICAL ACTIVITY POSSIBLE SELVES

image, including what first came to mind and details about aspects such as appearance and general health. Four weeks later, the participants were contacted to determine if the experimental conditions led to differences in subsequent exercise behaviour (Ouellette et al., 2005).

The findings of this study suggest that reflecting on either exerciser or nonexerciser possible selves and prototypes may be effective for increasing exercise (Ouellette et al., 2005) but that contemplating these different images will have different effects for different people. Differences between the exerciser and nonexerciser images were insignificant, thus for the possible selves and prototype conditions, the exerciser and nonexerciser image types were combined into a single condition. For those individuals who scored high on social comparison, imagining a prototype led to significantly greater exercise behaviour than for those who seldom engaged in social comparison. Also, individuals who scored high in the CFC trait experienced significant increases in their exercise behaviour after imagining their possible self; while those who seldom considered the future consequences were more likely to react to prototypes.

Subsequently, Murru and Martin Ginis' (2010) possible selves intervention examined the effects of imagining a hoped-for PA possible self, a feared PA possible self, or completing control condition tasks on the PA behaviour of a sample of inactive university students and whether self-regulatory efficacy variables might mediate this relationship. The procedure used for this randomized controlled study was based on that by Ouellette et al. (2005), with modified instructions for possible selves image generation, and inclusion of the same questions that served again as a manipulation check. An addition to this study was the participants' completion of self-regulatory efficacy measures before and after the manipulation to determine if the condition influenced self-regulatory outcomes. The participants were also asked to complete a daily

PHYSICAL ACTIVITY POSSIBLE SELVES

exercise log over the eight weeks following the intervention. The control group did not complete a possible selves generation task, but rather a quiz on PA in addition to the daily exercise log.

The researchers had hypothesized, based on previous health-related studies, that the feared possible selves intervention would lead to a greater increase in exercise behaviour than the hoped-for possible selves condition, which would lead to a greater increase in exercise behaviour than the control condition (Murru & Martin Ginis, 2010). As occurred in the study by Ouellette et al. (2005), the hoped-for and feared possible selves conditions were collapsed into one condition due to negligible differences in their effects (Murru & Martin Ginis, 2010). There were medium to large differences between the exercise behaviour of this combined group and the control group over the eight-week study, with the intervention group engaging in more total minutes (but not days) of exercise. Planning self-efficacy partially mediated the relationship at four but not at eight weeks (Murru & Martin Ginis, 2010).

Together, these two interventions demonstrate that university students are able to generate images of exercise possible selves. Additionally, these findings provide support for the use of possible selves interventions to increase exercise behaviour, at least in the short term, the role of certain self-regulatory mechanisms as mediators in this relationship, and individual differences as moderators.

Self-regulatory possible selves. Possible selves are believed to guide behaviour by first affecting self-efficacy, outcome expectations, and other self-regulatory variables (Cross & Markus, 1994; Markus & Nurius, 1986). However, Markus and Ruvolo (1989) posited that not all possible selves are equally effective at influencing behaviour. Rather, well-elaborated possible selves associated with action strategies for achieving them are more effective than less-elaborate possible selves. Past possible selves research supports this notion (Oyserman et al.,

PHYSICAL ACTIVITY POSSIBLE SELVES

2004), These well-developed possible selves have been called *self-regulatory* possible selves and are differentiated from *self-enhancing* possible selves, which simply increase one's self-appraisal (Oyserman et al., 2004). For example, a self-regulatory possible self as a great gymnast may include visual representations of getting adequate sleep and proper nutrition and spending hours training in the gym to steadily increase strength, flexibility and coordination. Meanwhile, a self-enhancing possible self of being a gymnast might merely include visions of oneself on the podium but not the steps required to arrive there. In light of this, it is unfortunate that in naturalistic settings, individuals' possible selves are poorly defined and not well supported by plans for attaining them (Oyserman et al., 2004). However, in lab settings where individuals are encouraged to make plans to support their possible selves, their hoped-for possible selves are more self-regulatory in nature (Oyserman et al., 2004).

Developing action strategies increases the likelihood that one will maintain positive affect and motivation to work towards the goals that are incorporated into their hoped-for possible selves, thus resulting in goal-relevant behaviour (Gollwitzer, 1999; Oyserman et al., 2004). The added effectiveness of self-regulatory possible selves as compared to self-enhancement possible selves has been shown in the academic domain (e.g., Hock et al., 2006; Oyserman et al., 2004) but has yet to be examined in the PA arena.

In light of the findings described above, the purpose of the current study was to expand upon the correlational and experimental exercise and PA possible selves research by elucidating factors that influence the effectiveness of PA possible selves interventions. First, it should be mentioned that since both published possible selves interventions had combined the hoped-for and feared conditions after finding insignificant differences between the two, the current study only examined hoped-for PA possible selves. This allowed for the examination of different

PHYSICAL ACTIVITY POSSIBLE SELVES

intervention procedures while maintaining a reasonable number of study conditions. Specifically, it was examined whether explicitly asking individuals to form self-regulatory PA possible selves (self-regulatory intervention condition; with strategies to attain the possible selves) would be more effective than interventions without this request (standard intervention condition) and than a control condition in terms of yielding greater self-regulatory outcomes (e.g, PA intentions, PA self-efficacy, etc.) and PA outcomes. Secondly, we examined the possible meditational roles of forming detailed plans for engaging in PA and for dealing with related setbacks on PA levels four weeks post-intervention by having participants report the degree to which they had made such plans over a two week follow-up.

While the current study did not include a full, separate action and coping planning intervention, the participants in the self-regulatory PA possible selves intervention condition were asked, as part of their possible selves manipulation task, to reflect about how they would advance towards their possible selves, incorporating elements typical of action planning such as *what* they would do, as well as *when, where, how, how often* and *with whom* (Gollwitzer, 1999; Sniehotta, Scholz, & Schwarzer, 2006). These participants were also asked to reflect upon strategies to overcome possible challenges associated with advancing toward their possible selves. Incorporating these details into one's possible self would make the possible self more *self-regulatory* in nature compared to possible selves without associated plans for achieving them. These possible selves would thus be more likely to lead to positive self-regulatory and behavioural outcomes (Markus & Ruvolo, 1989).

The meditational role of planning on subsequent PA was hypothesized for a several reasons. First, Frazier, Tix, and, Barron, (2004) explain that mediation is likely present when the predictor and outcome variables have a satisfactory relationship. In this case, it is hypothesized

PHYSICAL ACTIVITY POSSIBLE SELVES

that the predictor-the possible selves intervention, will be related to the outcome – PA at follow-up, as past research has identified this relationship (e.g. Ouellette et al., 2005; Murru & Martin Ginis, 2010). Secondly, inherent in the description of possible selves is their role as a motivator and regulator of behaviour, as they help individuals to select among future behaviours to either approach a hoped-for self or to avoid a feared self (Markus & Nurius, 1986). Thus, it appears as though developing self-regulatory possible selves leads to planning ways to attain/avoid these selves, which leads to possible self-relevant behaviour. Murru and Martin Ginis (2010), in their research on exercise possible selves, found that planning self-efficacy partially mediated the effects of the possible selves intervention on exercise at follow-up. Thus, it is logical to assume that actual planning, and not only the efficacy to plan, would mediate the intervention's effects on behaviour. Finally, as forming PA-specific action and coping plans has been shown to have positive effects in the greater PA literature (e.g., Murray, Rodgers, & Fraser, 2009; Schwarzer, Luszczynska, Ziegelmann, Scholz, & Lippke, 2008), it is likely that positive behavioural effects will also stem from describing strategies to be used to achieve one's PA possible self and to cope with setbacks that may arise. The findings of these mediation analyses may help to identify, in a PA context, the process through which a possible self may affect behaviour. This question has seldom been addressed in past possible selves research (Hoyle & Sherrill, 2006).

Research Questions

Based on past research findings, the following questions will be examined relative to a possible selves intervention where participants will be randomized to i) a control ii) a standard PA possible selves or iii) a self-regulatory PA possible selves condition. Potential covariates will be assessed for each dependent variable; those that meet specific guidelines (please see

PHYSICAL ACTIVITY POSSIBLE SELVES

‘Rationale for choosing covariates and moderators’) will be added into the analysis for that dependent variable.

1. A. Does forming a self-regulatory PA possible self as part of a self-regulatory PA possible selves intervention lead to additional self-regulatory and behavioural benefits compared to a control condition and a standard PA possible selves intervention in terms of:

1.A.1 - self-efficacy (PA task and self-regulatory) for and intentions to engage in PA during the eight weeks following the intervention, as measured immediately after the intervention with self-report questionnaires.

1.A.2 - self-reported action and coping planning at two and four weeks.

1.A.3 - self-reported PA over the four week follow-up period (using the GLTEQ).

B. Does forming a self-regulatory PA possible self as part of a self-regulatory PA possible selves intervention lead to additional benefits compared to a standard PA possible selves intervention in terms of self-reported self-efficacy for and perceived importance to achieve their PA possible self immediately following the intervention?

2. Does self-reported action and coping planning measured 2 weeks post-intervention mediate the effect between the standard and self-regulatory PA possible selves interventions and PA behaviour at four weeks?

PHYSICAL ACTIVITY POSSIBLE SELVES

Hypotheses

Question 1. A) It is expected that individuals in the self-regulatory PA possible selves condition will have higher scores on the following measures than individuals in the standard PA possible selves condition, who will have higher scores on these measures than individuals in the control condition:

1. self-efficacy (PA task and self-regulatory) for and intentions to engage in PA during the four weeks following the intervention, as measured immediately after the intervention.
2. self-reported action and coping planning at two and four weeks.
3. self-reported PA over the four week follow-up period (using the Godin Leisure Time Exercise Questionnaire; GLTEQ, Godin & Shephard, 1985).

B) It is expected that individuals in the self-regulatory PA possible selves condition will exhibit (using self-report measurement) greater self-efficacy for and perceived importance to achieve their PA possible self immediately following the intervention than individuals in the standard PA possible selves condition.

Question 2. The extent to which participants engaged in action and coping planning over the two-weeks post-intervention (using self-report measurement) will mediate the relationship between the study condition (standard or self-regulatory PA possible selves intervention conditions or control condition) and PA behaviour at the four week follow-up period.

For simplicity, the self-regulatory PA possible selves intervention condition will be referred to as the self-regulatory condition, the standard PA possible selves interventions condition will be referred to as the standard condition, and the control condition will be referred to as such.

PHYSICAL ACTIVITY POSSIBLE SELVES

Expected Contributions

The main aspired contribution of this research will be to build on preliminary support for the effectiveness of PA possible selves interventions by examining whether having participants reflect on more *self-regulatory* aspects of their PA possible selves influences/improves the effectiveness of such interventions. By recruiting a cross-section of adults, ranging from 18 to 64 years old, rather than only focusing on university students, another contribution may be that we will increase the generalizability of PA possible selves research. Age will be examined as potential covariate when it is found to be correlated with a specific outcome measure. Additionally, the focus of the current study will not be on *exercise* participation, but rather on *PA* participation which may be more inclusive/relatable to individuals currently not meeting PA guidelines.

Finally, this will be the first PA possible selves intervention to examine the effectiveness of delivering this type of intervention online, in terms of its impact on behavioural and self-regulatory outcomes. There are several advantages to this. First, since most North Americans regularly access the Internet in their households, libraries, or work places, there will be no need for them to commute to a laboratory. Beyond being accessible and convenient for participants, online studies may be more cost effective for researchers as space and personnel expenditures can be minimized. Encouragingly, online PA interventions can be effective at both increasing PA and self-regulatory outcomes over the four weeks post-intervention when the interventions are matched to the participants' current PA-related stage (nonintenders, intenders, or actors) and when the participants are highly engaged in the intervention (Richert, Lippke, and Ziegelmann, 2011). Furthermore, in a 'best possible selves' intervention with undergraduate students, online and in-person deliveries led to equally significant positive results, compared to a control

PHYSICAL ACTIVITY POSSIBLE SELVES

condition, on self-reported positive affect, flow (i.e. optimal experiences characterized by intense concentration and enjoyment, during which one's skill level corresponds perfectly with the activity; Csikszentmihalyi, 1990), and relatedness (feeling close and connected to others; Deci & Ryan, 2000, 2008) after the intervention (Layous, Nelson & Lyubomirski, 2012). This indicates that online best possible selves interventions can be as effective as those delivered in-person. Although Packard and Conway (2006) postulated that interventions delivered in the presence of the researcher allow participants to seek clarification and motivate participants to form more complete responses, Evans and Mathur (2005) offer solutions for these and other potential weaknesses of online surveys. For example, ensuring that instructions are simple and clear (perhaps by conducting a pilot study) may limit the clarification needed by participants, and personalizing communications with participants (e.g., using their name), may provide a personal touch that boosts motivation to complete the survey (Evans & Mathur, 2005). As PA possible selves interventions have been conducted exclusively in laboratory setting, this study will help to determine whether online delivery may also be effective.

Chapter III: Methods

A flow chart illustrating the study procedures and lists of the measures to be taken at each time point are included in Appendix A.

Design and Participants

This study featured a pre-post experimental design with two- and four-week follow-up assessments. The target sample included individuals who would be described as ‘adults’ in the 2011 Canadian Physical Activity Guidelines for Adults (Canadian Society for Exercise Physiology [CSEP], 2011) - they had to be between 18 and 64 years of age, inclusively. Adults who had engaged in less than 90 minutes of moderate to vigorous intensity PA (MVPA) in a typical week over the past year (thus not meeting the 2011 Canadian Physical Activity Guidelines [CSEP, 2011]) were eligible to participate. A less active sample was strategically chosen; possible selves in a given domain are most likely to influence current behaviour when one’s current behaviours and state in the same domain are discrepant (but not too discrepant) with these possible selves (Hoyle & Sherrill, 2006). Thus, individuals who were already engaging in high levels of PA would likely have been too close to their PA possible self for the intervention to have shown significant results. To guard against resistance to the intervention, participants also had to intend to increase their current PA participation over the eight weeks post-intervention.

To detect a medium effect size, 50 participants per condition is recommended (Cohen, 1992), thus recruiting 200 participants would have allowed for sufficient power in the occurrence of attrition or unusable data. During the recruitment period, 405 individuals began Time 1, the eligibility screening portion of the study. Of these, 5 individuals were not able to proceed as they did not give their consent and 114 engaged in 90 minutes or more of MVPA in an average week

PHYSICAL ACTIVITY POSSIBLE SELVES

in the last year, deeming them ineligible to participate. The remaining 286 individuals were eligible to participate and were sent the second link. 247 people completed Time 2 (39 dropouts between Times 1 and 2). With thirteen drop-outs between Times 2 and 3, 234 people completed Time 3. Finally, 221 people completed Time 4 (13 drop-outs between Time 3 and 4). Although participants were randomly assigned to one of three conditions leading to equal groups, unequal drop-out from the groups led to different *ns*. In the control, standard intervention and self-regulatory intervention groups, respectively, there were 77, 75, and 69 participants.

An attrition analysis was conducted to assess whether there were any significant differences between those who dropped out and those who stayed in the study. The two groups could only be compared on variables taken at Time 1, as the majority of individuals who dropped out did so after this time-point. One-way between-groups analyses of variance (ANOVAs) were used to compare the groups on age, body mass index (BMI), consideration of future consequences (CFC), strenuous, moderate and mild PA, and social desirability. Among these variables, there were no significant differences. A near significant difference is that those who dropped out had reported a greater number of 15 minute bouts of mild PA per week over the past year than those who remained in the study, $p = .030$ (dropped out: $M = 6.37$ sessions, $SD = 5.484$; stayed in: $M = 4.93$ sessions, $SD = 4.295$). This relationship became insignificant when the Brown-Forsythe and Welsh values were considered (as the assumption of homogeneity of variances was violated). Next, crosstabulations were used to determine whether the groups differed significantly on categorical variables including gender, culture, marital status, and education status. Among these variables the only significant difference was with gender, $\chi^2(1, n = 283) = 8.244, p = .004, \phi = -.181$. Roughly 37% of men who completed Time 1 discontinued

PHYSICAL ACTIVITY POSSIBLE SELVES

their participation in the study, while for women, this percentage only reached 18%. Thus, the initial sample had a greater proportion of men than did the final sample.

Measures

Eligibility screening. Participants were asked to indicate their first name and their email address to allow the researchers to match their responses across time-points. They were also asked to indicate how they learned about the study and whether or not they were comfortable reading and writing in English, had a good comprehension of the English language, their health status was such that they would be able to participate in PA, anyone else in their household was already a participant in this study, and they intended to engage in PA over the next eight weeks. They were also asked their age, where they lived (Canada or another country), and their average weekly number of minutes of MVPA over the past year, based on the Godin Leisure Time Exercise Questionnaire (GLTEQ, Godin & Shephard, 1985; see Appendix B). These questionnaires can be found in Appendix B.

Demographics. Participants were asked to indicate their gender, cultural background, height, body weight, marital status, the highest level of education that they completed, their current employment situation, the province or territory and city or town in which they lived, and their telephone number. These questionnaires can be found in Appendix C.

Self-reported physical activity levels. Slightly modified versions of the GLTEQ (Godin & Shephard, 1985) were used to assess PA levels at baseline and follow-ups (see Appendices D and E). The original questionnaire asks participants to indicate the number of 15-minute bouts of mild, moderate, and strenuous PA in which they engaged during a typical week during their free time (Godin & Shephard, 1985). Examples of activities for each intensity level are provided. For

PHYSICAL ACTIVITY POSSIBLE SELVES

each intensity, the reported weekly frequency is multiplied by the associated metabolic equivalent (METs), which are three, five, and nine, for mild, moderate, and strenuous intensity activities, respectively. These products are added to give the total weekly leisure PA level. In this study, however, participants' MET levels were not necessary as only the total number of bouts of moderate plus strenuous PA (MVPA) were used in the analyses. For each time-point the number of bouts of moderate and strenuous PA were added to give a single MVPA total.

To derive a more long-term assessment of participants' PA levels, respondents in the present study were asked about their PA levels for a typical week over the *past year* (Appendix D). This modified use of the scale is consistent with the assessment of PA levels in past PA possible selves literature (Murru & Martin Ginis, 2010). For follow-up assessments, PA recall for a typical week over the past two weeks was asked (Times 3 and 4; Appendix E). As the Canadian PA guidelines emphasize engaging in moderate and strenuous intensity PA, only PA recall for these two intensities, based on the GLTEQ, were used in the main analyses. The GLTEQ has been shown to be reliable (Godin & Shephard, 1985) and valid (Gionet & Godin, 1989; Godin & Shephard, 1985; Jacobs, Ainsworth, Hartman, & Leon, 1993), even against the Caltrac (R) portable accelerometer (Miller, Freedson & Kline, 1994).

Physical activity intentions. Two measures were used to assess PA intentions at baseline and at follow-up. The first method (see Appendix F) was based on a measure developed by Milne, Rodgers, Hall and Wilson (2008) designed to determine if an intervention can at least influence individuals to make small, positive behavioural changes. This three-item intention questionnaire asks participants: "Do you intend to maintain/increase/decrease your current activity level?" Participants respond using a 7-point Likert scale for each item ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Assessing individuals' relative intentions for PA in this

PHYSICAL ACTIVITY POSSIBLE SELVES

manner is important as a particular absolute amount of PA might represent a decrease for some, maintenance for others, and an increase for others (Milne et al., 2008); absolute PA intentions alone may not allow for determination of the intervention's effectiveness.

However, knowing the absolute amount of PA in which individuals intended to engage is also useful as this information provides a sense of participants' PA levels relative to PA guidelines in order to determine if intended increases in PA may have implications for health. Thus, the second measure of PA intentions (see Appendix G) examined individuals' intended weekly frequency of PA and the strength of these intentions. For each intensity level (i.e. strenuous, moderate, and mild), participants were asked to indicate the number of days that they intended to engage in PA at that level, for a minimum of 15 minutes. For each intended frequency, they also rated the strength of their intentions using a 9-point Likert scale, ranging from 1 (*definitely will not be physically active*) to 9 (*definitely will be physically active*). This second measure of PA intentions follows suggestions that using continuous open response scales produces the most accurate responses about social cognitive constructs for repeated behaviours such as exercise (Rhodes, Matheson & Blanchard, 2006).

Imagery ability. The 32-item Imaging Ability Questionnaire (AIQ; Kwekkeboom, 2000; see Appendix H) was used to assess participants' ability to generate a vivid mental image (11-item subscale) and to experience and become engaged in the image (21-item subscale; Kwekkeboom, 2000). Internal consistency and test-retest reliability have been shown to be .93 and .92, respectively (Kwekkeboom, 2000). This tool's use has been recommended in previous exercise research (Andersson & Moss, 2011), but to the best of our knowledge, it has not been used in possible selves research. The internal consistency of this scale in this study was .92.

PHYSICAL ACTIVITY POSSIBLE SELVES

Consideration of future consequences (CFC). The 12-item CFC scale (Strathman et al., 1994; Appendix I) was used to assess CFC, a relatively stable trait referring to the degree to which individuals consider the potential distal outcomes of their current actions (Strathman et al., 1994). CFC has been shown to moderate the effects of a possible selves intervention on subsequent exercise behaviour (Ouellette et al., 2005), thus it was included as a potential control variable in the current study. Individuals rated the extent to which each of the 12 statements was characteristic of them, from 1 (*not at all like you*) to 5 (*very much like you*). A sample item is: “I consider how things might be in the future, and try to influence those things with my day to day behavior”. Negatively worded items were reversed scored and then values were summed. Higher scores indicate a higher tendency to consider future consequences. This scale has demonstrated reliability and validity in college students (Strathman et al., 1994). It has been used in a past exercise possible selves intervention, with an internal consistency of .78 (Ouellette et al., 2005). In this study, this scale had an internal consistency of .84.

Physical activity task self-efficacy. Participants rated, on a scale from 0 (*cannot at all*) to 10 (*highly certain can do*), the degree to which they were confident that they could engage in MVPA for 10, 20, 30, 40, 50, and 60 consecutive minutes (see Appendix J). These scores were summed and averaged to form a mean task self-efficacy score. This manner of measuring task self-efficacy is based on suggestions from Bandura (2006) and McAuley and Mihalko (1998). In the current study, the internal consistency of this scale ranged from .95 to .96 (measured at different time-points).

Self-regulatory efficacy. A 13-item measure assessed participants’ confidence in their ability to engage in self-regulatory behaviours that would facilitate their PA participation over eight weeks post intervention (see Appendix K). Participants rated their confidence for each item

PHYSICAL ACTIVITY POSSIBLE SELVES

using a scale ranging from 0 (*not at all confident*) to 10 (*completely confident*). An example item is: “Over the next 8 weeks, how confident are you that you can arrange your schedule in order to do your physical activity no matter what?” These ratings were summed and averaged to form a mean self-regulatory efficacy score. The items and scales adhere to recommendations from Bandura (2006) and McAuley and Mihalko (1998) for assessing self-efficacy in the physical domain. This scale is also similar to ones used in past research (Strachan, Brawley, Spink, & Jung, 2009; Strachan, Woodgate, Brawley, & Tse, 2005). Measures of reliability for this scale in the present study across several time-points ranged from .94 to .97.

Social desirability. Social desirability (see Appendix L) was measured using Strahan and Gerbasi’s (1972) 10-item short form of the 33-item Marlowe-Crowne Social Desirability Scale (SDS; Crowne & Marlowe, 1960), recommended for use by Fisher and Fick (1993). This abbreviated version of the SDS has an alpha coefficient of .88 and a .96 correlation with the original SDS (Fisher & Fick, 1993). The reliability of this scale in the current study was .60.

Physical activity possible self self-efficacy. We asked participants to respond to the single item, “How capable do you feel of accomplishing this possible self?” using a 7-point Likert scale ranging from 1 (*not at all capable*) to 7 (*completely capable*; see Appendix M). This measure was based on previous possible selves research (e.g., Cross and Markus, 1991; Hooker & Kaus, 1994; McElwee & Haugh, 2010).

Perceived importance of achieving one’s physical activity possible self. Participants in the intervention conditions indicated their perceived importance of achieving their PA possible self by rating one item (“How important is it to you to achieve this PA possible self?”) on a 7-point Likert scale ranging from 1 (*not important at all*) to 7 (*very important*; see Appendix M).

PHYSICAL ACTIVITY POSSIBLE SELVES

This aspect of possible selves has been measured in this manner in past research (McElwee & Haugh, 2010; Norman & Aron, 2003).

Physical activity possible self reflection questions. Eight (or ten) items served as a manipulation check and a strategy for having the participants reflect adequately about their PA possible selves. Based on protocol from previous research, (Murru & Martin Ginis, 2010; Ouellette et al., 2005) the participants were asked to: 1) write about the first thing that came to mind when asked to think about their PA possible self, and to describe details of the image, including 2) appearance, 3) general health, 4) energy level, 5) attitude toward life, 6) achievements, 7) relationships, 8) and anything else that came to mind. The participants in the self-regulatory condition were asked two additional questions, concerning the action and coping plans that they had been asked to form in the imagery task (see Appendix N).

Action and coping planning. The participants completed Sniehotta, Schwarzer, Scholz, and Schuz's (2005) action and coping planning measure (see Appendix O) with modified items to inquire about plans to engage in PA rather than a single plan to engage in exercise. All items have the stem "Over the last two weeks, I made detailed plans regarding..." and were rated from 1 (*completely disagree*) to 4 (*totally agree*). The action planning items referred to when, where, how, how often, and with whom to engage in PA while four coping planning items referred to dealing with possible setbacks. Internal consistency for the action planning items range from .92 to .95 and for coping planning, from .90 to .91 (Sniehotta et al., 2005). In the current study, internal consistency was .93 for action planning at both follow-ups and ranged from .92 to .94 for coping planning.

PHYSICAL ACTIVITY POSSIBLE SELVES

Procedure

Ethics approval. Prior to starting participant recruitment, approval from the Health Sciences and Sciences Research Ethics Board at the University of Ottawa was sought and granted.

Recruitment. Adults aged 18 to 64 years were recruited through social media, email messages, newspaper advertisements, and posters around the University of Ottawa and in other public venues (see Appendices P – T). Snowball sampling was utilized as participants were encouraged to tell inform acquaintances about this study. On the recruitment materials was the link to the first part of the study, which included eligibility screening, the consent form, and demographic, and some control variable questionnaires. Participants could go directly the survey website (on the Robin Hood Technology server) and complete these questionnaires. The study email address and telephone number to reach the principal investigator were provided on the recruitment materials in case potential participants had questions about the study.

Time 1.

Eligibility screening. While completing the eligibility screening questions online, a message thanking the participants for their time and interest in the study and explaining that they were ineligible would appear if they provided an answer rendering them ineligible (See Appendix B).

Consent. Eligible participants were then presented with the consent form (Appendix U) to read and sign to indicate their consent. If they did not consent, a message appeared to thank them for their time and interest in the study.

PHYSICAL ACTIVITY POSSIBLE SELVES

Demographic information and select control variables. After indicating their consent, participants completed the following: i) a demographics questionnaire asking age, gender, cultural background, height, body weight, marital status, level of completed education, employment status, province/territory and city/town of residence, and phone number (Appendix C); ii) potential control variable measures including CFC (Appendix I), social desirability (Appendix L); and iii) the baseline PA recall measures (Godin & Shephard, 1985; Appendix D). Participants were then told to expect to receive Time 2 in their email within the next couple of days.

Randomization. Once Time 1 had been completed, the participants were randomized to one of the three conditions using two spreadsheets (one for each gender) in Microsoft Excel. Each of the three conditions had a designated colour (e.g., yellow, purple, and blue), and the rows of the spreadsheet were coloured in a repeated pattern (e.g., yellow, purple, blue; yellow, purple, blue, etc.). As participants completed Time 1, they were added to the spreadsheets, and their row colour determined their study condition.

Time 2.

Participants indicated their first name and email address to allow the researcher to match their data from this time-point to that of subsequent time-points. PA intentions (both ways of assessing them; Appendix F and G), was assessed as a baseline variable followed by control variables including imagery ability (Appendix H), PA task self-efficacy (Appendix J), and self-regulatory efficacy (Appendix K).

PHYSICAL ACTIVITY POSSIBLE SELVES

Control tasks. The participants in this condition were provided with an online copy of the 2011 Canadian Physical Activity Guidelines (CSEP, 2011; see Appendix X) which they were asked to read, reflect upon, and indicate whether or not they had read.

Physical activity possible selves intervention. The individuals in the intervention conditions also received an online copy of the 2011 Canadian Physical Activity Guidelines (CSEP, 2011; see Appendix X) to read, reflect upon, and indicate whether or not they had read. Next, they completed the possible selves manipulation. This intervention was based on past PA possible selves research which had successfully incited participants to reflect upon the images asked of them (Murru & Martin Ginis, 2010; Ouellette et al., 2005). The participants in the self-regulatory condition received instructions that were additional to what those in the standard condition received. Rather than simply creating a PA possible self, they were also asked to imagine and describe (with written responses to questions) steps they could take towards achieving this self and how they could cope with setbacks that could arise. These intervention instructions can be found in Appendices V and W. Participants indicated whether or not they had imagined a PA possible self. Finally, they described this self by responding to eight items pertaining to the general health and appearance the imagined, among other factors, which were based on past research (Murru & Martin Ginis, 2010; Ouellette et al., 2005). The participants in the self-regulatory condition responded to two additional items asking them to describe the steps and strategies to attain their possible self that they had imagined. These questions served as a manipulation check and to ensure that the participants adequately reflected on their PA possible selves. These ten questions can be found in Appendix N.

Outcome measures. Following the intervention/control condition materials, all participants completed outcome measures, including both measures of PA intentions

PHYSICAL ACTIVITY POSSIBLE SELVES

(Appendices F and G), PA task self-efficacy (Appendix J), and self-regulatory efficacy (Appendix K). The individuals in the intervention conditions also completed measures of PA possible self self-efficacy (Appendix M), and their perceived importance of achieving their PA possible selves (Appendix M). These measures were irrelevant for the control group participants as they did not form PA possible selves.

Follow-up assessments.

At Times 3 and 4 (two and four weeks post-intervention, respectively), participants received e-mails with links to the Robin Hood Technologies survey system. At each of these time points, there were a few questionnaires to answer.

Times 3 and 4. Participants provided/completed:

- their first name and email address (to link their data from all time-points)
- the action and coping planning measure (see Appendix O);
- a PA recall measure (Appendix E);
- the task self-efficacy and self-regulatory efficacy measures (Appendices J and K); and

Time 5. This was the final time-point for this study but the Time 5 data are not included within this document. At the end of Time 5, participants were thanked and were presented with the debriefing form. They were also asked whether they would like to receive a \$ 10.00 gift card for Starbucks or Chapters-Indigo and told that they would receive their card shortly.

Pilot Testing. Prior to beginning the intervention, 19 individuals completed the first time-point, and five to eight participants piloted each condition of Time 2. Since the following time-points contained mostly the same questionnaires, they were not piloted. The pilot testing allowed us to determine whether or not materials could be properly understood and completed by

PHYSICAL ACTIVITY POSSIBLE SELVES

the participants. Feedback about aspects that could be clarified was sought. Minor modifications to the wording of instructions were made following the pilot testing.

Data Analysis

Data management. Recommendations by Tabachnick and Fidell (2007) guided the data cleaning and preparation. Data were assessed for correct entry and requisite composite scores were computed. The amount of missing data was assessed; there was less than 5% missing data for all variables, with the exception of items for which there were complications with the online system at the beginning of data collection. The SPSS missing value analysis procedure was used to determine whether there were patterns to the missing data. Data were found to be missing completely at random, thus posing no problem in terms of the generalizability of the results (Tabachnick & Fidell, 2007). Missing variables were imputed using expectation-maximization as part of the missing value analysis for these missing cases.

Data were then assessed for univariate outliers. First, the standardized values of the continuous variables were saved as new variables, expressing the original scores in terms of z-scores. Z-scores above 3.29 and below -3.29 were considered univariate outliers; these outliers were not excluded, rather, the original values for these scores were altered to be one unit larger or smaller than the next most extreme score (depending on whether it was a positive or negative value). Next, the distribution of the each continuous variables was assessed for normality (i.e. skewness and kurtosis). When a continuous variable's skewness was smaller than -1 or greater than + 1, and/or its kurtosis was smaller than -2 or greater than + 2, data transformations were performed according to the valence and degree of the skewness and kurtosis (See Table 1). Next, data were examined for multivariate outliers using the SPSS regression method and the

PHYSICAL ACTIVITY POSSIBLE SELVES

Mahalanobis distance. As there were no or very few multivariate outliers per analysis (three in total), these cases were deleted.

Prior to the main analyses, data were examined for violations of assumptions following recommendations from Tabachnick and Fidell (2007) and Pallant (2007). Assumptions regarding sample size and normality were addressed through the recruitment procedure and data cleaning. ANOVAs and chi-square analyses were performed to assess whether there were significant group differences on demographic and descriptive variables despite randomization. For each of the main analyses, the linearity of the relationships between variables and the homogeneity of variances was assessed. For the analyses with more than one independent or dependent variable, the assumption of multicollinearity and singularity were examined and in all cases respected. For mediation analyses, the correlations between the independent and dependent variables were examined to assess whether or not they met the suggested minimum correlation strength of .30 (Pallant, 2007). For all analyses with covariates, the following assumptions were met: the covariates were measured prior to participants' exposure to the intervention/control materials, their reliability was ensured as scales previously found to be valid and reliable were used and high reliability values were found in the present study², there were small correlations among them but large enough correlations between them and the dependent variables, and homogeneity of regression between participant condition and the covariates was ensured. For all repeated measures analyses, the assumption of homogeneity of inter-correlations was tested using Box's Test of Equality of Covariance Matrices. This assumption was never violated.

Two important points should be noted. First, despite randomization, groups differed on marital status, with a disproportionately large percentage of individuals in the standard condition

² The internal reliability for the social desirability scale in the present study was only .60. This variable was not used in analyses so this does not impact the reliability of the findings.

PHYSICAL ACTIVITY POSSIBLE SELVES

being single (79.0%), as compared to the self-regulatory condition (54.5%) and the control condition (59.3%), $X^2(2, n = 244) = .220, p = .003, \phi = .220$. Secondly, the independent and dependent variables in the mediation analyses had smaller correlations than the recommended minimum of .30 (Pallant, 2007).

Analytical plan.

Based on guidelines by Pallant (2007), 36 participants per condition are required to meet the power requirements for these analyses. Given that the number of participants per condition ranged from 69 to 77, we met statistical power requirements.

For the mediation analyses, the procedure outlined by Frazier, Tix, and Barron (2004) was followed.

Manipulation check. First, participants in both intervention conditions responded to the dichotomous (yes/no) question posed immediately after the intervention asking whether they imagined a PA possible self. Secondly, an independent-samples *t*-test was used to examine whether there were between-group differences in the degree of elaboration on the eight possible selves image manipulation follow-up questions received by both intervention groups. Specifically, the means of the total word count for the eight questions were compared. As the participants in the self-regulatory condition received two additional follow-up questions, the total word count including these questions was compared to the standard condition participants' word count on the eight-questions, thus, a second independent-samples *t*-test was performed. Finally, two raters counted the number of action and coping plans written by each participant in the follow-up questions; inter-rater reliability for the total combined number of action and coping plans across all questions, for each participant, was assessed using the intraclass correlation

PHYSICAL ACTIVITY POSSIBLE SELVES

coefficient (Shrout & Fleiss, 1979)) Two independent-samples *t*-tests were used to assess whether there were between-group differences in the amount of planning, first with only the eight *description* questions and again with the inclusion of the two “how to” questions asked to the self-regulatory condition participants..

Rationale for choosing covariates and moderators. Several criteria were used to select covariates for each analysis. As suggested by Tabachnick and Fidell (2007), covariates used in past research were considered. Specifically, CFC (Ouellette et al., 2005) and imagery ability (Murru & Martin Ginis, 2010) were included as potential covariates as they have been found or have been theorized to influence possible selves interventions. Secondly, demographic and baseline values (not only of the dependent variable for a specific analysis, but other baseline variables as well) on which groups differed significantly were also considered as potential covariates (Vincent, 2005). Variables that met these first two conditions were only included as covariates if they were correlated with the dependent variable but not overly correlated with other covariates included in the same analysis (Tabachnick & Fidell, 2007). Additionally, variables that had not met the first two criteria but were correlated with the dependent variable were also controlled for (Tabachnick & Fidell, 2007). Furthermore, to account for differences in pretest scores of the dependent variable for a given analysis, these pretest scores were included as covariates as per recommendations (Vincent, 2005, Huck & McLean, 1975). Among these variables, those that were continuous were included in the main analyses as covariates; those variables that were categorical were included as independent variables (to examine their moderating effect).

Descriptions of the main analyses are included within the article (Chapter IV) and the supplemental analyses sections (Chapter V).

Chapter IV: Article

Running head: PHYSICAL ACTIVITY POSSIBLE SELVES

**Physical activity possible selves online intervention: A focus on self-regulatory possible
selves**

Meghan E. Marcotte¹ and Shaelyn M. Strachan²

¹University of Ottawa; ²University of Manitoba

¹Ottawa, Ontario, Canada; ²Winnipeg, Manitoba, Canada

Abstract

Imagining oneself in the future as a physically active person (physical activity possible self) has been associated with increased PA (Murru & Martin Ginis, 2010; Ouellette et al., 2005). This online randomized controlled study examined the self-regulatory and behavioural benefits of forming a *self-regulatory* PA possible self which involves people not only reflecting on the image of their PA possible self but also on the actions in which they would engage to pursue this possible self. This self-regulatory PA possible selves intervention was compared to a standard PA possible selves intervention and a control condition in terms of the impact on self-regulatory processes and cognitions (those processes and cognitions that guide individuals to alter their behaviour; Karoly, 1993; Zimmerman, 1990) and PA. 247 insufficiently active participants completed baseline measures prior to the intervention. Participants completed measures of PA self-efficacy and intentions immediately after the intervention and recalled PA 4 weeks after the intervention. Analysis of covariance (ANCOVA) demonstrated no PA benefits for the self-regulatory condition beyond those of the standard condition. ANCOVAs indicated no between-group differences on the self-regulatory variables examined. This study provides further support for PA possible selves interventions and shows that an online delivery method may be effective.

KEYWORDS: possible selves, self-regulatory possible selves, physical activity, randomized controlled intervention, adults

Physical activity possible selves online intervention: A focus on self-regulatory possible selves

Introduction and Literature Review

Evidence that the majority of Canadians fail to engage in, and consequently benefit from, sufficient physical activity (PA) is clear (Colley et al., 2011). Thus, it is imperative to understand the factors associated with PA participation and adherence and to use this information to develop successful PA interventions (e.g., Kahn et al., 2002; Ransdell, Dinger, Huberty, & Miller, 2009). Important factors emphasized for consideration are those that are psychological in nature (Baranowski, Anderson, & Carmack, 1998). *Possible selves*, which are detailed future-oriented self-representations (Markus & Nurius, 1986), are among these factors that warrant greater examination. Possible selves can take the form of what individuals expect, want, or fear to become in the future (expected, hoped-for, and feared possible selves; Markus & Nurius, 1986). Specifically, a possible self entails vivid representations of what this self would “look like” (e.g., physical appearance, energy level, impact on social relationships, etc; Markus & Nurius, 1986).

As with other *self* variables (Leary & Price Tangney, 2003; Oyserman, Bybee & Terry, 2006), possible selves have been theorized to influence motivation, self-regulation, behaviour, and affect (Hoyle & Sherrill, 2006; Markus & Nurius, 1986; Markus & Ruvolo, 1989). These effects are theorized to occur through one of two main mechanisms: first, they give self-relevant, cognitive form to goals and thus provide incentive for and energize behaviour; and second, they serve as criteria for assessing current behaviour and circumstances, and this interpretation influences affect and in turn, behaviour (Cross & Markus, 1991; Markus & Nurius, 1986).

PHYSICAL ACTIVITY POSSIBLE SELVES

The possible selves construct has been examined in relation to behaviour in several domains, including academia (e.g., Oyserman, Brickman, & Rhodes, 2007), youth delinquency (Oyserman & Markus, 1990), and health (e.g., exercise, smoking, alcohol use, sleeping, stress management; Aloise-Young, Hennigan, & Leong, 2001; Hooker & Kaus, 1992; 1994). Much of this research has been correlational, and interventions using the possible selves construct to attempt to influence behaviour or its antecedents have mainly focused on improving youths' academic behaviour (e.g., Hock, Schumaker, & Deshler, 2002, as cited in Hock, Deshler, & Schumaker, 2006). These intervention studies have shown many positive results, ultimately in the form of positive behaviour change and academic outcomes.

Likewise, the correlational research focusing on PA-related possible selves has shown positive results. For example, the importance that university students placed on attaining/maintaining a hoped-for exercise self over two years was a determinant of their desire to and perceived likelihood of achieving that self (Harju & Reed, 2003). Further, long-term exercisers report more detailed possible selves, higher self-efficacy, and greater outcome expectations, and attribute more importance to their possible selves than those who exercised less (Whaley, 2003).

In recognition of the relationship between PA possible selves and PA behaviour researchers have begun to explore whether adherence to PA can be improved through interventions that involve a focus on PA possible selves. There are two published, empirically tested PA possible selves intervention studies to date. Ouellette, Hessling, Gibbons, Reis-Bergan, and Gerrard (2005) examined the effects of imagining an exercise-related possible self versus an exercise-related prototype on exercise in a sample of university students. They also examined whether social comparison and consideration of future consequences (CFC) would moderate

PHYSICAL ACTIVITY POSSIBLE SELVES

these effects. Participants were randomly assigned to one of four conditions, whereby they either reflected on an individual 10-20 years from now who is 1) a prototype of a regular exerciser, 2) a prototype of a nonexerciser, 3) themselves as a regular exerciser (exerciser possible self), or 4) themselves as a nonexerciser (nonexerciser possible self). Participants wrote about their image and answered eight questions pertaining to the image, including details about aspects such as appearance and general health. When exercise was examined four weeks later, individuals who imagined their “exerciser” or “non-exerciser” possible self reported increases in exercise but only if they also scored high on CFC. Those who scored either low on CFC or high on social comparison and who were exposed to either a “regular exerciser” or a “nonexerciser” prototype condition also engaged in significantly more exercise at follow-up. The findings suggest that reflecting on either exerciser or nonexerciser possible selves and prototypes may be effective for increasing exercise (Ouellette et al., 2005) but that contemplating these different images will have different effects for different people.

Subsequently, Murru and Martin Ginis’ (2010) possible selves intervention examined the effects of imagining a hoped-for PA possible self, a feared PA possible self, or completing control condition tasks on the PA of a sample of inactive university students and whether self-regulatory efficacy variables mediate this relationship. The image-generation procedure used for this experiment was based on that by Ouellette et al. (2005). Participants also completed a self-regulatory efficacy measure before and after the manipulation to allow for this measure to be examined as a mediator of PA which was measured at baseline and over the 8 weeks of the intervention. As in the study by Ouellette et al. (2005), there were no differences between the hoped-for and feared possible selves conditions (Murru & Martin Ginis, 2010). Participants who reflected on either type of PA possible self reported more total minutes of PA eight weeks after

PHYSICAL ACTIVITY POSSIBLE SELVES

the intervention than control participants. Planning self-efficacy partially mediated the relationship at four but not at eight weeks (Murru & Martin Ginis, 2010).

These interventions suggest that a laboratory-based PA possible selves intervention is effective at increasing the short-term PA of university students. Further the findings suggest that planning self-efficacy mediates the relationship between the intervention and PA (Murru & Martin-Ginis, 2010) and that CFC may have an impact on the effect of the intervention. This work can be extended to further examine the characteristics of these interventions.

An important consideration stems from theory (Markus & Ruvolo, 1989) and research (Oyserman, Bybee, Terry, & Hart-Johnson, 2004) suggesting that *self-regulatory* possible selves—those associated with action strategies for achieving a possible self—are more effective than *self-enhancing* possible selves, which simply increase one's self-appraisal (Markus & Ruvolo, 1989; Oyserman et al., 2004). For example, a PA self-regulatory possible self may include visual representations of “how to” information about becoming physically active, such as seeing oneself getting up early in the morning to exercise. Meanwhile, a PA self-enhancing possible self might merely include visions of oneself as an exerciser (fit, healthy, trim) but not the steps required to arrive there. As forming PA-specific action and coping plans has also shown positive effects in the greater PA literature (e.g., Murray et al., 2009; Schwarzer et al., 2008), it is likely that positive behavioural effects will also stem from describing strategies to be used to achieve one's PA possible self and to cope with setbacks that may arise. In a possible selves intervention study by Hock et al., (2002, as cited in Hock et al., 2006), a strategy to have university student-athletes create elaborate, self-regulatory possible selves pertaining to life goals and academic achievement was used. Participants were asked to reflect in depth about their hoped-for, feared, and expected possible selves, and to elaborate on action plans to approach their hoped-for selves,

PHYSICAL ACTIVITY POSSIBLE SELVES

including short-term goals. This protocol, when compared to the control condition, was associated with positive outcomes including the identification of more life goals of a higher degree of specificity and earning higher grades. The inclusion of procedures designed to elicit *self-regulatory possible selves* as a means of increasing the effectiveness of a possible selves intervention has not been studied in the PA context.

Thus, the main purpose of the this study was to expand upon previous PA possible selves research by examining whether explicitly asking individuals to form self-regulatory PA possible selves (with "how to" information to attain them; self-regulatory condition) would be more effective than an intervention without this request (standard condition) and than a control condition. Outcome variables of interest are self-regulatory variables (self-efficacy and intentions) and PA behaviour over the four weeks post-intervention. Based on previous findings and theory, it was hypothesized that self-regulatory condition participants would score higher on outcome variables than would those in the standard condition, who would have higher scores than individuals in the control condition.

An additional strength of this study was to explore the effectiveness of delivering PA possible selves interventions online. First, since the Internet is widely available, this delivery is convenient for participants, cost effective for the researcher as space and personnel expenditures can be minimized, and facilitates the recruitment of participants over a large geographical area (Evans & Mathur, 2005; Wright, 2005). Past research has shown that online interventions can be effective. In a 'best possible selves' intervention with undergraduate students, online and in-person deliveries led to equally significant positive results, compared to a control condition, on self-reported positive affect, flow (i.e. optimal experiences characterized by intense concentration and enjoyment, during which one's skill level corresponds perfectly with the

PHYSICAL ACTIVITY POSSIBLE SELVES

activity; Csikszentmihalyi, 1990), and relatedness (feeling close and connected to others; Deci & Ryan, 2000, 2008) after the intervention (Layous, Nelson & Lyubomirski, 2012). This indicates that online best possible self interventions can be as effective as those delivered in-person. Although Packard and Conway (2006) suggested that interventions delivered in the presence of the researcher allow participants to seek clarification and motivate participants to form more complete responses, Evans and Mathur (2005) offer solutions for these and other potential weaknesses of online surveys. For example, ensuring that instructions are simple and clear (perhaps by conducting a pilot study) may limit the clarification needed by participants, and personalizing communications with participants (e.g., using their name), may provide a personal touch that boosts motivation to complete the survey (Evans & Mathur, 2005). As PA possible selves interventions have been conducted exclusively in laboratory setting, this study will help to determine whether online delivery may also be effective.

Finally, past PA/exercise possible selves interventions focused solely on university student samples (Murru & Martin Ginis, 2010; Ouellette et al., 2005). It is unlikely that the effects of PA possible selves interventions are limited to young adults. In a cross-sectional study, Cross and Markus (1991) found that the citation of possible selves falling into the “physical category” (e.g. being in shape and exercising regularly), was consistently greater in each successive age group (18-24, 25-39, 40-59, and 60-86; Cross & Markus, 1991). Thus, there is reason to believe that adults of a wide age range would benefit from imagining hoped-for PA possible selves. Therefore, the current study sought to examine whether PA possible selves interventions can help adults of a broad age range to create and experience the benefits of such possible selves.

Methods

Design Overview

This study featured an experimental design where participants were randomized to a control, standard or self-regulatory PA possible selves intervention condition. Control participants read the recent PA guidelines (Canadian Society for Exercise Physiology, 2011). Participants in the standard condition (typical of past PA possible selves intervention research; Murru & Martin Ginis, 2010; Ouellette et al., 2005) reflected on future images of themselves as regularly active individuals. In addition to exposure to the standard procedures, participants in the self-regulatory condition were exposed to aspects designed to elicit *self-regulatory* possible selves. Outcomes were assessed immediately post and 4 weeks post intervention.

Participants

Prior to recruitment participants, approval from the Health Sciences and Sciences Research Ethics Board at the University of Ottawa was sought and granted.

Participants were 247 insufficiently-active individuals 18 to 64 years of age who intended to engage in PA. This age range was chosen as it adheres to the definition of ‘adults’ in the 2011 Canadian PA Guidelines for Adults (Canadian Society for Exercise Physiology [CSEP], 2011). Insufficiently active adults were considered to be those who had engaged in fewer than 90 minutes of moderate to vigorous PA (MVPA) in a typical week over the past year (thus not meeting the 2011 PA guidelines [CSEP, 2011]). A less active sample was strategically chosen; possible selves are most likely to influence current behaviour when one’s current behaviour in that domain is discrepant with these possible selves (Hoyle & Sherrill, 2006). Thus, individuals

PHYSICAL ACTIVITY POSSIBLE SELVES

who were engaging in high levels of PA would likely have been too “close” to their PA possible selves for the intervention to have a significant impact. To guard against resistance to the intervention, participants also had to intend to increase their current PA. Additional eligibility criteria included comfort reading and writing in/a good comprehension of English, sufficient health for PA participation, and self-report of being the sole participant from their household.

Of the 405 individuals who were screened for eligibility at Time 1, 286 were eligible and provided consent. The intervention or control tasks (Time 2), were completed by 247 individuals (86.4% of those eligible at Time 1), and the four week follow-up (Time 4) was completed by 221 people (77.27% of those from Time 1)³. An attrition analysis compared participants who discontinued the study after Time 1 to those who stayed in past this point. The only Time 1 variable on which these two groups differed significantly was gender, $\chi^2(1, n = 283) = 8.244, p = .004, \phi = -.181$. Roughly 37% of men who completed Time 1 discontinued their participation in the study, while for women this percentage only reached 18%.

Randomization at Time 1 yielded three conditions of equal group size, but unequal drop-out produced different *n*'s. Of the participants who completed Time 4, there were 77, 75, and 69, in the control, standard and self-regulatory conditions, respectively. Participants were, 29.55 years ($SD = 10.84$) of age, on average, and were primarily female (82.4%), Caucasian (72.1 %), single (64.3 %), graduates of college, vocational programs, or undergraduate degree programs (51.34%), and had engaged in an average of 5.52 bouts ($SD = 4.93$) of more than 15 minutes of MVPA in an average week over the past year. ANOVAs (continuous variables) and chi-square analyses (categorical variables) comparing demographic and baseline variables across conditions revealed no differences between groups on these variables with the exception of marital status. A

³ Results from the Time 3 follow-up are not presented in this article.

PHYSICAL ACTIVITY POSSIBLE SELVES

disproportionately large percentage of individuals in the standard condition were single (79.0%), as compared to the self-regulatory condition (54.5%) and the control condition (59.3%), $X^2(2, n = 244) = .220, p = .003, \phi = .220$.

Measures

Demographics. Participants reported their gender, cultural background, height, body weight, marital status, highest level of education, current employment situation, the province/territory and city/town in which they lived, and their telephone number.

Self-reported physical activity levels. Slightly modified versions of the Godin Leisure Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985) assessed PA at baseline and at four-week follow-up. To derive a long-term assessment of PA levels for eligibility screening, participants were asked about their PA for a typical week over the *past year*. This modified use of the scale is consistent with the assessment of PA in past PA possible selves literature (Murru & Martin Ginis, 2010). For the follow-up assessment, participants reported the number of bouts of PA of 15 minutes in duration or longer *over the past two weeks* (Times 4). The GLTEQ has been shown to be reliable (Godin & Shephard, 1985) and valid (Gionet & Godin, 1989; Godin & Shephard, 1985; Jacobs, Ainsworth, Hartman, & Leon, 1993), even against the Caltrac (R) portable accelerometer (Miller, Freedson & Kline, 1994).

Physical activity intentions. To measure intentions in eligibility screening, participants responded 'yes' or 'no' when asked: "Do you intend to engage in regular physical activity over the next 8 weeks?" At following time-points, one item from the three-item PA intention measure by Milne, Rodgers, Hall and Wilson (2008) asked participants: "Do you intend to increase your

PHYSICAL ACTIVITY POSSIBLE SELVES

current activity level?" using a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Imagery ability. The 32-item Imaging Ability Questionnaire (IAQ; Kwekkeboom, 2000) was used to assess participants' ability to generate a vivid mental image and to experience and become engaged in the image. Internal consistency and test-retest reliability have been shown to be .93 and .92, respectively (Kwekkeboom, 2000). This tool's use has been recommended in previous exercise research (Andersson & Moss, 2011), but to the best of our knowledge, it has not been used in possible selves research. The internal consistency of this scale in this study was .92.

Consideration of future consequences (CFC). The 12-item scale (Strathman, Gleicher, Boninger, & Edwards, 1994) was used to assess CFC, which is the degree to which individuals consider the potential distal outcomes of their current actions (Strathman et al. 1994). Individuals rated the extent to which each of the 12 statements characterized them, from 1 (*not at all like you*) to 5 (*very much like you*). Negatively phrased items were reversed scored, all items were summed, and the mean was computed. Higher scores indicate a higher tendency to consider future consequences. This scale has demonstrated reliability and validity (Strathman et al., 1994). In the present study, internal consistency was .84.

Physical activity task self-efficacy. Participants rated, on a scale from 0 (*cannot at all*) to 10 (*highly certain can do*), the degree to which they were confident that they could engage in MVPA for 10, 20, 30, 40, 50, and 60 consecutive minutes. These ratings were summed and averaged to form a mean task self-efficacy score. This manner of measuring task self-efficacy is

PHYSICAL ACTIVITY POSSIBLE SELVES

based on suggestions from Bandura (2006) and McAuley and Mihalko (1998). The internal consistency of this measure in the present study ranged from .95 to .96 at different time-points.

Self-regulatory efficacy. A 13-item measure assessed participants' confidence in their ability to engage in self-regulatory behaviours that would facilitate their PA participation over eight weeks post intervention. Participants rated their confidence for each item using a scale ranging from 0 (*not at all confident*) to 10 (*completely confident*). These ratings were summed and averaged to form a mean self-regulatory efficacy score. The items and scales adhere to recommendations from Bandura (2006) and McAuley and Mihalko (1998) for assessing self-efficacy in the physical domain, and are similar to ones used in past research (e.g., Strachan, Brawley, Spink, & Jung, 2009; Strachan, Woodgate, Brawley, & Tse, 2005). The internal consistency of this scale in the current study ranged from .94 to .97 at different time-points.

Physical activity possible self reflection questions. Eight items served as a manipulation check and a strategy for having participants reflect adequately upon their PA possible selves. Based on protocol from past research (Murru & Martin Ginis, 2010; Ouellette et al., 2005), the participants were asked to: 1) write about the first thing that came to mind when asked to think about their possible self, and to describe details of the image, including 2) appearance, 3) general health, 4) energy level, 5) attitude toward life, 6) achievements, 7) relationships, 8) and anything else that came to mind. The participants in the self-regulatory condition received two additional questions concerning the strategies for achieving the possible selves that they had been asked to consider ("Describe steps you could take and strategies you could use to achieve your physical activity possible self"; and "Describes steps you could take and strategies you could use to help yourself achieve your physical activity possible self when challenging setbacks arise").

PHYSICAL ACTIVITY POSSIBLE SELVES

Procedure

Main recruitment strategies included social media, email messages, newspaper advertisements, and posters around the University of Ottawa and in other public venues. Interested individuals accessed the survey website directly to complete eligibility screening; those who were eligible were immediately presented with the consent form, the demographics questionnaire, and two control measures (CFC and baseline PA recall). Once individuals had completed these measures (Time 1), they were randomized to one of the three conditions (control; standard possible selves; self-regulatory possible selves). Within two days of completing Time 1, participants were sent links containing either one of the two PA possible selves image manipulation tasks or the control task, depending on their participant condition, and were asked to complete the tasks within two days. Regardless of the condition, participants were first asked to indicate their first name and email address (this was asked at each time-point) and to complete the baseline PA intentions, self efficacy measures, followed by the imagery ability questionnaire. All participants were shown the 2011 Canadian PA Guidelines (CSEP, 2011), which they were asked to read and reflect upon. While the control participants received no further materials, the intervention participants received one of two image manipulation texts shown below, adapted from Murru and Martin Ginis (2010). The only difference between the two versions is the added instruction in the self-regulatory condition version (which appears in bold text). As a reminder, the definitions of moderate and vigorous intensity PA were provided.

Please read carefully.

We are interested in your impression of yourself 5 to 10 years from now. More specifically, we would like you to think about yourself in the future as a person who is

PHYSICAL ACTIVITY POSSIBLE SELVES

active and participates regularly in physical activity. You follow a lifestyle that includes physical activity on most days of the week at a moderate to vigorous intensity. When you think about yourself five to ten years from now as regularly engaging in physical activity (we will call this your physical activity possible self), what images come to mind? Please take a few minutes to imagine and think about this image **and steps that you would take toward achieving this possible self, including what you will do, and how, when, where, with whom, as well as any other pertinent details. Also, consider the challenges that you may face in trying to become more physically active and to achieve your possible self, as well as how you will cope with these setbacks.** On the following pages, you will be asked to answer some questions about this image.

The participants were then asked whether or not they imagined a PA possible self, and were asked to describe this self by responses to the possible selves reflection questions used in past research (Murru & Martin Ginis, 2010; Ouellette et al., 2005). Participants in the self-regulatory condition answered the two additional questions designed to elicit self-regulatory possible selves.

Upon completion of the intervention/control tasks, all participants completed the PA intentions, PA task self-efficacy, and self-regulatory efficacy outcome measures.

Follow-up assessment. At four weeks post-intervention, participants received an e-mail with the link to Time 4. At this time-point, they were asked to complete the GLTEQ PA recall (Godin & Shephard, 1985), task self-efficacy and self-regulatory efficacy measures.

Pilot testing. Prior to beginning the intervention, 19 individuals completed Time 1 and five to eight participants piloted each condition of Time 2. Since Time 4 contained mostly the

PHYSICAL ACTIVITY POSSIBLE SELVES

same questionnaires, it was not piloted. Feedback was sought about aspects of the study that could be clarified; minor modifications to the instruction wording ensued.

Results

Data Management

Recommendations by Tabachnick and Fidell (2007) and Pallant (2007) guided data cleaning and preparation and the examination of assumptions. There was less than 5% missing data for all variables, with the exception of items for which there were complications with the online system. Data were missing completely at random, posing no problem in terms of the results' generalizability (Tabachnick & Fidell, 2007). Missing variables were imputed using expectation-maximization.

Analytic Plan

General linear model analyses of covariance (ANCOVAs) were used to compare the groups on outcome variables. For all analyses, appropriate covariates (when variables were continuous) and moderators (when variables were categorical) were chosen based on recommendations. Potential covariates, such as those recommended in past research (Tabachnick & Fidell, 2007) including CFC (Ouellette et al., 2005) and imagery ability (Murru & Martin Ginis, 2010); and demographic and baseline variables on which groups differ significantly, (Vincent, 2005), were only included as potential covariates if they were correlated with the dependent variable but not overly correlated with other covariates included in the same analysis (Tabachnick & Fidell, 2007). Variables that had not met the first two criteria but were correlated with the dependent variable were also controlled for (Tabachnick & Fidell, 2007). Furthermore,

PHYSICAL ACTIVITY POSSIBLE SELVES

to account for differences in pretest scores of the dependent variable for a given analysis, these pretest scores were included as covariates as per recommendations (Vincent, 2005, Huck & McLean, 1975). A separate analysis was run for each dependent variable as the dependent variables were correlated, which counters recommendations for MANCOVAs (Tabachnick & Fidell, 2007, pp. 249).

For the mediation analyses, the procedure outlined by Frazier, Tix, and Barron (2004) was followed.

Preliminary Analyses

Manipulation Check.

Ninety-eight percent of participants responded ‘yes’ when asked, immediately post intervention, whether they imagined a PA possible self. The four individuals who responded ‘no’ equally represented the two intervention conditions. This suggests that, in general, participants acknowledged forming a PA possible self, and that the conditions were equally effective at provoking these self-representations. The *t*-test comparing the intervention conditions on their total number of action and coping plans described in response to the eight *description* follow-up questions showed no significant difference ($t(156) = -5.58; p = .578$). However, a second *t*-test, differing only by the inclusion of the self-regulatory condition participants’ responses to the two “*how to*” questions, showed a significant difference between the two intervention conditions ($t(156) = -5.928; p < .00$); those in the self-regulatory condition provided on average 5.35 plans ($SD = 3.79$) while those in the standard condition wrote 2.33 plans ($SD = 2.50$). The mean difference was 3.02 (95% CI: 2.01 to -4.02), with a small- effect size ($\eta^2 = .18$).

Main analyses

Physical activity task self-efficacy. This ANCOVA included two categorical variables, marital status and educational attainment, as independent variables to allow for an examination of their potential interaction with the experimental groups on the outcome. Baseline levels of PA and of PA task self-efficacy, age, BMI, and scores on the CFC and imagery ability were entered as potential covariates.

Two covariates had significant effects on PA task self-efficacy: age, $F(1, 219) = 9.146$, $p = .003$, partial $\eta^2 = .040$, and pretest PA task self-efficacy, $F(1, 219) = 1325.313$, $p = .000$, partial $\eta^2 = .858$. After accounting for these effects, the main effect for participant condition was not significant, $F(2, 219) = 0.36$, $p = .965$, partial $\eta^2 = .000$, nor were the main effects for marital status or education status. There were no interaction effects between any of the independent variables. Means and standard deviations are presented in Table 1.

Insert Table 1 here

Self-regulatory efficacy. Potential covariates in this one-way between groups ANCOVA were pretest self-regulatory efficacy, CFC and imagery ability. Levene's test of equality of error variances was violated, thus a more conservative alpha level was set (Pallant, 2007). Pretest self-regulatory efficacy was a significant covariate, $F(1, 237) = .688.400$, $p = .000$, partial $\eta^2 = .744$, while the effect of imagery ability only approached significance, $F(1, 237) = 5.669$, $p = .018$, partial $\eta^2 = .023$. After accounting for these effects, participant condition did not have a

PHYSICAL ACTIVITY POSSIBLE SELVES

significant main effect, $F(2, 237) = 2.070, p = .128, \text{partial } \eta^2 = .017$. Means and standard deviations are presented in Table 1.⁴

Intentions to increase physical activity. Potential covariates in this one-way between groups ANCOVA were pretest intentions and imagery ability. Imagery ability was a significant covariate, $F(1, 238) = 10.363, p = .001, \text{partial } \eta^2 = .042$, as were pre-test intentions to increase PA, $F(1, 238) = 260.545, p = .000, \text{partial } \eta^2 = .523$. After accounting for these covariates, participant condition did not have a main effect on intentions, $F(2, 238) = 1.367, p = .257, \text{partial } \eta^2 = .011$. Means and standard deviations are presented in Table 1.

Physical activity over the 4 weeks post-intervention. In this two-way between groups ANCOVA, marital status was entered as an independent variable as it differed between participant groups and was significantly correlated with the dependent variable, and is categorical thus could not be tested as a covariate. Baseline MVPA values, BMI, and age were entered as potential covariates. Baseline PA was a significant covariate, $F(1, 208) = 29.056, p = .000, \text{partial } \eta^2 = .123$. After taking baseline PA into account, the main effect for participant condition approached significance, $F(2, 208) = 2.589, p = .077, \text{partial } \eta^2 = .024$ (see Table 1 for means and standard deviations). There was no significant main effect for marital status and no interaction effect between participant condition and marital status.

Physical activity over the 4 weeks post-intervention with combined intervention conditions. The near-significant effect of participant condition on levels of PA at four weeks prompted the re-examination of this question with the two intervention conditions collapsed into one, while all else remained unchanged. In addition to the near-significant group differences on

⁴ A factor analysis was conducted with the self-regulatory efficacy items to determine whether separate factors could be examined separately in a similar analysis. No significant factors emerged.

PHYSICAL ACTIVITY POSSIBLE SELVES

PA levels at four weeks, past PA possible selves research also provides justification as two intervention conditions were similarly collapsed when there were insignificant intervention group differences on main outcome measures (Murru & Martin Ginis, 2010).

Thus, another two-way between-groups ANCOVA was conducted to compare the PA levels at 4 weeks post-intervention of the participants in the control versus those in the combined intervention conditions. Marital status was also included as an independent variable. Baseline PA proved to be a significant covariate, $F(1, 210) = 28.870, p = .000, \text{partial } \eta^2 = .121$. While marital status did not have a significant main effect on PA, participant condition did, $F(1, 210) = 4.240, p = .041, \text{partial } \eta^2 = .020$ with participants in the combined intervention condition reporting more PA than those in the control condition. There was no significant interaction effect between marital status and participant condition.

Discussion

This study examined whether a *self-regulatory* PA possible selves intervention led to self-regulatory intervention effectiveness in terms of its impact on self-regulatory variables and PA as compared to control and standard possible selves conditions. Participants in a combined intervention condition reported significantly more MVPA than participants in the control condition yet contrary to hypotheses, the self-regulatory condition did not offer superior benefits. Participants did not differ on the self-regulatory outcomes as a function of their condition.

Comparing Conditions

It is surprising that the self-regulatory condition did not have a superior effect on outcomes as compared to the standard condition, as the generation of a self-regulatory possible self should help “organize and energize” behaviours to approach this self, such as action and

PHYSICAL ACTIVITY POSSIBLE SELVES

coping planning strategies (Markus & Ruvolo, 1989, pg. 219). Past correlational (Oyserman et al., 2004) and experimental (e.g. Oyserman et al., 2006) research demonstrates this benefit of *self-regulatory* possible selves over standard or *self-enhancing* possible selves. It is worth noting that the difference in PA reported by self-regulatory condition participants as compared to other participants approached significance ($p = .077$) which suggests a trend towards the self-regulatory condition having superior effects on PA; further research is needed to determine the validity of this suggestion.

A possible explanation for no significant advantage being associated with the self-regulatory intervention is that the present protocol was not effective at eliciting self-regulatory possible selves. Manipulation check findings do not favour this explanation: self-regulatory condition participants provided more self-regulatory information (i.e., planning) than standard condition participants. However, it is possible that the self-regulatory condition participants' mention of, on average, roughly three plans more than the standard condition participants was still not strong enough to lead to superior intervention outcomes.

Future self-regulatory PA possible selves interventions may need to provoke a more elaborate self-regulatory possible self than did the present study to see superior intervention effects over a standard intervention condition. One way of doing so may be to implement an explicit action and coping planning protocol. For example, although participants in the current study were asked to think about and describe the various elements of planning (e.g., where, when, and how they would engage in behaviours that would advance them towards their possible selves), the participants were not explicitly prompted to write about *each* element. This protocol may have resulted in the elicitation of a more fully-formed self-regulatory possible self associated with superior intervention outcomes. Research with student athletes employed an

PHYSICAL ACTIVITY POSSIBLE SELVES

elaborate protocol similar to that just described (Hock et al., 2002, as cited in Hock et al., 2006). The finding that this detailed self-regulatory possible selves intervention was associated with positive outcomes such as academic outcomes is encouraging. However, the intervention was not compared to a standard possible selves intervention so conclusions about the superiority of this intervention over a standard intervention cannot be drawn. Nonetheless, a similar protocol may provide an effective means of engaging in in-depth planning for achieving one's possible self, thus eliciting a more fully-developed *self-regulatory* possible self than the protocol used in the present study.

The Effects of the Intervention on MVPA Over the 4 Weeks Post-Intervention

When the two PA possible selves intervention conditions were combined, significantly more MVPA over follow-up was reported when compared to the control condition. The difference in PA amounts to a minimum of 30 additional minutes of MVPA for those in the intervention conditions, weekly. While a small effect (partial $\eta^2 = .02$; Cohen, 1988, pp. 22), any increase in PA offers health benefits (Paffenbarger, Hyde, Wing, & Hsieh, 1986, in Katzmarzyk, 2010). The findings are in line with past possible selves intervention research (Murru & Martin Ginis, 2010; Ouellette et al., 2005). As with these studies, the current intervention led to increases in PA with just a single manipulation session. The findings of these studies converge to suggest a modest but consistent positive effect of hoped for PA possible selves interventions on PA.

These PA findings support theory; developing a hoped-for possible self in a domain encourages individuals to engage in behaviour that brings them closer to attaining this self (Markus & Nurius, 1986). According to the possible selves framework (Marks & Nurius, 1986),

PHYSICAL ACTIVITY POSSIBLE SELVES

the elicitation of possible selves may have provided incentive that motivated behaviour, or they may have served as standards against which participants compared their current behaviour.

When a discrepancy exists between one's actual behaviour and that required to attain their possible self, individuals try to decrease the resulting negative affect by altering their behaviour to approach their possible self (Markus & Nurius, 1986). In the future, assessment of these theoretically-sound explanations is warranted.

The Effects of the Intervention on Self-Regulatory Variables

While possible selves provide behavioural incentive, individuals need to self-regulate in order to pursue their possible self (Cross & Markus, 1991). The present study examined the impact of a possible selves intervention on self-regulatory variables (task and self-regulatory efficacies; PA intentions) however no between-group differences were identified. This finding is surprising especially considering that the intervention led to increases in PA. Several factors may explain these null findings.

One past study supports an ameliorative effect of a PA possible selves intervention on self-efficacy (Murru & Martin Ginis, 2010). This finding supports theory; possible selves interventions may provide an imaginal experience which is a known self-efficacy source (Bandura, 1997). The failure of the present study to replicate this finding may be due to certain aspects of the online delivery of the present study. While past online PA studies (e.g., Richert, Lippke, & Ziegelmann, 2011) and a 'best possible selves' study (e.g., Layous, Nelson & Lyubomirski, 2012) have been effective when delivered online, in the present study, the online delivery may not have been effective enough to lead to positive self-regulatory benefits. This mode may be less likely to elicit a vivid image of one's PA possible self as compared to a

PHYSICAL ACTIVITY POSSIBLE SELVES

laboratory-based approach such as that of Murru and Martin Ginis (2010), in turn serving as a poor source of self-efficacy. Among the possible reasons for this are that participants may speed through the online questionnaires and there is not a researcher present to ensure that the procedures are properly followed. Likewise, if the intervention did not result in a vivid image that was deeply processed, the image may have lacked enough incentive value to lead to increased intentions to pursue the possible self. Indeed, lab interventions with a researcher present allow for researcher-participant interaction and the opportunity for clarification of procedures which has been associated with more complete responses (Packard & Conway, 2006). Clearly, online interventions are at a disadvantage when it comes to providing opportunities for clarification and interaction which may influence the vividness of the possible self images generated by participants. Perhaps modifying the online protocol to include more follow-ups during which the participants are prompted to reflect upon their possible selves, more contact with the researcher, and/or techniques to have the participants create a more vivid PA possible self would increase the effectiveness of these interventions.

Another difference between the Murru and Martin Ginis (2010) study and the current intervention is that in their study, the intervention participants were reminded daily to think about their possible selves. These prompts may have resulted in a stronger image associated with greater self-regulatory efficacy among the intervention participants. Repeated exposure to the image generation task may be an important addition to the intervention. This may also explain why the present intervention did not result in greater PA intentions among participants. Possible selves theory states that when these selves are activated they will motivate the individual to attain/avoid their hoped-for/feared self (Markus and Nurius, 1987). Norman and Aron's (2003) findings support this rationale; the more that the participants thought about their hoped-for

PHYSICAL ACTIVITY POSSIBLE SELVES

possible selves, the more motivated they were to attain these selves. Since intentions are a recognized measure of quantity of motivation (Ajzen, 1991; Fortier et al., 2011), having participants reflect on their possible selves more frequently could increase PA intentions.

Even with this added component, however, intentions may not have been significantly impacted. Despite recruiting participants who did not meet PA guidelines when screened (CSEP, 2011), participants reported intentions for levels of PA that would meet guidelines. Perhaps the failure of the intervention to impact intentions is due to intentions being so high at baseline ($X = 5.48$ sessions per week) that there was little room for improvement. At baseline, several participants also reported having engaged in more PA than they had reported at screening. For a possible self to be motivating (lead to intentions), there must be a discrepancy between one's current state and their possible self (Markus & Nurius, 1986), which may not have been the case for some participants. It is also possible that the possible selves that some participants created were *too discrepant* from their current selves. These selves would feel very hard to attain and may lead to low self-efficacy. In future PA possible selves research, it would be valuable to assess the discrepancy between one's current self and their PA possible self, as different levels of discrepancy may differentially impact the possible selves' effectiveness.

Strengths, Limitations, and Future Directions

The current study has a number of strengths. First, the randomized, controlled design adds strength and rigor to the study (Sibbald & Roland, 1998). This design, in addition to a thorough examination of possible covariates and moderators, provides confidence in the results. Pilot testing assures the participants were able to comprehend the content. Manipulation checks provide confidence in the intervention protocol. While the effectiveness of PA possible selves

PHYSICAL ACTIVITY POSSIBLE SELVES

interventions has been supported, little is known regarding the optimal design that would maximize the impact of such interventions. Through examining the effectiveness of a *self-regulatory* PA possible selves intervention over the standard PA possible selves intervention, the present study informs this objective. Another contribution lies in this study being the first PA possible selves intervention to utilize online delivery. Not only were the positive PA results similar to those of the two exercise possible selves interventions delivered in laboratories, but the online delivery was convenient for the participants while also being economical. Of course, ways to modify the online protocol in order to positively impact *self-regulatory* outcomes as well are worth examining; ideas are provided below. Finally, the current study's inclusion of adults from 18 to 64 years of age renders the results more generalizable than those from past exercise possible selves interventions which focused on university students. The focus on *PA* rather than *exercise* is also more relatable to individuals currently not meeting PA guidelines.

Limitations should be noted and should guide future research. A limitation relates to the sample's baseline activity. Despite participants reporting low PA levels during screening, many participants reported higher PA levels at baseline. The reason for this inconsistency is unclear. As one's hoped-for possible selves function best to promote behaviour change when they are discrepant from their current self and behaviours, if participants were engaged in relatively high levels of MVPA they may not have been very sensitive to the intervention.

The present choice to only examine hoped-for PA possible selves was informed. Since past PA possible selves interventions found no differences, in terms of impact on PA, between feared and hoped-for possible selves (Murru & Martin Ginis, 2010) or exercisers versus nonexercisers images (Ouellette et al., 2005), the present study only employed hoped-for possible self images which allowed for a reasonable number of conditions. Yet, this choice may

PHYSICAL ACTIVITY POSSIBLE SELVES

have limitations. Hoped-for and feared PA possible selves may have differing effects on self-regulation (Hooker & Kaus, 1994). In fact, feared selves may play a role in PA engagement; Hooker and Kaus (1994) found that adults' efficacy and effort to avoid feared PA possible selves were significant predictors of health behaviours, and these selves were more numerous and more important than hoped-for selves⁵. Future research should determine if feared and hoped-for possible selves, or balanced possible selves, differentially impact self-regulatory variables as well as intentions.

Work remains to refine PA possible selves interventions so as to bolster their effectiveness. As previously mentioned, the intervention protocol could be modified to have participants elaborate more on their possible selves and ultimately create a stronger intervention. Potential enhancements include repeated exposure to the image generation task, (Vandelanotte et al., 2007) and use of procedures that result in the creation of a more elaborate image (e.g, more explicit action and coping planning; image generation in the presence of a researcher; Packard & Conway, 2006).

Finally, the results of this study shed light on several possible moderators of the intervention-PA relationship that could be explored further. These potential moderators include personal characteristics that were among the variables controlled for in the analyses, and were significantly correlated with certain outcome variables. Age was a significant covariate and holds potential as a moderator since the importance that one attributes to their possible self depends on their stage of life (Cross & Markus, 1991). Particularly, Cross and Markus (1991) found that existing possible selves (i.e., not elicited through intervention) in the "physical" category (e.g.,

⁵ There was insufficient data to determine whether self-regulatory variables were positively correlated with hoped-for health-related possible selves (Hooker & Kaus, 1994).

PHYSICAL ACTIVITY POSSIBLE SELVES

being in optimal physical condition) increased in their frequency of citation across participant age groups. Imagery ability was another significant covariate that may serve as a moderator especially considering that imagery ability has been related to exercise self-regulatory outcomes (Cumming, 2008). Finally, characteristics of participants' PA possible selves, such as their perceived temporal proximity (i.e. how close the future self feels; Strahan & Wilson, 2006), their clarity or vividness (McElwee & Haugh, 2010), and their availability (i.e. ease with which it can be examined; Norman & Aron, 2003) have all been found to influence self-regulation towards or achievement of one's possible self. As such, these variables could be analyzed for their moderating effects on the possible selves' effectiveness.

Conclusions

The present findings add to the small number of PA possible selves intervention studies which suggest that PA possible selves interventions lead to increased PA. The present study uniquely suggests that small but practically significant ameliorative effects of this intervention are applicable beyond an undergraduate population to a broader range of adults and that online delivery of this intervention holds promise. These accumulating findings have practical implications. For example, implementing a PA possible selves image generation task into the intake procedures of a fitness program may provide an easy and cost-effective way to promote PA adherence. A major objective of the present study was to determine if the ameliorative effect of a PA possible selves intervention could be further increased through the elicitation of *self-regulatory* possible selves. While the findings do not definitively support a superior effect of such a self-regulatory possible selves intervention, continued and refined testing of a PA self-regulatory possible selves intervention seems warranted especially when the preliminary nature of the present study is considered.

PHYSICAL ACTIVITY POSSIBLE SELVES

Notes

The participants completed Strahan and Gerbasi's (1972) 10-item short form of the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960). Analyses indicated that there were no group differences on this variable and it was not correlated with any of the outcome.

References

- Ajzen, I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211. doi: 10.1016/0749-5978(91)90020-T
- Aloise-Young, P.A., Hennigan, K.M., & Leong, C.W. (2001). Possible selves and negative health behaviors during early adolescence. *The Journal of Early Adolescence*, 21, 158-181. doi: 10.1177/0272431601021002002
- Anderson, E.S., Wojcik, J.R., Winett, R.A., & Williams, D.M. (2006). Social-cognitive determinants of physical activity: The influence of social support, self-efficacy, outcomes expectations, and self-regulation among participants in a church-based health promotion study. *Health Psychology*, 25, 510-520. doi: 10.1037/0278-6133.25.4.510
- Andersson, E.K., & Moss, T.P. (2011). Imagery and implementation intention: A randomised controlled trial of interventions to increase exercise behaviour in the general population. *Psychology of Sport and Exercise*, 12, 63-70. doi: 10.1016/j.psychsport.2010.07.004
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215. doi: 10.1037/0033-295X.84.2.191
- Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T.C. Urdan (Eds.). *Self-Efficacy Beliefs of Adolescents* (pp.307-337). Greenwich, CT: Information Age.
- Baranowski, T., Anderson, C., & Carmack, C. (1998). Mediating variable framework in physical activity interventions: How are we doing? How might we do better? *American Journal of Preventive Medicine*, 15, 266-297. doi: 10.1016/S0749-3797(98)00080-4

PHYSICAL ACTIVITY POSSIBLE SELVES

Canadian Society for Exercise Physiology. (2011). *Canadian physical activity guidelines*.

Retrieved April 7th, 2011 from <http://www.csep.ca/CMFiles/Guidelines/CSEP-InfoSheets-adults-ENG.pdf>.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New Jersey: Lawrence Erlbaum Associates.

Colley, R.C., Garriguet, D., Janssen, I., Craig, C., Clarke, J., & Tremblay, M.S. (2011). Physical activity of Canadian adults: Accelerometer results from the 2007–2009 Canadian Health Measures Survey. *Health Reports*, 22, 7- 14.

Cross, S., & Markus, H. (1991). Possible selves across the life span. *Human Development*, 34, 230-255. doi: 10.1159/000277058

Crowne, D.P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, 24, 349-354.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.

Deci, E.L., & Ryan, R.M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227-268. doi: 10.1207/S15327965PLI1104_01

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology*, 49, 182–185. doi: 10.1037/a0012801

PHYSICAL ACTIVITY POSSIBLE SELVES

Evans, J.R., & Mathur, A. (2005). The value of online surveys. *Internet Research, 15*, 195-219.

doi: 10.1108/10662240510590360

Fortier, M. S., Wiseman, E., Sweet, S. N., O'Sullivan, T. L., Blanchard, C. M., Sigal, R. J., & Hogg, W. (2011). A moderated mediation of motivation on physical activity in the context of the Physical Activity Counseling randomized control trial. *Psychology of Sport and Exercise, 12*, 71-78. doi: 10.1016/j.psychsport.2010.08.001

Gionet, N.J., & Godin, G. (1989). Self-reported exercise behavior of employees: A validity study. *Journal of Occupational Medicine, 31*, 969-973.

Godin, G., & Shephard, R.J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Science, 10*, 141-146.

Harju, B.L., & Reed, J.M. (2003). Potential clinical implications of implicit and explicit attitudes within possible exercise selves schemata: A pilot study. *Journal of Clinical Psychology in Medical Settings, 10*, 201-208. doi: 10.1023/A:1025414913130

Hock, M. F., Deshler, D. D., & Schumaker, J. B. (2002). Nurturing possible selves in student-athletes through peer interactions: Surfacing academic, athletic, and personal goals. Manuscript in preparation.

Hock, M. F., Deshler, D. D., & Schumaker, J. B. (2006). Enhancing student motivation through the pursuit of possible selves. In C. Dunkel & J. Kerpelman (Eds.), *Possible selves: Theory, research and applications* (pp. 205–221). Hauppauge, NY: Nova.

PHYSICAL ACTIVITY POSSIBLE SELVES

- Hooker, K., & Kaus, C.R., (1992). Possible selves and health behaviors in later life. *Journal of Aging and Health, 4*, 390-411. doi: 10.1177/089826439200400304
- Hooker, K. & Kaus, C.R. (1994). Health-related possible selves in young and middle adulthood. *Psychology and Aging, 9*, 126-133. doi: 10.1037/0882-7974.9.1.126
- Hoyle, R.H., & Sherrill, M.R. (2006). Future orientation in the self-system: Possibles selves, self-regulation, and behavior. *Journal of Personality, 74*, 1673-1696. doi: 10.1111/j.1467-6494.2006.00424.x
- Huck, S. W., & McLean, R. A. (1975). Using a repeated measures ANOVA to analyze data from a pretest-posttest design: A potentially confusing task. *Psychological Bulletin, 82*, 511-518
- 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.
- Kahn, E.B., Ramsey, L.T., Brownson, R.C., Heath, G.W., Howze, E.H., Powell, K.E., Stone, E.J., Rajab, M.W., & Corso, P. (2002). The effectiveness of interventions to increase physical activity: A systematic review. *American Journal of Preventive Medicine, 22*, S73-S107. doi: org/10.1016/S0749-3797(02)00434-8
- Karoly, P. (1993). Mechanisms of self-regulation: A systems view. *Annual Review of Psychology, 44*, 23-52. doi: 10.1146/annurev.ps.44.020193.000323

PHYSICAL ACTIVITY POSSIBLE SELVES

- Katzmarzyk, P. T. (2010). Physical activity, sedentary behavior, and health: paradigm paralysis or paradigm shift? *Diabetes*, *59*, 2717–2725. <http://dx.doi.org/10.2337/db10-0822>
- Kwekkeboom, K. L. (2000). Measuring imaging ability: psychometric testing of the imaging ability questionnaire. *Research in Nursing and Health*, *23* 301-309. doi: 10.1002/1098-240X(200008)
- Layous, K., Nelson, S.K., & Lyubomirsky, S. (2012). What is the optimal way to deliver a positive activity intervention? The case of writing about one's best possible selves. *Journal of Happiness Studies*, 1-20. doi: 10.1007/s10902-012-9346-2
- Leary, M. R., & Price Tangney, J. (2003). The self as an organizing construct in the behavioral and social sciences. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 3-14). New York: Guilford Press.
- Luszczynska, A. (2006). An implementation intentions intervention, the use of planning strategy, and physical activity after myocardial infarction. *Social Science & Medicine*, *62*, 900-908. doi: 10.1016/j.socscimed.2005.06.043,
- Luszczynska, A., Sobczyk, A., & Abraham, C. (2007). Planning to lose weight: Randomized controlled trial of an implementation intention prompt to enhance weight reductions among overweight and obese women. *Health Psychology*, *26*, 507-512. doi: 10.1037/0278-6133.26.4.507
- Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist*, *41*, 954-969. doi: 10.1037/0003-066X.41.9.954

PHYSICAL ACTIVITY POSSIBLE SELVES

- Markus, H., & Nurius, P. (1987). Possible selves: The interface between motivation and the self-concept. In K. Yardley & T. Honess (Eds.), *Self and Identity: Psychosocial perspectives* (pp.157-172). Oxford, England: John Wiley & Sons.
- Markus, H., & Ruvolo, A. (1989). Possible selves: Personalized representations of goals. In L.A. Pervin (Ed.). *Goal Concepts in Personality and Social Psychology* (pp. 211-237). New Jersey: Lawrence Erlbaum Associates.
- McAuley, E., & Mihalko, S. L. (1998). Measuring exercise-related self-efficacy. In J. L. Duda (Ed.), *Advances in sport and exercise psychology measurement* (pp.371–381). Morgantown, WV: Fitness Information, Inc.
- McElwee, R.O., & Haugh, J.A. (2010). Thinking clearly versus frequently about the future self: Exploring this distinction and its relation to possible selves. *Self and Identity*, 9, 298-321. doi: 10.1080/15298860903054290
- Miller, D.J., Freedson, P.S., & Kline, G.M. (1994). Comparison of activity levels using the Caltrac I accelerometer and five questionnaires. *Medicine and Science in Sports and Exercise*, 26, 3, 376-382.
- Milne, M.I., Rodgers, W.M., Hall, C.R., & Wilson, P.M. (2008). Starting up or starting over: The role of intentions to increase and maintain the behaviour of exercise initiates. *Journal of Sport and Exercise Psychology*, 30, 285-301.
- Murray T.C., Rodgers, W.M., & Fraser, S.N. (2009). Examining implementation intentions in an exercise intervention: The effects on adherence and self-efficacy in a naturalistic setting.

PHYSICAL ACTIVITY POSSIBLE SELVES

- Journal of Applied Social Psychology*, 39, 2303-2320. doi: 10.1111/j.1559-1816.2009.00527.x
- Murru, E., & Martin Ginis, K.A. (2010). Imagining the possibilities: The effects of a possible selves intervention on self-regulatory efficacy and exercise behavior. *Journal of Sport and exercise psychology*, 32, 537-554.
- Norman, C.C., & Aron, A. (2003). Aspects of possible selves that predict motivation to achieve or avoid it. *Journal of Experimental Social Psychology*, 39, 500-507. doi: 10.1016/S0022-1031(03)00029-5
- Ouellette, J.A., Hessling, R., Gibbons, F.X., Reis-Bergan, M., & Gerrard, M. (2005). Using images to increase exercise behaviour: Prototypes versus possible selves. *Personality and Social Psychology Bulletin*, 31, 610-620. doi: 10.1177/0146167204271589
- Oyserman, D., Brickman, D., & Rhodes, M. (2007). School success, possible selves, and parent school involvement. *Family Relations*, 56, 479-489. doi: 10.1111/j.1741-3729.2007.00475.x
- Oyserman, D., Bybee, D., & Terry, K. (2006). Possible selves and academic outcomes: How and when possible selves impel action. *Journal of Personality and Social Psychology*, 91, 188-204. doi: 10.1037/0022-3514.91.1.188
- Oyserman, D., Bybee, D., Terry, K., & Hart-Johnson, T. (2004). Possible selves as roadmaps. *Journal of Research in Personality*, 38, 130-149. doi: 10.1016/S0092-6566(03)00057-6
- Oyserman, D., & Markus, H. (1990). Possible selves and delinquency. *Journal of Personality and Social Psychology*, 59, 112-125. doi: 10.1037/0022-3514.59.1.112

PHYSICAL ACTIVITY POSSIBLE SELVES

- Oyserman, D., Terry, K., & Bybee, D. (2002). A possible selves intervention to enhance school involvement. *Journal of Adolescence, 25*, 313-326. doi: 10.1006/jado.2002.0474
- Paffenbarger, R.S. Jr., Hyde, R.T., Wind, A.L., & Hsieh, C.C. (1986). Physical activity, all-cause mortality, and longevity of college alumni. *New England Journal of Medicine, 314*, 605-613.
- Pallant, J. (2007). *SPSS survival manual: A step by step guide to data analysis using SPSS* (3rd ed.). New York: Open University Press.
- Ransdell, L.B., Dinger, M.K., Huberty, J., & Miller, K.M. (2009). *Developing effective physical activity programs* (pp. 3-12). Champaign, IL: Human Kinetics.
- Richert, J., Lippke, S., & Ziegelmann, J. P. (2011). Intervention–engagement and its role in the effectiveness of stage-matched interventions promoting physical exercise. *Research in Sports Medicine, 19*, 145-161. doi: 10.1080/15438627.2011.583164
- Schwarzer, R., Luszczynska, A., Ziegelmann, J.P., Scholz, U., & Lippke, S. (2008). Social-cognitive predictors of physical exercise adherence: Three longitudinal studies in rehabilitation. *Health Psychology, 27*, S54-S63. doi: 10.1037/0278-6133.27.1(Suppl.).S54.
- Sniehotta, F.F., Schwarzer, R., Scholz, U., & Schuz, B. (2005). Action plans and coping plans for long term lifestyle change: Theory and assessment. *European Journal of Social Psychology, 35*, 565-576. doi: 10.1348/135910705X43804

PHYSICAL ACTIVITY POSSIBLE SELVES

- Strachan, S.M., Brawley, L. R., Spink, K.S., & Jung, M.E. (2009). Strength of exercise identity and identity-exercise consistency: Affective and social cognitive relationships. *Journal of Health Psychology, 14*, 1196-1206. doi: 10.1177/1359105309346340
- Strachan, S.M., Woodgate, J., Brawley, L.R., & Tse, A. (2005). The relationship of self-efficacy and self-identity to long-term maintenance of vigorous physical activity. *Journal of Applied Biobehavioral Research, 10*, 98-112. doi: 10.1111/j.1751-9861.2005.tb00006.x
- Strahan, E.J., & Wilson, A.E. (2006). Temporal comparisons, identity, and motivation: The relation between past, present, and possible future selves. In C. Dunkel & J. Kerpelman (Eds.). *Possible selves: Theory, research and application* (pp. 1-15). New York: Nova Science Publishers.
- Strahan, R., & Gerbasi, K.C. (1972). Short, homogenous versions of the Marlowe-Crowne social desirability scale. *Journal of clinical Psychology, 28*, 191-193. doi: 10.1002/1097-4679(197204)28:2<191::AID-JCLP2270280220>3.0.CO;2-G
- Strathman, A., Gleicher, F., Boninger, D.S., & Edwards, S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behavior. *Journal of Personality and Social Psychology, 66*, 742-752. doi: 10.1037/0022-3514.66.4.742
- Tabachnick, B.G., & Fidell, L.S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Allyn and Bacon.
- Vincent, W.J. (2005). *Statistics in kinesiology* (3rd ed.). Champaign, IL: Human Kinetics.

PHYSICAL ACTIVITY POSSIBLE SELVES

Whaley, D. E. (2003). Future-oriented self-perceptions and exercise behavior in middle-aged women. *Journal of Aging and Physical Activity, 10*, 306-322.

Whaley, D.E., & Schrider, A.F. (2005). The process of adult exercise adherence: Self-perceptions and competence. *The Sport Psychologist, 19*, 148-163.

Wright, K.B. (2005). Researching Internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of Computer-Mediated Communication, 10*, 00.
doi: 10.1111/j.1083-6101.2005.tb00259.x

Ziegelmann, J.P., Lippke, S. & Schwarzer, R. (2006). Adoption and maintenance of physical activity: Planning interventions in young, middle-aged, and older adults. *Psychology and Health, 21*, 145-163. doi: 10.1080/1476832050018891

Zimmerman, B. J. (1990). 'Self-regulated learning and academic achievement: An overview.'
Educational Psychologist, 25, 3-17.

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 1: Means and Standard Deviations of all Outcome Variables

Means and standard deviations of all conditions on the outcome variables

Immediate Outcomes At Time 1	Control Condition (n=86)	Standard Condition (n=81)	Self-regulatory Condition (n=77)	Total (n=244)
Task self-efficacy (SD)	6.53 (2.33)	6.26 (2.53)	6.46 (2.55)	6.42 (2.46)
Self-regulatory efficacy (SD)	6.48 (1.72)	6.47 (1.80)	6.50 (1.96)	6.48 (1.82)
PA intentions (SD)	5.63 (1.16)	5.74 (1.43)	5.82 (1.31)	5.73 (1.30)
MVPA over four week follow-up ¹	n = 78	n = 71	n = 69	n = 218
		7.63 (6.98)	8.33 (7.00)	
MVPA four weeks post intervention (SD)	6.03 (5.23)	Combined conditions (n = 140)		7.28 (6.46)
		7.98 (6.99)		

Note. PA = physical activity

¹ Analyses on MVPA measured four weeks post-intervention had fewer participants due to participant attrition.

Chapter V: Supplemental Analyses

This section presents the results of analyses that pertain to the research questions posed within the thesis but that were not included in the article chapter.

Descriptive Statistics

While descriptive statistics are described in the article, please see Table 2 for more detailed information on these statistics and baseline variables.

Manipulation Check

Word count. The t -test results comparing the two intervention groups on responses to the eight descriptive follow-up questions showed that there was no significant difference in the total word count, $t(156) = .172, p = .863, \eta^2 < 0.01$, with the mean word count being 89.64 ($SD = 54.39$) and 88.21 ($SD = 49.47$) for the standard and self-regulatory conditions, respectively. Since the participants in the self-regulatory condition were presented with two additional “how to” questions, they did ultimately elaborate more on their possible selves. Comparing the self-regulatory condition participants’ total word count ($M = 117.98; SD = 61.67$) to that of the standard condition participants 89.64 ($SD = 54.39$), the difference becomes significant, $t(156) = -3.058, p = .003, \eta^2 = 0.057$ (small-moderate effect).

Count of action and coping planning strategies. The t -test comparing the intervention conditions on their total number of action and coping plans described in response to the eight *description* follow-up questions showed no significant difference ($t(156) = -5.58; p = .578$). However, a second t -test, differing only by the inclusion of the self-regulatory condition participants’ responses to the two “how to” questions, showed a significant difference between

PHYSICAL ACTIVITY POSSIBLE SELVES

the two intervention conditions ($t(156) = -5.928; p < .00$); those in the self-regulatory condition provided on average 5.35 plans ($SD = 3.79$) while those in the standard condition wrote 2.33 plans ($SD = 2.50$). The mean difference was 3.02 (95% CI: 2.01 to -4.02), with a small- effect size ($\eta^2 = .18$).

Main Analyses

A note about the PA intentions measures: While the participants responded to the several intention items listed in the main measures section, only responses to “Do you intend to increase your current activity level?” (Milne et al., 2008) were used in analyses, both as an outcome variable and as a potential covariate. This is because the participant conditions did not lead to differential outcomes on the intention measures asked. Thus, to simplify the analyses, only one intention item was used-that which best reflected the goal of this study – to increase participants’ PA intentions.

Research question 1.A. – Comparison of conditions on immediate and follow-up measures.

For more detailed information on the results presented in the article, please see Table 3 (PA task self efficacy), Table 4 (self-regulatory and PA intentions results), Table 5 (PA four weeks post intervention across all conditions), and Table 6 (PA four weeks post intervention with the control and collapsed intervention conditions).

1.A.2. Action planning at 2 and 4 weeks. A one-way, 3x 2, mixed between-within subjects ANCOVA with repeated measures was conducted to examine between-group differences on degree of action planning two and four weeks post-intervention. Baseline MVPA was entered as a covariate. Baseline MVPA was a significant covariate effecting action planning,

PHYSICAL ACTIVITY POSSIBLE SELVES

$F(1, 209) = 6.248, p = .013, \text{partial } \eta^2 = .029$. After taking this into account, there was no significant main effect for participant condition, $F(2, 209) = .119, p = .888, \text{partial } \eta^2 = .001$ or for time on action planning, $F(1, 209) = .156, p = .693, \text{partial } \eta^2 = .001$. There were no interaction effects. Means and standard deviations are presented in Table 7.

1.A. 2. Coping planning at 2 and 4 weeks. A one-way, 3 x 2, mixed between-within subjects ANCOVA with repeated measures was conducted to examine between-group differences on degree of coping planning two and four weeks post-intervention. Baseline MVPA and imagery ability were entered as potential covariates. Baseline MVPA was a significant covariate effecting action planning, $F(1, 208) = 9.838, p = .002, \text{partial } \eta^2 = .045$, as was imagery ability, $F(1, 208) = 6.490, p = .012, \text{partial } \eta^2 = .030$. After taking this into account, there was no significant main effect for participant condition, $F(2, 208) = 1.165, p = .314, \text{partial } \eta^2 = .011$ nor for time on coping planning, $F(1, 208) = .585, p = .445, \text{partial } \eta^2 = .003$. There were no interaction effects. Means and standard deviations are presented in Table 7.

1.B. Comparison between the intervention conditions.

Physical activity possible self self-efficacy. A one-way ANCOVA was conducted to assess just the two intervention conditions' differential effects on participants' self-efficacy to achieve their PA possible self. Imagery ability, CFC, and BMI were entered as potential covariates. No assumptions were violated for this analysis. The covariate imagery ability had a significant effect on the dependent variable, $F(1, 157) = 8.781, p = .004, \text{partial } \eta^2 = .054$, as did CFC, $F(1, 157) = 5.358, p = .022, \text{partial } \eta^2 = .034$. Taking the covariates into account, there was no main effect for participant condition, $F(1, 157) = 2.19, p = .141, \text{partial } \eta^2 = .014$. Means and standard deviations can be seen in Table 8.

PHYSICAL ACTIVITY POSSIBLE SELVES

Perceived importance of achieving one's physical activity possible self. A one-way ANCOVA was used to assess just the two intervention conditions' differential effects on participants' perceived importance of achieving their PA possible self. Age was entered as a covariate. There was no main effect for participant condition, $F(1, 157) = .511, p = .476$, partial $\eta^2 = .003$. Means and standard deviations can be seen in Table 8.

Research question 2. – Action and coping planning as potential mediators between participant condition and PA at 4 weeks.

Please see Table 9 showing the variables used for each mediation analysis, including the covariates and moderators.

Action planning. The regression analyses indicated that action planning two weeks post intervention did not mediate the relationship between participant condition and PA four weeks post-intervention. The first regression confirmed that participant condition was significantly related with PA four weeks post intervention, $\beta = .146, p = .021$, even after controlling for covariates (baseline PA was the only significant covariate, $\beta = .350, p = .000$). Thus, the first condition of mediation was satisfied: the independent variable was related to the dependent variable. The second condition in which the independent variable should relate to the proposed mediator was not satisfied, however, as the regression between participant condition and action planning at two weeks was not significant, $\beta = -.061, p = .364$. The final regression showed a significant relationship between action planning at two weeks and PA at four weeks, $\beta = .215, p = .001$, satisfying the third condition where the proposed mediator should relate to the dependent variable. Baseline PA was a significant covariate, $\beta = .316, p = .000$, while age, BMI and marital status had no significant effects on the outcome. The same regression showed that the

PHYSICAL ACTIVITY POSSIBLE SELVES

relationship between participant condition and PA four weeks post intervention was not reduced, but was in fact greater, when action planning at two weeks was entered into the model. Thus, the fourth condition of mediation was not satisfied. Please see Figure 1 for a representation of the model tested and Table 10 for the mediation analysis results.

Coping planning. The regression analyses indicated that coping planning two weeks post intervention did not mediate the relationship between participant condition and PA four weeks post intervention. The first regression, which satisfied the first condition, was identical to the first regression in the action planning mediation reported above. The second condition was not satisfied, however, as participant condition was not significantly related with coping planning at two weeks ($\beta = -.083$, $p = .209$) after taking the significant covariates into account, $\beta = .197$, $p = .007$. Therefore, the meditational relationship does not exist. The final regression showed a significant relationship between coping planning at two weeks and PA at four weeks, satisfying the third condition, $\beta = .236$, $p = .000$. Baseline PA was a significant covariate in this model, $\beta = .299$, $p = .000$, while age, BMI and marital status did not significantly affect the outcome variable. This regression illustrated that the fourth condition was not satisfied as the relationship between participant condition and PA four weeks post intervention was not reduced, but was greater when coping planning at two weeks was entered into the model, $\beta = .160$, $p = .010$. The fourth condition of mediation was not satisfied. Please see Figure 2 for a representation of the model tested and Table 11 for the mediation analysis results.

Chapter VI: General Discussion

This study is the first to examine whether a *self-regulatory* PA hoped for possible selves intervention leads to increased intervention effectiveness in terms of its impact on self-regulatory variables and PA as compared to a standard possible selves intervention and a control condition. Through mediation analyses the present study also examined, in the PA context, whether action and coping planning act as mechanisms by which PA possible selves interventions affect MVPA; identifying such mechanisms has been recognized as a need in possible selves research (Hoyle & Sherrill, 2006). Novel elements of this study also include the use of online rather than in-person delivery, the focus on PA rather than exercise, and the examination of intervention effectiveness in a broader sample of adults as opposed to university students who comprised the samples in previous research.

The current findings provide support for the effectiveness of a PA possible selves intervention on MVPA; as hypothesized, four weeks following the intervention, self-reported MVPA levels were modestly but significantly greater for participants in the intervention conditions (when these conditions were combined) as compared to those in the control condition. Contrary to our hypothesis, however, the self-regulatory condition did not offer additional benefit over the standard condition. Furthermore, there were no significant between-group differences on the various self-regulatory outcomes, and the hypothesized mediational roles of action and coping planning between the intervention and PA were not found at four weeks post-intervention.

Comparing Conditions

The self-regulatory condition did not have a superior effect on study outcomes as compared to the standard condition. First, these two conditions did not differ on any self-regulatory or PA outcomes. This finding is surprising; the generation of a possible self that is more elaborate, such as one including strategies for achieving it (a self-regulatory possible self) was the intent of the of the self-regulatory condition and is theorized to help participants “organize and energize” their behaviours to approach this self (Markus & Ruvolo, 1989, pg. 219). Past correlational (Oyserman et al., 2004) and experimental (e.g., Hock et al., 2002, as cited in Hock et al., 2006; Oyserman et al., 2002; 2006) research has also demonstrated this benefit of *self-regulatory* possible selves over standard or *self-enhancing* possible selves (Oyserman et al., 2004).

It is worth noting that the difference in PA four weeks post-intervention between the two intervention conditions did approach significance ($p = .077$). On average, the participants in the standard condition engaged in 7.63 (SD = 6.98) weekly sessions of at least 15 minutes of MVPA over the four weeks post-intervention, while for the self-regulatory condition, MVPA levels averaged 8.33 (SD = 7.00; see Table 5) weekly sessions. Further, after controlling for baseline PA, those in the self-regulatory condition increased their MVPA by roughly 1.25 weekly sessions more than did those in the standard condition (their increase was of an average of 3.21 sessions and 1.97 sessions, respectively). These near-to-significant differences in PA suggest that the self-regulatory condition *may* have modestly superior effects on PA; further research is needed to determine the validity of this suggestion.

A possible explanation for the present findings is that in the PA domain a self-regulatory possible selves intervention may not be associated with superior effects. Given that theory and

PHYSICAL ACTIVITY POSSIBLE SELVES

research in other domains support the superior impact of self-regulatory possible selves it seems prudent, however, to carefully consider alternative explanations for the failure of the self-regulatory condition to yield superior findings over the standard condition before conclusions are drawn about efficacy.

It is possible that the intervention protocol used in this study was ineffective at bringing about a *self-regulatory* possible self. Participants in both intervention conditions answered eight questions prompting them to reflect upon their PA possible selves. Within the instructions for answering these questions, standard intervention participants were asked to merely *describe* their PA possible self; self-regulatory condition participants were asked not only to describe both their PA possible self but also how they would attain this self. If self-regulatory participants did describe “how to” information in addition to a general description of their possible self (which was the intent of the self-regulatory image generation task) they likely would have written more words than the standard condition participants yet there was no difference in words provided when intervention conditions were compared. This subtle difference in instruction designed to elicit a self-regulatory possible self in the case of the self-regulatory condition may not have led to the formation of self-regulatory possible selves.

As another attempt to prompt the formation of self-regulatory possible selves among self-regulatory condition participants, these participants were asked to answer two additional questions about their PA possible selves, which prompted participants to reflect upon and write about steps they would take to move towards their possible selves. When these additional items were taken into consideration, participants in the self-regulatory condition did provide, overall, more words about their PA possible self ($p = .003$). While this finding is not surprising since the self-regulatory condition participants responded to two additional questions, it does confirm that

PHYSICAL ACTIVITY POSSIBLE SELVES

intervention attempts to promote greater description in the self-regulatory condition were successful.

In addition to examining the total word count, the extent to which self-regulatory condition participants' responses to the two additional items contained self-regulatory content was also examined. Not surprisingly, these additional prompts resulted in the self-regulatory participants providing more planning information than did the standard condition participants. This finding suggests that the addition of the follow up questions asking participants to describe steps and strategies for achieving their possible selves and for overcoming challenges to achieving these selves may have resulted in the self-regulatory condition participants forming possible selves that were more self-regulatory in nature and as such, may be an effective component of self-regulatory possible selves elicitation procedures. Still, future PA self-regulatory possible selves research may need to provoke a greater level of possible self elaboration than did the present study in order to see superior intervention effects over a standard intervention condition. One way of doing so may be to implement a more explicit action and coping planning protocol that yields more in depth plans. For example, although participants in the current study were asked to think about the various elements of action planning (e.g., where, when, and with whom they would engage in behaviours that would advance them towards their possible selves), the participants were not explicitly asked to write about *each* element. If they had been asked to do so, they may have elaborated more on each element. The creation of action plans has been shown to positively relate to PA in correlational and experimental PA research (Luszczynska, 2006; Sniehotta et al., 2005). Borrowing this type of action plan protocol may provide an effective means of engaging in in-depth planning for achieving one's possible self, thus eliciting a more *self-regulatory* possible self than the protocol used in the present study.

PHYSICAL ACTIVITY POSSIBLE SELVES

Possible selves research by Hock et al. (2002, as cited in Hock et al., 2006) provides an example of the level of possible self elaboration that may be necessary to elicit effective self-regulatory possible selves. These researchers had university student-athletes think about, describe, and visually represent (as a sketch of a tree and its surroundings) their hoped for, expected, and feared possible selves. Next, the participants reflected upon specific ways to achieve their hoped-for possible selves and developed action plans to approach them, including short-term goals. Compared to the control participants, those who received the intervention identified more life goals of a higher degree of specificity, earned higher GPAs, and had a higher rate of graduation. Perhaps this more in-depth action planning related to achieving the possible selves was a key element of the program's success. It should be noted that the study by Hock and colleagues did not compare a more elaborate possible selves condition to a less elaborate one; the only comparison condition was a control condition. It is unknown if their elaborate possible selves intervention (which included a focus on self-regulation towards the possible self) was superior to a more standard possible selves condition which does not involve a focus on self-regulatory possible selves. However, the elaborate protocol in their study yielded success as measured by several outcomes and it is possible that self-regulatory possible selves were elicited and responsible for the positive outcomes observed.

The Effects of the Intervention on MVPA over the 4 Weeks Post-Intervention

When the two PA possible selves intervention conditions were combined, significantly more MVPA over follow-up was observed when compared to the control condition. The difference in PA levels amounts to roughly two sessions of MVPA of 15 minutes or more per week, equalling at least 30 additional minutes of MVPA for those in the intervention conditions, weekly. While the effect size is small (partial $\eta^2 = .02$; Cohen, 1988, pp. 22), in practical terms, it

PHYSICAL ACTIVITY POSSIBLE SELVES

would help participants meet or approach Canada's PA guidelines (CSEP, 2011) of accumulating 150 minutes of MVPA per week. At baseline, the participants had engaged in an average of at least 83 minutes of MVPA per week over the past year. Increasing this by at least 30 minutes per week would help them to approach the PA guidelines. Further, the observed increase in PA is beneficial regardless of whether or not it led to participants meeting the PA guidelines given epidemiological evidence of inverse dose-response relationships between PA levels and all cause mortality (Paffenbarger, Hyde, Wing, & Hsieh, 1986, in Katzmarzyk, 2010). As was found in past research, (Murru & Martin Ginis, 2010; Ouellette et al., 2005) the current intervention led to increases in PA over the four weeks following a PA possible selves intervention with just a single manipulation session. Different measurement techniques between the studies make drawing a precise comparison of the results challenging, but together, the findings of these studies provide converging support for a modest but consistent positive effect of PA possible selves interventions on levels of PA.

Overall, these PA findings support the theorized effect of hoped-for possible selves – that developing a hoped-for possible self in a certain domain can encourage individuals to engage in behaviour that brings them closer to attaining this self (Markus & Nurius, 1986). Returning to the possible selves framework (Marks & Nurius, 1986), the vivid cognitive self-representations may have provided incentive that motivated and guided the participants' behaviour, or they may have served as standards against which participants compared their current behaviour. When a discrepancy exists between one's actual behaviour and that required to attain their possible self, individuals try to decrease the resulting negative affect by altering their behaviour to approach their possible self (Cross & Markus, 1991; Markus & Nurius, 1986). Given that the present study did not assess the incentive value of the possible self or perceptions of discrepancy between

PHYSICAL ACTIVITY POSSIBLE SELVES

current and possible selves, these explanations for how the intervention led to increases in PA remains theoretical. In the future, assessment of these theoretically-sound explanations is warranted.

The Effects of the Intervention on Self-Regulatory Variables

While possible selves provide incentive for behaviour, individuals need to self-regulate in order to behave in accordance with their possible self (Cross & Markus, 1991). Therefore, the effect of possible selves on behaviour is posited to be preceded by the use of self-regulatory processes (Cross & Markus, 1991; Markus, Cross & Wurf, 1990). The association between self-regulatory processes and health behaviours has been shown (Hooker & Kaus, 1992). Although limited PA research has addressed the impact of possible selves interventions on self-regulatory variables, past findings suggest that these interventions can increase self-regulatory efficacy, both barrier and planning (Murru & Martin Ginis, 2010). A contribution of the present study is that it examined the impact of a possible selves intervention on a variety of self-regulatory variables, however no between-group differences on these variables were identified. These results are surprising given that the intervention resulted in group differences on PA levels over the four weeks after the intervention. There are several factors that may help explain why, in the present study, self-regulatory variables did not differ between intervention groups.

Self-efficacy. One past study supports an ameliorative effect of a PA possible selves intervention on self-efficacy (barriers and planning self-efficacy; Murru & Martin Ginis, 2010). This finding supports theory; possible selves interventions may provide an imaginal experience which is a known self-efficacy source (Bandura, 1997). This finding was not replicated in the present study. The online nature of the intervention may have been less likely to elicit a vivid

PHYSICAL ACTIVITY POSSIBLE SELVES

image of one's PA possible self as compared to a laboratory-based approach such as that of Murru & Martin Ginis (2010), in turn serving as a poor source of self-efficacy. Indeed, lab interventions allow for interaction between the interviewer and the participant and the opportunity for explanation and clarification of procedures (Hooker & Kaus, 1992; Packard & Conway, 2006). Additionally, it is suggested that participants will offer more complete responses when in the presence of a researcher (Packard & Conway, 2006) which in the present case, may result in the generation of a more elaborate possible self. Clearly, in the current online intervention, was at a disadvantage when it came to providing opportunities for clarification and interaction which may have influenced the vividness of the possible self images generated by participants. Modifying the online protocol to allow for more contact with the researcher and to have participants create a more vivid possible self may increase the effectiveness of such interventions.

Another difference between the Murru and Martin Ginis (2010) study and the current intervention is that in their study, the intervention condition participants were reminded daily through their PA logs to think about the possible selves they had created. These daily prompts, not present in current study, may have resulted in a stronger image which may have been enough to promote greater self-regulatory efficacy among the intervention condition participants. As such, they may be an important addition to the intervention.

Further, perhaps differences in self-efficacy outcomes were not identified between the conditions in the present study due to the use of a general measure of self-regulatory efficacy. In past research, possible selves interventions were shown to impact some aspects of self-regulatory efficacy (i.e. barrier and planning) but not others (Murru & Martin Ginis, 2010). If this is the

PHYSICAL ACTIVITY POSSIBLE SELVES

case, the impact of the current intervention on some forms of self-regulatory efficacy may have been muted by those which were not influenced by the intervention.

Past exercise possible selves research has shown that participants' "perceptions of competence" (Whaley & Schrider, 2005, pp. 158), or self-efficacy for exercise can be positively influenced by a variety of factors, including feedback from significant others and comparison to other individuals or oneself (Whaley & Schrider, 2005). Perhaps these elements and other suggested sources of self-efficacy from self-efficacy theory need to be incorporated into possible selves interventions to help bolster participants' self-efficacy to pursue their PA possible selves.

Intentions to increase physical activity. Given that possible selves are thought to motivate behaviour (Markus & Nurius, 1986), it is especially surprising that differences in intentions – a recognized measure of quantity of motivation (Ajzen, 1991; Fortier et al., 2011) - did not emerge when conditions were compared. As with self-efficacy, if the intervention did not result in a vivid image that was deeply processed, the image may have lacked enough incentive value to lead to increased intentions to pursue the possible self. Again, another consideration concerns the frequency with which the participants were exposed to the intervention tasks, and perhaps how long the possible self stayed relevant to the participants. Possible selves theory states that when these selves are brought into one's working memory, they become activated and will motivate the individual to attain/avoid their hoped-for/feared self (Markus and Nurius, 1987). Norman and Aron's (2003) findings support this rationale; the more that the participants in their study thought about their hoped-for possible selves, the more motivation they had to attain these selves. Perhaps having participants reflect on their possible selves more frequently could increase intentions for PA.

PHYSICAL ACTIVITY POSSIBLE SELVES

Even with such an added component, however, intentions may still not be significantly impacted. Despite recruiting participants who did not meet the PA guidelines according to screening measures (CSEP, 2011), participants reported intentions for levels of PA that would meet these guidelines. Perhaps the failure of the intervention to impact intentions is due to intentions being so high at baseline ($X = 5.48$ sessions per week) that there was little room for them to increase. At baseline, several participants also reported having engaged in more PA in a typical week than they had reported at eligibility screening. For a possible self to be motivating (lead to intended PA), there must be a discrepancy between one's current state and their possible self (Markus & Nurius, 1986), which may not have been the case for some participants.

Perceived importance of and self-efficacy to attain one's physical activity possible self. Contrary to hypotheses, the self-regulatory condition participants did not rate attaining their PA possible selves as more important nor did they express greater efficacy to attain these selves than did the participants in the standard condition. Participants of both interventions rated these variables strongly. On a 7-point scale with seven representing 'very important' or 'completely capable', the mean response for importance was 6.05 ($SD = 1.20$) and 5.88 ($SD = 1.27$) for those in the standard and self-regulatory conditions respectively; scores on efficacy were 5.53 ($SD = 1.17$) and 5.25 ($SD = 1.41$) for the standard and self-regulatory conditions respectively. These findings suggest that the formation of self-regulatory possible selves (self-regulatory condition) did not result in higher PA possible self self-efficacy or importance ratings than did the standard condition. In retrospect, the self-regulatory conditions' focus on *how to* achieve the possible self may not have impacted perceived importance. However, reflection upon *how to* information among self-regulatory condition participants theoretically should have impacted self-efficacy ratings for achieving one's possible self; this exercise could have served as a form of

PHYSICAL ACTIVITY POSSIBLE SELVES

visualization which is a self-efficacy source (Bandura, 1997). Indeed, self-regulatory condition participants provided more planning information than standard participants which should have served as a targeted source of efficacy. If self-regulatory condition participants had provided even more planning information in concert with their generated image, the possible self may have been more vivid and in turn, a stronger source of self-efficacy. Still, it is encouraging that as a whole, intervention participants perceived high levels of efficacy to achieve their possible selves and that the achievement of these selves was important. These strong perceptions *may* have contributed to the increase in PA exhibited by the intervention participants over the course of the study. However, given the present design, this suggestion is only speculative. Design aspects did not allow for the measurement of baseline ratings of importance or possible selves self-efficacy or a comparison to controls so it is not possible to attribute high levels of these variables to the intervention.

Action and coping planning. Contrary to hypotheses, there were no group differences in the amount of participants' self-reported action and coping planning at two and four weeks post intervention. Given that neither of the intervention conditions led to increased planning above that of the control condition, it is not surprising that planning did not mediate the positive relationship between the intervention and PA levels. Overall, this lack of significant findings was unexpected, as possible selves have been theorized to facilitate self-regulation towards attaining an outcome (Cross & Markus, 1991). Additionally, considering Murru and Martin Ginis' (2010) findings that planning *efficacy* played a mediational role between a PA possible selves intervention and PA at follow-up, we reasoned that *actual planning* would also play a mediational role. Furthermore, it is particularly surprising that the self-regulatory condition did not impact planning, as it has been posited that possible selves supported by action strategies

PHYSICAL ACTIVITY POSSIBLE SELVES

have a greater impact on self-regulation than possible selves without such strategies (Markus & Ruvolo, 1989), and research has supported this (e.g., Oyserman et al., 2004).

Action and coping planning, in this study, were simply not among the self-regulatory variables that helped to increase MVPA levels. Perhaps they could have been, however, if a more effective planning protocol had been used. An example is the action and coping planning method used by Hock et al. in an academic setting (2002, as cited in Hock et al., 2006) that was presented earlier. Additionally, had the participants been exposed to several image manipulation sessions (Vandelandotte, Spathonis, Eakin, & Neville, 2007), been asked to reflect daily about their possible selves (e.g., Murru & Martin Ginis, 2010), or perhaps done the intervention in person (Packard & Conway, 2006), they may have reflected more about their possible selves, and developed more detailed action and coping plans.

Further, Ziegelmann, Lippke, and Schwarzer (2006) found that for adults aged 18 to 80 years, action plans that were formed with the help of an interviewer using motivational interviewing techniques were more complete than those developed alone while in the presence of an interviewer (Zieglemann et al., 2006). The same was true of coping planning for adults aged 40 to 80, but for those aged 18 to 39, coping plans were more complete when developed without the help of the interviewer. Both forms of planning were predictive of strenuous exercise at either two week (action planning), four week (coping planning), or six months follow-ups (action and coping planning). Again, this suggests that a face-to-face intervention technique, in this case utilizing motivational interviewing techniques, may be a superior method of having participants form effective self-regulatory PA possible selves. It is also possible that action and coping are simply not strong mediators of the possible selves-PA behaviour relationship, and that other variables play a more significant role in this relationship.

PHYSICAL ACTIVITY POSSIBLE SELVES

Strengths, Limitations, and Future Directions

The current study has a number of strengths. First, the randomized controlled design added strength and rigor to the study (Sibbald & Roland, 1998). This design, in addition to a thorough examination of possible covariates and moderators guiding the careful selection of these variables for each analysis, provided confidence in the results and relationships found. Pilot testing of the materials provided assurance that the participants would be able to comprehend the content. Manipulation checks indicated that participants in both intervention conditions reportedly formed PA possible selves, and responses to the follow-up questions showed that the two conditions were equally effective at provoking these self-representations. Further, additional manipulation procedures that were a part of the self-regulatory condition were successful in yielding planning information as a part of the generated image, which suggests that, to some extent, participants in this condition formed self-regulatory possible selves.

This was the first intervention to examine the added effectiveness of a *self-regulatory* PA possible selves intervention over the standard PA possible selves intervention. This expansion upon the past PA/exercise possible selves intervention research was warranted given that the effectiveness of this type of intervention has been demonstrated. Yet little is known regarding the optimal design and elements to be incorporated to maximize the positive impact of such interventions. Further, the current study made an important contribution by being, the first PA possible selves intervention to utilize an online rather than within-lab delivery. Not only were the positive PA results similar to those of the two exercise possible selves interventions delivered in laboratories (Murru & Martin Ginis, 2010; Ouellette et al., 2005), but the online delivery made the intervention accessible and convenient for the participants while also being economical. Finally, the current study's inclusion of adults from 18 to 64 years of age, inclusively, renders

PHYSICAL ACTIVITY POSSIBLE SELVES

the results more generalizable than those from the past two exercise possible selves interventions which focused on university students. The focus on *PA* participation rather than simply *exercise* participation is also more relatable to individuals currently not meeting PA guidelines.

While this study's strengths should be recognized, its limitations should also be noted and should guide future PA possible selves research. First, males were not well represented in the study making up merely 18% of participants. Furthermore, 38% of men who had completed Time 1 later dropped out, compared to 18% of women, a significant difference ($p = .004$). The tendency for males to be less likely to volunteer than females, in general, is documented (Smith, 2005) and males are more motivated when payment is involved (Gerstein, Wilkeson, & Anderson, 2004). The small compensation provided to participants in the current study (a \$ 10.00 gift card) may have been insufficient to motivate and sustain participation for the majority of male participants. In the future, measures should be taken to recruit and retain more male participants in order to test a PA possible selves intervention with a sample that is more representative of both genders.

Another sample-related limitation relates to the baseline activity level of our sample. Despite participants reporting during eligibility screening that they had engaged in fewer than 90 minutes of MVPA in a typical week over the past year, many participants reported having engaged in more than 90 minutes of MVPA over the past week when PA was assessed at baseline. The reason for this inconsistency is unclear. As one's hoped-for possible selves should function best to promote behaviour change when they are discrepant from their current self and behaviours, if participants in this study were engaged in relatively high levels of MVPA they may not be very sensitive to the intervention.

PHYSICAL ACTIVITY POSSIBLE SELVES

A methodological constraint concerns a limitation associated with the PA measure used, which was the reliable, validated and commonly used Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985). This measure asks participants to report the number of PA sessions per week of *more than 15 minutes in duration*. One session of PA may represent a bout of 16 minutes or it could also represent a substantially longer bout (anything greater than 15 minutes). This provision of a general as opposed to a specific assessment of PA (e.g., total minutes) made it difficult to determine, for example, whether or not the amount of PA reported by participants met or did not meet PA guidelines. However, the demonstrated reliability (Godin & Shepard, 1985) and validity (Jacobs, et al., 1993) of this questionnaire, even against the Caltrac (R) portable accelerometer (Shephard, 2003) suggest that the choice to use this measure was justified. Finally, it must be acknowledged that though reliable and valid, our choice of PA measure is subjective and if possible, future research would benefit from the use of more objective measures of PA.

In the present study, the choice to only examine hoped-for PA possible selves was an informed one. Since past PA possible selves interventions found no differences, in terms of their impact on exercise, between feared and hoped-for possible selves (Murru & Martin Ginis, 2010) or exercisers or nonexercisers images (Ouellette et al., 2005), the present study only employed hoped-for possible self images which allowed for the number of experimental conditions to be kept to a reasonable number. Yet, this choice may have had some associated limitations. It has been suggested that hoped-for and feared PA possible selves have differing effects on self-regulatory variables related to these selves (Hooker & Kaus, 1994). In fact, feared selves may play an important role in PA engagement. Research has found that adults' efficacy and effort to avoid feared PA possible selves were significant predictors of health behaviours, and these selves

PHYSICAL ACTIVITY POSSIBLE SELVES

were more numerous and more important than hoped-for selves (Hooker & Kaus, 1994)⁶. Future research should determine if feared and hoped-for possible selves, or balanced possible selves, differentially impact self-regulatory variables such as intentions, in addition to rated importance. This relationship may vary by type of health goal, as stated by Hooker and Kaus (1994).

Overall, work remains to determine the optimal delivery for a PA possible selves intervention and which components should be used to bolster their effectiveness. Previously mentioned were other ways that the intervention protocol could be modified to have participants elaborate on their possible selves to a greater degree and ultimately create a stronger intervention. These potential intervention enhancements include repeated exposure to the image generation task (Norman & Aron, 2003; Vandelanotte et al., 2007), and the use of procedures that result in the creation of a more elaborate image (e.g, the use of more explicit action and coping planning exercises; completion of image generation in the presence of a researcher). There are several others factors that may influence the effectiveness of a PA possible selves intervention that remain to be tested. For example, utilizing guided imagery techniques – much like those used in the imagery literature (e.g., Chan & Cameron, 2012; Duncan, Hall, Wilson, & Rodgers, 2012) may elicit within participants a more vivid image of their possible self.

Finally, the results of this study shed light on several possible moderators of the intervention-PA relationship that could be explored in future research. These potential moderators include personal characteristics that were among the variables controlled for in the analyses, and were significantly correlated with certain outcome variables. First, age explained part of the variance in PA task self-efficacy, a known precursor to PA. It is also reasonable to

⁶ There was insufficient data to determine whether self-regulatory variables were positively correlated with hoped-for health-related possible selves (Hooker & Kaus, 1994).

PHYSICAL ACTIVITY POSSIBLE SELVES

assume that age may moderate the intervention's effectiveness since the importance that one attributes to their possible self depends on their stage of life (Markus & Nurius, 1986; Cross & Markus, 1991). Particularly, Cross and Markus (1991) found that naturally existing hoped-for possible selves (i.e., not elicited through intervention) falling under the "physical" category (e.g., being in optimal physical condition, losing weight) were cited less by those in the youngest age group (18-24 years), and cited consistently more among older age groups. Secondly, imagery ability should be examined for its possible role as a moderator as in the current study it explained part of the variance in PA intentions, perceived amounts of coping planning, and efficacy to achieve one's PA possible self. The role of appearance-health related imagery ability in exercise-related outcomes has been shown; it has predicted exercise engagement and coping efficacy and has moderated the relationship between frequency of imagery and exercise, coping efficacy, and scheduling efficacy (Cumming, 2008).

Finally, characteristics of participants' PA possible selves, such as their temporal proximity, clarity, and availability, could be analyzed for their moderating effects on the possible selves' effectiveness. Possible selves that feel temporally close are more motivating than those that feel further in time (Strahan & Wilson, 2006). Furthermore, clarity (or vividness) of the participants' possible selves has been found to positively impact ratings of importance and likelihood of achieving the hoped-for possible self and time spent thinking about this self (McElwee & Haugh, 2010). Finally, a possible self that is available, or that can easily be imagined, is more likely to influence one's behaviour to attain/void a hoped for/feared self (Norman & Aron, 2003). As the current study was one of the first to implement and evaluate a PA possible selves intervention, questions remain regarding how to maximize its effectiveness.

PHYSICAL ACTIVITY POSSIBLE SELVES

Future research that examines potential moderators of intervention effectiveness such as those outlined above will help identify useful intervention components.

To further shed light on how PA possible selves interventions may incite behaviour change, research can seek to identify mediators of this intervention-behaviour relationship. As the possible selves intervention-PA relationship was not mediated by action or coping planning and there were not between group differences on the self-regulatory variables examined post-intervention (thus these variables cannot serve as mediators), it is unknown which self-regulatory variables may have mediated this relationship. There are several such variables that could be examined in future research.

For instance, although intentions to engage in PA were measured, and this serves as a measure of *quantity* of motivation (Fortier et al., 2011), the *quality* of one's motivation to engage in MVPA holds potential as a mediator between a PA possible selves intervention and self-regulatory outcomes and PA. According to self-determination theory, as behaviours become internalized into the self, they also become self-determined (Ryan & Deci, 2003) or internally regulated (Ryan & Deci, 2000 (e.g., exercising because exercise is inherently enjoyable or because engaging in exercise aligns with one's values). In PA contexts, self-determined forms of motivation are associated with positive PA outcomes such as greater levels of PA participation (e.g. Teixeira, Carraça, Markland, Silva, & Ryan, 2012; Thøgersen-Ntoumani & Ntoumanis, 2006). It is conceivable that the act of having participants reflect on their PA possible self would facilitate the internalization of PA. For example, if one's possible self included a view of oneself as a competent exerciser, more self-determined motivation should be promoted given that competence is a psychological need which, when in place, promotes self-determined motivation (Ryan & Deci, 2000). It would be of interest to examine whether a PA possible selves

PHYSICAL ACTIVITY POSSIBLE SELVES

intervention may help to foster more self-determined types of PA motivation in its participants which may in turn act as a mechanism through which this intervention impacts PA.

Another potential mediator that might explain the association between PA possible selves interventions and PA is *PA identity*. If possible selves represent the self *in the future*, identities capture how one views oneself *currently* within a given role and serves as a behavioural standard (Stets & Burke, 2003); when individuals endorse an identity (e.g., I am a physically active person), they are motivated to maintain consistency between identity and behaviour (e.g., engage in regular PA; Stets & Burke, 2003). Research supports this proposed association between identity and behaviour in the PA context (Strachan & Whaley, in press). PA possible selves interventions hold potential to strengthen PA identities. Dunkel (2000), and colleagues (Dunkel & Anthis, 2001) argue that by contemplating possible selves, individuals explore identities and as such, possible selves may be a mechanism involved in identity change. In turn, potential increases in PA identity that stem from a PA possible self intervention may be responsible for increases in PA brought about through the intervention. However, whether PA identity mediates the relationship between a PA possible self intervention and PA adherence has never been tested.

Conclusions

The present findings add to the small number of PA possible selves intervention studies which suggest that PA possible selves interventions lead to increases in PA. The present study uniquely suggests that the ameliorative effects of this intervention are applicable beyond an undergraduate population to a broader range of adults and that online delivery of this intervention holds promise. These accumulating findings have practical implications. For

PHYSICAL ACTIVITY POSSIBLE SELVES

example, implementing a PA possible selves image generation task into the intake procedures of a fitness program or facility or over the course of a fitness program may provide an easy and cost-effective way to promote PA. A major objective of the present study was to determine if the ameliorative effect of a PA possible selves intervention could be further increased through the elicitation of *self-regulatory* possible selves. While the present findings do not definitively support a superior effect of such a self-regulatory possible selves intervention, they do provide insight into how self-regulatory possible selves may be elicited. Given that this study was the first to attempt to elicit and test a self-regulatory possible selves intervention, future research that incorporates ideas for improving this intervention are advised. Such research efforts will provide valuable information about the efficacy of self-regulatory possible selves interventions and if efficacious, how they are best delivered.

Chapter VII: References

- Ajzen, I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211. doi: 10.1016/0749-5978(91)90020-T
- Aloise-Young, P.A., Hennigan, K.M., & Leong, C.W. (2001). Possible selves and negative health behaviors during early adolescence. *The Journal of Early Adolescence*, 21, 158-181. doi: 10.1177/0272431601021002002
- Anderson, E.S., Wojcik, J.R., Winett, R.A., & Williams, D.M. (2006). Social-cognitive determinants of physical activity: The influence of social support, self-efficacy, outcomes expectations, and self-regulation among participants in a church-based health promotion study. *Health Psychology*, 25, 510-520. doi: 10.1037/0278-6133.25.4.510
- Andersson, E.K., & Moss, T.P. (2011). Imagery and implementation intention: A randomised controlled trial of interventions to increase exercise behaviour in the general population. *Psychology of Sport and Exercise*, 12, 63-70. doi: 10.1016/j.psychsport.2010.07.004
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215. doi: 10.1037/0033-295X.84.2.191
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T.C. Urdan (Eds.). *Self-Efficacy Beliefs of Adolescents* (pp.307-337). Greenwich, CT: Information Age.

PHYSICAL ACTIVITY POSSIBLE SELVES

- Baranowski, T., Anderson, C., & Carmack, C. (1998). Mediating variable framework in physical activity interventions: How are we doing? How might we do better? *American Journal of Preventive Medicine*, *15*, 266-297. doi: 10.1016/S0749-3797(98)00080-4
- 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.
- Biddle, S.J.H., & Mutrie, N. (2008). *Psychology of physical activity: Determinants, well-being & interventions* (2nd ed.). New York, NY: Routledge.
- Brassington, G.S., Atienza, A.A., Perczek, R.E., DiLorenzo, T.M., & King, A.C. (2002). Intervention-related cognitive versus social mediators of exercise adherence in the elderly. *American Journal of Preventive Medicine*, *23*, S80-S86. doi: org/10.1016/S0749-3797(02)00477-4
- Burke, P. J. (1980). The self: Measurement from an interactionist perspective. *Journal of Social Psychology Quarterly*, *43*, 18–29. doi: 10.2307/3033745
- Canadian Society for Exercise Physiology. (2011). *Canadian physical activity guidelines*. Retrieved April 7th, 2011 from <http://www.csep.ca/CMFiles/Guidelines/CSEP-InfoSheets-adults-ENG.pdf>.
- Chan, C.K.Y., & Cameron, L.D. (2012). Promoting physical activity with goal-oriented mental imagery: a randomized controlled trial. *Journal of Behavioural Medicine*, *35*, 347-363. doi: 10.1007/s10865-011-9360-6

PHYSICAL ACTIVITY POSSIBLE SELVES

Clarke, L.H., & Griffin, M. (2008). Failing bodies: body image and multiple chronic conditions in later life. *Qualitative Health Research, 18*, 1084-1095. doi:

10.1177/1049732308320113

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New Jersey: Lawrence Erlbaum Associates.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155-159. doi: 10.1037/0033-2909.112.1.155

Colley, R.C., Garriguet, D., Janssen, I., Craig, C., Clarke, J., & Tremblay, M.S. (2011). Physical activity of Canadian adults: Accelerometer results from the 2007–2009 Canadian Health Measures Survey. *Health Reports, 22*, 7- 14.

Contrada, R.J., & Ashmore, R.D. (1999). *Self, social identity and physical health*. New York: Oxford University Press.

Cramp, A.G., & Bray, S.T. (2009). A prospective examination of exercise and barrier self-efficacy to engage in leisure-time physical activity during pregnancy. *Annals of Behavioral Medicine, 37*, 325-334. doi: 10.1007/s12160-009-9102-y

Cross, S., & Markus, H. (1991). Possible selves across the life span. *Human Development, 34*, 230-255. doi: 10.1159/000277058

Cross, S., & Markus, H. (1994). Self-schemas, possible selves, and competent performance. *Journal of Educational Psychology, 86*, 423-438. doi: 10.1037/0022-0663.86.3.423

PHYSICAL ACTIVITY POSSIBLE SELVES

- Crowne, D.P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology, 24*, 349-354.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.
- Cumming, J. (2008). Investigating the relationship between exercise imagery, leisure-time exercise behavior, and self-efficacy. *Journal of Applied Sport Psychology, 20*, 184-198. doi: 10.1080/10413200701810570
- Deci, E.L., & Ryan, R.M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227-268. doi: 10.1207/S15327965PLI1104_01
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology, 49*, 182–185. doi: 10.1037/a0012801
- Dimitrov, D. M. & Rumrill, P.D. Jr. (2003). Pretest-posttest designs and measurement of change. *Work: A Journal of Prevention, Assessment, and Rehabilitation, 20*, 159-165.
- Duncan, L., Hall, C., Wilson, P., & Rodgers, W. (2012). The use of a mental imagery intervention to enhance integrated regulation for exercise among women commencing an exercise program. *Motivation and Emotion, 36*, 452-464 doi: 10.1007/s11031-011-9271-4
- Dunkel, C.S. (2000). Possible selves as a mechanism for identity exploration. *Journal of Adolescence, 23*, 519-529. doi: 10.1006/jado.2000.0340

PHYSICAL ACTIVITY POSSIBLE SELVES

- Dunkel, C.S., & Anthis, K.S. (2001). The role of possible selves in identity formation: a short-term longitudinal study. *Journal of Adolescence*, *24*, 765-776. doi: 10.1006/jado.2001.0433
- Dweck, C.S., Higgins, E.T., & Grant-Pillow, H. (2003). Self-systems give unique meaning to self variables. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 239-252). New York: Guilford Press.
- Elavsky, S. & McAuley, E. (2005). Physical activity, symptoms, esteem, and life satisfaction during menopause. *Maturitas*, *52*, 374-385. doi: 10.1016/j.maturitas.2004.07.014
- Erikson, M.G. (2007). The meaning of the future: Toward a more specific definition of possible selves. *Review of General Psychology*, *11*, 348-358. doi: 10.1037/1089-2680.11.4.348
- Fisher, D., & Fick, C. (1993). Measuring social desirability: short forms of the Marlowe-Crowne Social Desirability Scale. *Educational and Psychological Measurement*, *53*, 417-424. doi: 10.1177/0013164493053002011
- Fox, K.R., & Wilson, P.M. (2008). Self-perceptual systems and physical activity. In T. Horn (Ed.), *Advances in sport psychology* (pp.49-64). Champaign, IL: Human Kinetics.
- Fortier, M.S., Wiseman, E., Sweet, S.N., O'Sullivan, T.L., Blanchard, C.M., Sigal, R.J., & Hogg, W. (2011). A moderated mediation of motivation on physical activity in the context of the Physical Activity Counseling randomized control trial. *Psychology of Sport & Exercise*, *12*, 71-78. doi: 10.1016/j.psychsport.2010.08.001

PHYSICAL ACTIVITY POSSIBLE SELVES

- Frazier, P.A., Tix, A.P., & Barron, K.E. (2004). Testing moderator and mediator effects in counseling psychology research. *Journal of Counseling Psychology, 51*, 115-134. doi: 10.1037/0022-0167.51.1.115
- Gebhardt, W.A. (2006). Contextualizing health behaviors: The role of personal goals. In D.T.D. de Ridder & J.B.F. de Wit (Eds.). *Self-regulation in health behavior* (pp. 27-43). West Sussex, England: John Wiley & Sons.
- Gerstein, L.H., Wilkeson, D.A., & Anderson, H. (2004). Differences in motivations of paid versus nonpaid volunteers. *Psychological Reports, 94*, 163-175. doi: 10.2466/pr0.94.1.163-175
- Gibbons, F.X. & Gerrard, M. (1995). Predicting young adults' health risk behavior. *Journal of Personality and Social Psychology, 69*, 505-517. doi: 10.1037/0022-3514.69.3.505
- Gionet, N.J., & Godin, G. (1989). Self-reported exercise behavior of employees: A validity study. *Journal of Occupational Medicine, 31*, 969-973.
- Godin, G., & Shephard, R.J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Science, 10*, 141-146.
- Gollwitzer, P.M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist, 54*, 493-503. doi: 10.1037/0003-066X.54.7.493
- Hagger, M.S., Chatzisarantis, N.L.D., & Biddle, S.J.H. (2002). A meta-analytic review of the theories of reasoned action and planned behavior in physical activity: predictive validity and the contribution of additional variables. *Journal of Sport and Exercise Psychology, 24*, 3-32.

PHYSICAL ACTIVITY POSSIBLE SELVES

- Hardman, A.E., & Stensel, D.J. (2009). *Physical activity and health: The evidence explained* (2nd ed.). New York, NY: Routledge.
- Harju, B.L., & Reed, J.M. (2003). Potential clinical implications of implicit and explicit attitudes within possible exercise selves schemata: A pilot study. *Journal of Clinical Psychology in Medical Settings, 10*, 201-208. doi: 10.1023/A:1025414913130
- Hock, M. F., Deshler, D. D., & Schumaker, J. B. (2002). Nurturing possible selves in student-athletes through peer interactions: Surfacing academic, athletic, and personal goals. Manuscript in preparation.
- Hock, M. F., Deshler, D. D., & Schumaker, J. B. (2006). Enhancing student motivation through the pursuit of possible selves. In C. Dunkel & J. Kerpelman (Eds.), *Possible selves: Theory, research and applications* (pp. 205–221). Hauppauge, NY: Nova.
- Hooker, K., & Kaus, C.R., (1992). Possible selves and health behaviors in later life. *Journal of Aging and Health, 4*, 390-411. doi: 10.1177/089826439200400304
- Hooker, K. & Kaus, C.R. (1994). Health-related possible selves in young and middle adulthood. *Psychology and Aging, 9*, 126-133. doi: 10.1037/0882-7974.9.1.126
- Hoyle, R.H. (2010). Personality and self-regulation. In R.H. Hoyle (Ed.), *Handbook of Personality and Self-Regulation* (pp.1-18). Malden, MA: Wiley-Blackwell.
- Hoyle, R.H., & Sherrill, M.R. (2006). Future orientation in the self-system: Possibles selves, self-regulation, and behavior. *Journal of Personality, 74*, 1673-1696. doi: 10.1111/j.1467-6494.2006.00424.x

PHYSICAL ACTIVITY POSSIBLE SELVES

- 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.
- Kahn, E.B., Ramsey, L.T., Brownson, R.C., Heath, G.W., Howze, E.H., Powell, K.E., Stone, E.J., Rajab, M.W., & Corso, P. (2002). The effectiveness of interventions to increase physical activity: A systematic review. *American Journal of Preventive Medicine*, 22, S73-S107. doi: org/10.1016/S0749-3797(02)00434-8
- Karoly, P. (1993). Mechanisms of self-regulation: A systems view. *Annual Review of Psychology*, 44, 23-52. doi: 10.1146/annurev.ps.44.020193.000323
- Katzmarzyk, P. T. (2010). Physical activity, sedentary behavior, and health: paradigm paralysis or paradigm shift? *Diabetes*, 59, 2717 – 2725. <http://dx.doi.org/10.2337/db10-0822>
- Kwekkeboom, K. L. (2000). Measuring imaging ability: psychometric testing of the imaging ability questionnaire. *Research in Nursing and Health*, 23 301-309. doi: 10.1002/1098-240X(200008)
- Lang, P.L. (1979). A bio-informational theory of emotional imagery. *Psychophysiology*, 16, 495-512. doi:10.1111/j.1469-8986.1979.tb01511.x
- Layous, K., Nelson, S.K., & Lyubomirsky, S. (2012). What is the optimal way to deliver a positive activity intervention? The case of writing about one's best possible selves. *Journal of Happiness Studies*, 1-20. doi: 10.1007/s10902-012-9346-2

PHYSICAL ACTIVITY POSSIBLE SELVES

- Leary, M. R., & Price Tangney, J. (2003). The self as an organizing construct in the behavioral and social sciences. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 3-14). New York: Guilford Press.
- Luszczynska, A. (2006). An implementation intentions intervention, the use of planning strategy, and physical activity after myocardial infarction. *Social Science & Medicine*, *62*, 900-908. doi: 10.1016/j.socscimed.2005.06.043,
- Maddux, J.E. & Gosselin, J.T. (2003). Self-efficacy. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 218-238). New York: Guilford Press.
- Markus, H. (2004). Foreword. In C. Dunkel & J. Kerpelman (Eds.). *Possible selves: Theory, research and application* (pp. xi-xiv). New York: Nova Science Publishers.
- Markus, H., Cross, S., & Wurf, E (1990). The role of the self-system in competence. In R.J. Sternberg & J. Jr. Kolligian (Eds.), *Competence considered* (pp.205-225). New Haven, CT, US: Yale University Press.
- Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist*, *41*, 954-969. doi: 10.1037/0003-066X.41.9.954
- Markus, H., & Nurius, P. (1987). Possible selves: The interface between motivation and the self-concept. In K. Yardley & T. Honess (Eds.), *Self and Identity: Psychosocial perspectives* (pp.157-172). Oxford, England: John Wiley & Sons.
- Markus, H., & Ruvolo, A. (1989). Possible selves: Personalized representations of goals. In L.A. Pervin (Ed.). *Goal Concepts in Personality and Social Psychology* (pp. 211-237). New Jersey: Lawrence Erlbaum Associates.

PHYSICAL ACTIVITY POSSIBLE SELVES

- McAuley, E., & Mihalko, S. L. (1998). Measuring exercise-related self-efficacy. In J. L. Duda (Ed.), *Advances in sport and exercise psychology measurement* (pp.371–381). Morgantown, WV: Fitness Information, Inc.
- McElwee, R.O., & Haugh, J.A. (2010). Thinking clearly versus frequently about the future self: Exploring this distinctions and its relation to possible selves. *Self and Identity*, 9, 298-321. doi: 10.1080/15298860903054290
- Miles, L. (2007). Physical activity and health. *Nutrition Bulletin*, 32, 314-363. doi: 10.1111/j.1467-3010.2007.00668.x
- Miller, D.J., Freedson, P.S., & Kline, G.M. (1994). Comparison of activity levels using the Caltrac I accelerometer and five questionnaires. *Medicine and Science in Sports and Exercise*, 26, 376-382.
- Milne, M.I., Rodgers, W.M., Hall, C.R., & Wilson, P.M. (2008). Starting up or starting over: The role of intentions to increase and maintain the behaviour of exercise initiates. *Journal of Sport and Exercise Psychology*, 30, 285-301.
- Mischel, W., & Morf, C.C. (2003). The self as a psycho-social dynamic processing system: A meta-perspective on a century of the self in psychology. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 15-43). New York: Guilford Press.
- Murray T.C., Rodgers, W.M., & Fraser, S.N. (2009). Examining implementation intentions in an exercise intervention: The effects on adherence and self-efficacy in a naturalistic setting. *Journal of Applied Social Psychology*, 39, 2303-2320. doi: 10.1111/j.1559-1816.2009.00527.x

PHYSICAL ACTIVITY POSSIBLE SELVES

- Murru, E., & Martin Ginis, K.A. (2010). Imagining the possibilities: The effects of a possible selves intervention on self-regulatory efficacy and exercise behavior. *Journal of Sport and exercise psychology, 32*, 537-554.
- Norman, C.C., & Aron, A. (2003). Aspects of possible selves that predict motivation to achieve or avoid it. *Journal of Experimental Social Psychology, 39*, 500-507. doi: 10.1016/S0022-1031(03)00029-5
- Ouellette, J.A., Hessling, R., Gibbons, F.X., Reis-Bergan, M., & Gerrard, M. (2005). Using images to increase exercise behaviour: Prototypes versus possible selves. *Personality and Social Psychology Bulletin, 31*, 610-620. doi: 10.1177/0146167204271589
- Oyserman, D., Brickman, D., & Rhodes, M. (2007). School success, possible selves, and parent school involvement. *Family Relations, 56*, 479-489. doi: 10.1111/j.1741-3729.2007.00475.x
- Oyserman, D., Bybee, D., & Terry, K. (2006). Possible selves and academic outcomes: How and when possible selves impel action. *Journal of Personality and Social Psychology, 91*, 188-204. doi: 10.1037/0022-3514.91.1.188
- Oyserman, D., Bybee, D., Terry, K., & Hart-Johnson, T. (2004). Possible selves as roadmaps. *Journal of Research in Personality, 38*, 130-149. doi: 10.1016/S0092-6566(03)00057-6
- Oyserman, D., & Fryberg, S. (2006). The possible selves of diverse adolescents: Content and function across gender, race and national origin. In C. Dunkel & J. Kerpelman (Eds.). *Possible selves: Theory, research and application* (pp. 17-39). New York: Nova Science Publishers.

PHYSICAL ACTIVITY POSSIBLE SELVES

- Oyserman, D., & Markus, H. (1990). Possible selves and delinquency. *Journal of Personality and Social Psychology*, *59*, 112-125. doi: 10.1037/0022-3514.59.1.112
- Oyserman, D., Terry, K., & Bybee, D. (2002). A possible selves intervention to enhance school involvement. *Journal of Adolescence*, *25*, 313-326. doi: 10.1006/jado.2002.0474
- Packard, B. W. L., & Conway, P. F. (2006). Methodological choice and its consequences for possible selves research. *Identity*, *6*, 251-271. doi: 10.1207/s1532706xid0603_3
- Paffenbarger, R.S. Jr., Hyde, R.T., Wind, A.L., & Hsieh, C.C. (1986). Physical activity, all-cause mortality, and longevity of college alumni. *New England Journal of Medicine*, *314*, 605-613
- Pallant, J. (2007). *SPSS survival manual: A step by step guide to data analysis using SPSS (3rd ed.)*. New York: Open University Press.
- Ransdell, L.B., Dinger, M.K., Huberty, J., & Miller, K.M. (2009). *Developing effective physical activity programs* (pp. 3-12). Champaign, IL: Human Kinetics.
- Rhodes, R.E., Matheson, D.H., & Blanchard, C.M. (2006). Beyond scale correspondence: A comparison of continuous open scaling and fixed graded scaling when using social cognitive constructs in the exercise domain. *Measurement in Physical Education and Exercise Science*, *10*, 13-39. doi: 10.1207/s15327841mpee1001_2
- Richert, J., Lippke, S., & Ziegelmann, J. P. (2011). Intervention–engagement and its role in the effectiveness of stage-matched interventions promoting physical exercise. *Research in Sports Medicine*, *19*, 145-161. doi: 10.1080/15438627.2011.583164

PHYSICAL ACTIVITY POSSIBLE SELVES

Ronen, T. (2011). *The positive power of imagery: harnessing client imagination in CBT and related therapies*. Chichester, West Sussex: Wiley Blackwell.

Ruvolo, A. P., & Markus, H. R. (1992). Possible selves and performance: The power of self-relevant imagery. *Social Cognition, 10*, 95–124.

Ryan, R.M. & Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development and well-being. *American Psychologist, 55*, 68-78.

Ryan, R. M., & Deci, E. L. (2003). On assimilating identities to the self: A self-determination theory perspective on internalization and integrity within cultures. In M. R. Leary & J. P. Tangney (Eds.), *Handbook on self & identity* (pp. 253-274). New York: The Guilford Press.

Scholz, U., Schüz, B., Ziegelmann, J.P., Lippke, S., & Schwarzer, R. (2008). Beyond behavioural intentions: Planning mediates between intentions and physical activity. *British Journal of Health Psychology, 13*, 479-494. doi: 10.1348/135910707X216062

Schwarzer, R., Luszczynska, A., Ziegelmann, J.P., Scholz, U., & Lippke, S. (2008). Social-cognitive predictors of physical exercise adherence: Three longitudinal studies in rehabilitation. *Health Psychology, 27*, S54-S63. doi: 10.1037/0278-6133.27.1(Suppl.).S54

Schwarzer, R., Schüz, B., Ziegelmann, J.P., Lippke, S., Luszczynska, A., & Scholz, U. (2007). Adoption and maintenance of four health behaviors: Theory-guided longitudinal studies on dental flossing, seat belt use, dietary behavior, and physical activity. *Annals of Behavioral Medicine, 33*, 156-166. doi:10.1007/BF02879897

PHYSICAL ACTIVITY POSSIBLE SELVES

Shephard, R.J. (2003). Limits to the measurement of habitual physical activity by questionnaires.

British Journal of Sports Medicine, 37, 197-206. doi: 10.1136/bjism.37.3.197

Sheppard, L.A., & Ely, S. (2008). Breast cancer and sexuality. *The Breast Journal*, 14, 176-181.

doi: 10.1111/j.1524-4741.2007.00550.x

Shrout, P.E. & Fleiss, J.L. (1979). Intraclass correlations: Uses in assessing rater reliability.

Psychological Bulletin, 86, 420-428. doi: 10.1037/0033-2909.86.2.420

Sibbald, B., & Roland, M. (1998). Understanding controlled trials: Why are randomised

controlled trials important? *British Medical Journal*, 316, 201. doi:

<http://dx.doi.org/10.1136/bmj.316.7126.201>

Smith, T. J. (2005). Ethnic and gender differences in community service participation among

working adults. *Journal of Extension*, 43, 85-94.

Sniehotta, F.F., Scholz, U., & Schwarzer, R. (2006). Action plans and coping plans for physical

exercise: A longitudinal intervention study in cardiac rehabilitation. *British Journal of*

Health Psychology, 11, 23-37. doi: 10.1348/135910705X43804

Sniehotta, F.F., Schwarzer, R., Scholz, U., & Schuz, B. (2005). Action plans and coping plans

for long term lifestyle change: Theory and assessment. *European Journal of Social*

Psychology, 35, 565-576. doi: 10.1348/135910705X43804

Sonstroem, R.J., Speliotis, E.D., & Fava, J.L. (1992). Perceived physical competence in adults:

An examination of the Physical Self-Perception Profile. *Journal of Sport & Exercise*

Psychology, 14, 207-221.

Speck, R.M., Gross, C.R., Hormes, J.M., Ahmed, R.L., Lytle, L.A., Hwang, W.-T., & Schmitz,

PHYSICAL ACTIVITY POSSIBLE SELVES

- K.H. (2009). Changes in the Body Image and Relationship Scale following a one-year strength training trial for breast cancer survivors with or at risk for lymphedema. *Breast Cancer Research and Treatment, 121*, 421-430. doi: 10.1007/s10549-009-0550-7
- Strachan, S.M., & Whaley, D. (in press). The role of self-identity in understanding exercise behaviour. In P. Ekkekakis (Ed.), *Handbook of physical activity and mental health*. Routledge.
- Stoll, O., & Alfermann, D. (2002). Effects of physical exercise on resources evaluation, body self-concept and well-being among older adults. *Anxiety, Stress, & coping: An International Journal, 15*, 311-319. doi: 10.1080/1061580021000020752
- Stets, J.E., & Burke, P.J. (2003). A sociological approach to self and identity. In M. R. Leary, & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 128-152). New York, NY: Guilford Press.
- Strachan, S.M., Brawley, L. R., Spink, K.S., & Jung, M.E. (2009). Strength of exercise identity and identity-exercise consistency: Affective and social cognitive relationships. *Journal of Health Psychology, 14*, 1196-1206. doi: 10.1177/1359105309346340
- Strachan, S.M., Woodgate, J., Brawley, L.R., & Tse, A. (2005). The relationship of self-efficacy and self-identity to long-term maintenance of vigorous physical activity. *Journal of Applied Biobehavioral Research, 10*, 98-112. doi: 10.1111/j.1751-9861.2005.tb00006.x
- Strahan, E.J., & Wilson, A.E. (2006). Temporal comparisons, identity, and motivation: The relation between past, present, and possible future selves. In C. Dunkel & J. Kerpelman

PHYSICAL ACTIVITY POSSIBLE SELVES

- (Eds.). *Possible selves: Theory, research and application* (pp. 1-15). New York: Nova Science Publishers.
- Strahan, R., & Gerbasi, K.C. (1972). Short, homogenous versions of the Marlowe-Crowne social desirability scale. *Journal of clinical Psychology, 28*, 191-193. doi: 10.1002/1097-4679(197204)28:2<191::AID-JCLP2270280220>3.0.CO;2-G
- Stratham, A., Gleicher, F., Boninger, D.S., & Edwards, S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behavior. *Journal of Personality and Social Psychology, 66*, 742-752. doi: 10.1037/0022-3514.66.4.742
- Stryker, J. H., & Burke, P. J. (2000). The past, present and future of identity theory. *Social Psychology Quarterly, 63*, 284–297.
- Tabachnick, B.G., & Fidell, L.S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Allyn and Bacon.
- Taylor, S.E., & Brown, J.D. (1988). Illusions and well-being: A social psychological perspective on mental health. *Psychological Bulletin, 102*, 193-210. doi: 10.1037/0033-2909.103.2.193
- Teixeira, P.J., Carraça, E.V., Markland, D., Silva, M.N., & Ryan, R.M. (2012). Exercise, physical activity, and self-determined theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 9*, 78-107. doi: 10.1186/1479-5868-9-78
- Thøgersen-Ntoumani, C., & Ntoumanis, N. (2006). The role of self-determined motivation in the understanding of exercise-related behaviours, cognitions, and physical self-evaluations. *Journal of Sports Sciences, 24*, 393-404.

PHYSICAL ACTIVITY POSSIBLE SELVES

- Vandelandotte, C., Spathonis, K.M., Eakin, E.G., & Owen, N. (2007). Website-delivered physical activity interventions. *American Journal of Preventive Medicine*, *33*, 54-64. doi: 10.1016/j.amepre.2007.02.041
- Vassallo, M., Saba, A., Arvola, A., Dean, M., Messina, F., Winkelmann, M., Claupein, E., Lähteenmäki, L., & Shepherd, R. (2009). Willingness to use functional breads. Applying the Health Belief Model across four European countries. *Appetite*, *52*, 452-460. doi: 10.1016/j.appet.2008.12.008
- Vincent, W.J. (2005). *Statistics in kinesiology* (3rd ed.). Champaign, IL: Human Kinetics.
- Whaley, D. E. (2003). Future-oriented self-perceptions and exercise behavior in middle-aged women. *Journal of Aging and Physical Activity*, *10*, 306-322.
- Whaley, D.E. (2004). Seeing isn't always believing: Self-perceptions and physical activity behaviors in adults. In M.R. Weiss (Ed.), *Developmental sport and exercise psychology: A lifespan perspective* (p. 289-311). Morgantown, WV: Fitness Information Technology.
- Whaley, D.E., & Schrider, A.F. (2005). The process of adult exercise adherence: Self-perceptions and competence. *The Sport Psychologist*, *19*, 148-163.
- Woodgate, J. & Brawley, L.R. (2008). Self-efficacy for exercise in cardiac rehabilitation: Review and recommendations. *Journal of Health Psychology*, *13*, 366-387. doi: 10.1177/1359105307088141
- Ziegelmann, J.P., Lippke, S. & Schwarzer, R. (2006). Adoption and maintenance of physical activity: Planning interventions in young, middle-aged, and older adults. *Psychology and Health*, *21*, 145-163. doi: 10.1080/1476832050018891

PHYSICAL ACTIVITY POSSIBLE SELVES

Zimmerman, B. J. (1990). 'Self-regulated learning and academic achievement: An overview.'

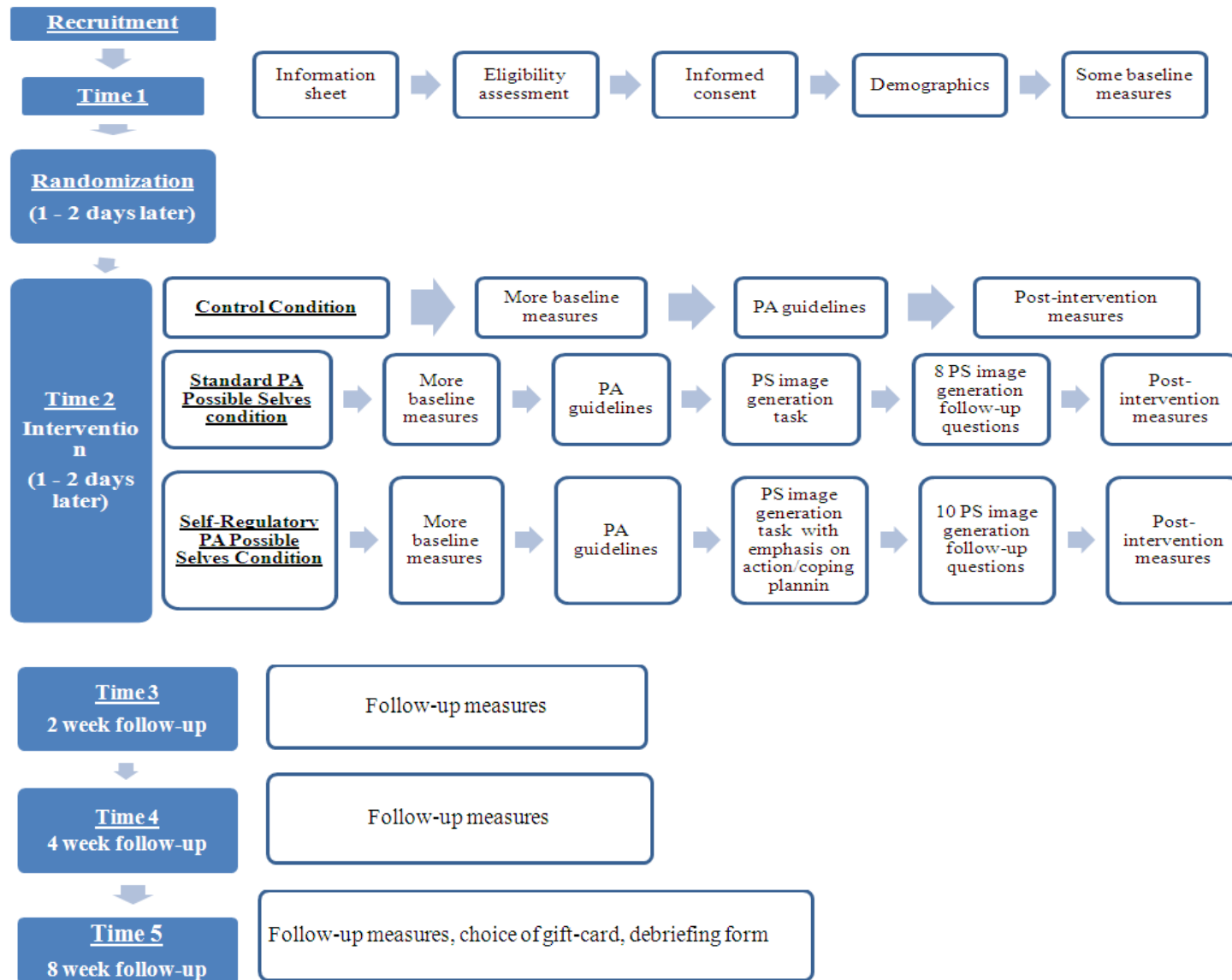
Educational Psychologist, 25, 3-17.

Zimmerman, B.J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational*

Psychology, 25, 82-91. doi:10.1006/ceps.1999.1016

Zimmerman, B. J. (2002). 'Becoming a self-regulated learner.' *Theory Into Practice*, 41, 65-70.

Appendix A: Study Flowchart and Measures Lists



PHYSICAL ACTIVITY POSSIBLE SELVES

Eligibility Criteria and Initial Questions

- Name and email address
- Avenue by which the participant learned about the study
- Comfortable reading and writing English, good comprehension of the English language
(all yes/no)
- Whether or not anyone else in their household was a participant in the study (yes/no)
- Age
- Whether their health status was such that they would have been able to participate in PA
(yes/no)
- Whether they lived in Canada or in another country
- Whether they intended to engage in regular PA over the following eight weeks (yes/no)
- Physical activity recall (number of minutes of moderate and strenuous PA in a typical week over the past year)

Demographics

- Gender
- Cultural background
- Height
- Body weight
- Marital status
- Highest level of education
- Current employment situations
- Province or territory in which they lived
- City or town in which they lived

PHYSICAL ACTIVITY POSSIBLE SELVES

Baseline Variables

- Physical activity recall (Godin & Shephard, 1985)*
- Physical activity intentions (Milne, Rodgers, Hall, & Wilson, 2008* and in absolute quantities)
- Physical activity task self-efficacy
- Self-regulatory self-efficacy

Personal characteristics – potential covariates

- Consideration of future consequences (Strathman et al., 1994)
- Social desirability (Crowne & Marlowe, 1960; Fisher & Fick, 1993; Strahan & Gerbasi, 1972)
- Imagery ability (Kwekkeboom, 2000)

Immediate Outcome Measures

- Physical activity intentions (Milne, Rodgers, Hall, & Wilson, 2008 and in absolute quantities)
- Physical activity task self-efficacy
- Self-regulatory efficacy
- Physical activity possible self self-efficacy (intervention conditions only)
- Importance of achieving one's PA possible self (intervention conditions only)

Outcome Measures at 2 and 4 weeks

- Action and coping planning
- PA task self-efficacy
- Self-regulatory efficacy
- Physical activity recall (Godin & Shephard, 1985)

Appendix B: Eligibility Screening Questionnaire

First, we would like to find out a little more about you, our participants.

1. Please provide your first name.

*The study consists of five (5) time points. We ask that you provide your name solely for the purpose of matching your responses at each of the time points should you be found to be eligible to complete the study. If you are uncomfortable providing your name, you may choose to only provide your e-mail address (below).

2. Please provide your email address.

*Again, we ask that you provide your email solely for the purpose of matching your responses at each of the time points should you be found to be eligible to complete the study. If you do not provide your email address, we will be unable to match up your data from the multiple time points.

2. b. To ensure that we have the proper email address, please type it again.

3. We would like to know how you learned about this study. Please choose from the following options.

- a) Through a Facebook message
- b) Through a Facebook ad
- c) Through word of mouth
- d) By e-mail
- e) Through an advertisement at the University of Ottawa
- f) Through an advertisement at Starbucks
- g) Online newsletter
- h) Other

3. b. If you selected 'other' in the previous question, please indicate how you learned about the study.

PHYSICAL ACTIVITY POSSIBLE SELVES

4. Are you comfortable reading English?
 - Yes
 - No
5. Are you comfortable writing in English?
 - Yes
 - No
6. Do you have a good comprehension of the English language?
 - Yes
 - No
7. Is anyone else in your household a participant in this study?
 - Yes
 - No
8. How old are you? (Scale from 'under 18 or over 64' to '64 years')
9. Is your health status such that you are able to participate in physical activity?
 - Yes
 - No
10. Do you intend to engage in regular physical activity over the next 8 weeks?
 - Yes
 - No
11. Where do you live?
 - a) Canada
 - b) A country other than Canada

12. Examining physical activity over the past year

Please think about your physical activity over the past year. Approximately how many minutes of moderate or strenuous physical activity did you do in a typical week over the past year? Please do your best to answer as precisely as possible and to not simply respond with what you think we 'want to hear'. Don't worry if you have not done as much physical activity as you wish you had.

Moderate physical activity is described as physical activity that is not exhausting but that requires more than minimal effort. Examples are: fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, and/or dancing.

PHYSICAL ACTIVITY POSSIBLE SELVES

Strenuous physical activity is described as exhausting physical activity during which the heart beats rapidly. Examples are: running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, vigorous roller skating/blading, vigorous swimming, vigorous long distance bicycling, and/or skating.

- a) 0 to 29 minutes total of moderate and strenuous physical activity in a typical week over the past year
- b) 30 to 59 minutes total of moderate and strenuous physical activity in a typical week over the past year
- c) 60 to 89 minutes total of moderate and strenuous physical activity in a typical week over the past year
- d) 90 or more minutes in total of moderate and strenuous physical activity in a typical week over the past year

PHYSICAL ACTIVITY POSSIBLE SELVES

Appendix C: Demographics Questionnaire

1. Please indicate your gender.
_____ Male
_____ Female

2. Please indicate your cultural background. If you respond 'multiracial' or 'other', you will be asked to describe your cultural background in the next question.
 - a) Aboriginal/Native
 - b) Arab
 - c) Black
 - d) Chinese
 - e) Filipino
 - f) Japanese
 - g) Korean
 - h) Latin American
 - i) South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
 - k) Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian, etc)
 - l) West Asian (e.g., Iranian, Afghan, etc.)
 - m) White
 - n) Multiracial
 - o) Other

3. If you responded 'multiracial' or 'other' in the previous questions, please indicate your cultural background. _____

4. What is your height?
 - a) Shorter than 4'8" (142 cm)
 - b) 4'8" (142 cm)
 - c) 4'9" (144.5 cm)
 - d) 4'10" (147 cm)
 - e) 4'11" (150 cm)
 - f) 5' (152.5 cm)
 - g) 5'1" (155 cm)
 - h) 5'2" (157.5 cm)
 - i) 5'3" (160 cm)
 - j) 5'4" (162.5 cm)
 - k) 5'5" (165 cm)
 - l) 5'6" (167.5 cm)
 - m) 5'7" (170 cm)
 - n) 5'8" (172.5 cm)
 - o) 5'9" (175 cm)

PHYSICAL ACTIVITY POSSIBLE SELVES

- p) 5'10" (177.5 cm)
 - q) 5'11" (180 cm)
 - r) 6' (183 cm)
 - s) 6'1" (185.5 cm)
 - t) 6'2" (188 cm)
 - u) 6'3" (190.5 cm)
 - v) Taller than 6'3" (190.5 cm)
5. Please indicate your approximate body weight, in either pounds or kilograms. In the next question, you will be asked to indicate whether your measurement is in pounds or kilograms.

6. Please specify whether you indicate your body weight in pounds or kilograms. _____
7. Please indicate your marital status.
- a) Single
 - b) Common-law
 - c) Married
 - d) Separated
 - e) Divorced
 - f) Widowed
8. What is the highest level of education that you have completed?
- a) Have not completed high school
 - b) High school
 - c) College/vocational school
 - d) Undergraduate degree
 - e) Professional degree
 - f) Masters degree
 - g) Ph.D.
 - h) Other
9. If you responded 'other' to the previous question, please indicate the level of education that you have completed. _____
10. What is your current employment situation?
- a) Employed full time
 - b) Employed part time
 - c) Self-employed
 - d) Out of work
 - e) A homemaker
 - f) A student
 - g) Retired
 - h) Unable to work

PHYSICAL ACTIVITY POSSIBLE SELVES

11. Please indicate the province or territory in which you live.
 - a) Alberta
 - b) British Columbia
 - c) Manitoba
 - d) New Brunswick
 - e) Newfoundland and Labrador
 - f) Northwest Territories
 - g) Nova Scotia
 - h) Nunavut
 - i) Ontario
 - j) Prince Edward Island
 - k) Québec
 - l) Saskatchewan
 - m) Yukon

12. Please indicate the city or town in which you live. _____

13. Please provide your phone number. It will not be shared with any outside parties. Please use the following format: 111-111-1111.

PHYSICAL ACTIVITY POSSIBLE SELVES

Appendix D – Physical Activity Recall (Version A; Godin & Shephard, 1985)

Instructions: It is important for us to know your approximate physical levels for the past year. Please indicate how much physical activity you have actually engaged in, on average, during a typical week over the past year. Please try to respond as accurately as possible, and avoid indicating the level of physical activity you would like to have engaged in or hope to engage in. Take the time you need to reflect about the past year and answer.

1. Please read carefully: Consider a typical **7-Day period** (a week) over the past year, how many times on the average did you do the following kinds of exercise for **more than 15 minutes** during your **free time**? Write on each line the appropriate number.

A) STRENUOUS EXERCISE (Heart beats rapidly)

Examples: Running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, and/or skating

Times per week _____

B) MODERATE EXERCISE (Not exhausting)

Examples: Fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, and/or dancing

Times per week _____

C) MILD EXERCISE (Minimal effort)

Examples: Yoga, archery, fishing from a river bank, bowling, horseshoes, golf, snow-mobiling, and/or easy walking

Times per week _____

PHYSICAL ACTIVITY POSSIBLE SELVES

Appendix E: Physical Activity Recall (Version B; Godin & Shephard, 1985)

Note: This was used for follow-ups at Times 3 and 4 regarding the previous two weeks, and as Time 5 regarding the previous 4 weeks.

Instructions: We would like to assess your physical activity levels since you completed over the past two/four weeks. Please think back to a typical week over the past two/four weeks and indicate the amount of physical activity in which you engaged. You can use your logbook to help you remember. Don't worry if you haven't engaged in as much physical activity as you would have wished; just indicate what you actually did.

1. Please read carefully: Consider the a typical **7-Day period** (a week) over the past two/four weeks, how many times on the average did you do the following kinds of exercise for **more than 15 minutes** during your **free time**? Write on each line the appropriate number.

A) STRENUOUS EXERCISE (Heart beats rapidly)

Examples: Running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, and/or skating

Times per week _____

B) MODERATE EXERCISE (Not exhausting)

Examples: Fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, and/or dancing

Times per week _____

C) MILD EXERCISE (Minimal effort)

Examples: Yoga, archery, fishing from a river bank, bowling, horseshoes, golf, snow-mobiling, and/or easy walking

Times per week _____

Appendix F: Physical Activity Intentions Questionnaire (A)

We would like to know about your intentions to engage in physical activity. Please answer the following questions with regards to the next eight weeks:

1. Do you intend to maintain your current activity level?

1	2	3	4	5	6	7
Strongly disagree						Strongly agree

2. Do you intend to increase your current activity level?

1	2	3	4	5	6	7
Strongly disagree						Strongly agree

3. Do you intend to decrease your current activity level?

1	2	3	4	5	6	7
Strongly disagree						Strongly agree

Appendix G: Physical Activity Intentions Questionnaire (B)

1. Strenuous Physical Activity :

Please indicate in the blank space below the **number of days per week (in the upcoming 8 weeks)** that you **intend** to engage in physical activity at a **strenuous intensity** (exhausting exercise, such as running, vigorous swimming, etc.) for at least 15 minutes continuously. Try to be as accurate as possible in your intentions.

I intend to engage in physical activity at a **strenuous intensity** _____ times per week (for a minimum of 15 minutes) over the course of the next 8 weeks.

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

**Definitely will NOT
engage in
physical activity**

1 2 3 4 5 6 7 8 9

**Definitely will
engage in
physical activity**

2. Moderate Physical Activity:

Please indicate in the blank space below the **number of days per week (in the upcoming 8 weeks)** that you **intend** to engage in physical activity at a **moderate intensity** (non-exhausting exercise, such as fast walking, tennis, etc.) for at least 15 minutes continuously. Try to be as accurate as possible in your intentions.

I intend to engage in physical activity at a **moderate intensity** _____ times per week (for a minimum of 15 minutes) over the course of the next 8 weeks.

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

**Definitely will NOT
engage in
physical activity**

1 2 3 4 5 6 7 8 9

**Definitely will
engage in
physical activity**

PHYSICAL ACTIVITY POSSIBLE SELVES

3. Mild Physical Activity:

Please indicate in the blank space below the **number of days per week (in the upcoming 8 weeks)** that you **intend** to engage in physical activity at a **mild intensity** (minimal effort physical activity such as yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking) for at least 15 minutes continuously. Try to be as accurate as possible in your intentions.

I intend to engage in physical activity at a **mild intensity** _____ times per week (for a minimum of 15 minutes) over the course of the next 8 weeks.

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

**Definitely will NOT
engage in
physical activity**

1 2 3 4 5 6 7 8 9

**Definitely will
engage in
physical activity**

PHYSICAL ACTIVITY POSSIBLE SELVES

Appendix H: Imaging Ability Questionnaire (Kwekkeboom, 2000)

Items 1 - 21 contain statements about how people experience memories, images, and other occurrences. Read each statement and describe how true it is for you using the scale underneath.

1. Sometimes I feel and experience things as I did when I was a child.

0	1	2	3	4
Not true at all for me				Very true for me

2. I can be greatly moved by eloquent or poetic language.

0	1	2	3	4
Not true at all for me				Very true for me

3. While watching a movie, a T.V. show, or a play, I may become so involved that I forget about myself and my surroundings and experience the story as if it were real and as if I were taking part in it.

0	1	2	3	4
Not true at all for me				Very true for me

4. If I stare at a picture and then look away from it, I can sometimes “see” an image of the picture, as if I were still looking at it.

0	1	2	3	4
Not true at all for me				Very true for me

PHYSICAL ACTIVITY POSSIBLE SELVES

5. Sometimes I feel as if my mind could envelop the whole world.

0 1 2 3 4

Not true at
all for me

Very true
for me

6. I can imagine (or daydream) some things so vividly that they hold my attention as a good movie or story does.

0 1 2 3 4

Not true at
all for me

Very true
for me

7. I think I really know what people mean when they talk about mystical experiences.

0 1 2 3 4

Not true at
all for me

Very true
for me

8. I sometimes "step outside" my usual self and experience an entirely different state of being.

0 1 2 3 4

Not true at
all for me

Very true
for me

9. Textures -- such as wool, sand, wood -- sometimes remind me of colors or music.

0 1 2 3 4

Not true at
all for me

Very true
for me

PHYSICAL ACTIVITY POSSIBLE SELVES

10. Sometimes I experience things as if they were doubly real.

0	1	2	3	4
Not true at all for me				Very true for me

11. When I listen to music I can get so caught up in it that I don't notice anything else.

0	1	2	3	4
Not true at all for me				Very true for me

12. I can imagine that my body is so heavy that I could not move it if I wanted to.

0	1	2	3	4
Not true at all for me				Very true for me

13. I can often sense the presence of another person before I actually see or hear that person.

0	1	2	3	4
Not true at all for me				Very true for me

14. It is possible for me to be completely immersed in nature or in art and to feel as if my whole state of consciousness has been temporarily altered.

0	1	2	3	4
Not true at all for me				Very true for me

PHYSICAL ACTIVITY POSSIBLE SELVES

15. Different colors have distinctive and special meanings for me.

0	1	2	3	4
Not true at all for me				Very true for me

16. I can sometimes recall certain past experiences in my life with such clarity and vividness that it is like living them again or almost so.

0	1	2	3	4
Not true at all for me				Very true for me

17. Things that might seem meaningless to others often make sense to me.

0	1	2	3	4
Not true at all for me				Very true for me

18. My thoughts often occur as visual images rather than words.

0	1	2	3	4
Not true at all for me				Very true for me

19. Some music reminds me of pictures or changing color patterns.

0	1	2	3	4
Not true at all for me				Very true for me

PHYSICAL ACTIVITY POSSIBLE SELVES

20. Sometimes I feel the presence of someone who is not physically there.

0	1	2	3	4
Not true at all for me				Very true for me

21. Sometimes images come to me without the slightest effort on my part.

0	1	2	3	4
Not true at all for me				Very true for me

Items 22 - 32 are descriptions of several images. Picture each image in your mind and then rate its vividness using the scale underneath.

Circle the number that describes the vividness of YOUR image.

22. Imagine the sun rising above the horizon into a hazy sky.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

23. Imagine clouds with a storm blowing up and flashes of lightening.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

24. Think of a store you often go to. Imagine the overall appearance of the store from the opposite side of the road.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

PHYSICAL ACTIVITY POSSIBLE SELVES

25. Imagine a window display at the store including shapes and details of individual items for sale.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

26. Imagine you are near the entrance to the store seeing the color, shape, and details of the door.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

27. Imagine that you go to the counter and the clerk serves you.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

28. Imagine the landscape of a country scene with trees, mountains, and a lake.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

29. Imagine the color and shape of the lake.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

PHYSICAL ACTIVITY POSSIBLE SELVES

30. Imagine a strong wind blowing on the trees and on the lake causing waves.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

31. Imagine feeling or touching sand.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

32. Imagine the taste of jelly.

0	1	2	3	4
No image at all	Vague & dim	Moderately clear & vivid	Reasonably clear & vivid	Perfectly clear & vivid

PHYSICAL ACTIVITY POSSIBLE SELVES

Appendix I: Consideration of Future Consequences Questionnaire (Strathman et al., 1994)

For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please write a "1" to the left of the question; if the statement is extremely characteristics of you (very much like you) please write a "5" next to the question. And, of course, use the numbers in the middle if you fall between the extremes. Please keep the following scale in mind as you rate each of the statements below.

1	2	3	4	5
extremely	somewhat	uncertain	somewhat	extremely
uncharacteristic	uncharacteristic		characteristic	characteristic

___ 1. I consider how things might be in the future, and try to influence those things with my day to day behaviour.

___ 2. Often I engage in a particular behaviour in order to achieve outcomes that may not result for many years.

___ 3. I only act to satisfy immediate concerns, figuring the future will take care of itself.

___ 4. My behaviour is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.

___ 5. My convenience is a big factor in the decisions I make or the actions I take.

___ 6. I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.

___ 7. I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.

PHYSICAL ACTIVITY POSSIBLE SELVES

___ 8. I think it is more important to perform a behaviour with important distant consequences than a behaviour with less-important immediate consequences.

___ 9. I generally ignore warnings about possible future problems because I think the problems be resolves before the reach crisis level.

___ 10. I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.

___ 11. I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.

___ 12. Since my day to day work has specific outcomes, it is more important to me than behaviour that has distant outcomes.

PHYSICAL ACTIVITY POSSIBLE SELVES

Appendix J: Physical Activity Task Self-Efficacy Questionnaire

How certain are you that you can engage in moderate- to strenuous-intensity physical activity for the following durations? Please rate your degree of confidence for each duration using the scales.

10 minutes

0	1	2	3	4	5	6	7	8	9	10
Cannot at all					Moderately					Highly certain
					can do					can do

20 minutes

0	1	2	3	4	5	6	7	8	9	10
Cannot at all					Moderately					Highly certain
					can do					can do

30 minutes

0	1	2	3	4	5	6	7	8	9	10
Cannot at all					Moderately					Highly certain
					can do					can do

40 minutes

0	1	2	3	4	5	6	7	8	9	10
Cannot at all					Moderately					Highly certain
					can do					can do

50 minutes

0	1	2	3	4	5	6	7	8	9	10
Cannot at all					Moderately					Highly certain
					can do					can do

60 minutes

0	1	2	3	4	5	6	7	8	9	10
Cannot at all					Moderately					Highly certain
					can do					can do

PHYSICAL ACTIVITY POSSIBLE SELVES

Appendix K: Self-Regulatory Efficacy Questionnaire

Please rate your confidence in your ability to engage in the following behaviours over the next 8 weeks.

1. Over the next 8 weeks, how confident are you that you can identify key factors that trigger lapses in your physical activity?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

2. Over the next 8 weeks, how confident are you that you can arrange your schedule in order to do your physical activity no matter what?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

3. Over the next 8 weeks, how confident are you that you will set realistic physical activity goals?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

4. Over the next 8 weeks, how confident are you that you will develop solutions to cope with potential barriers that can interfere with your physical activity?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

PHYSICAL ACTIVITY POSSIBLE SELVES

5. Over the next 8 weeks, how confident are you that you can make up times when you miss your physical activity sessions?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

6. Over the next 8 weeks, how confident are you that you will follow through with your physical activity for the week, even though it may be difficult at times?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

7. Over the 8 weeks, how confident are you that you will organize your time and responsibilities around each physical activity session no matter what?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

8. Over the next 8 weeks, how confident are you that you will resume your physical activity when it is interrupted and you miss physical activity for a few days or weeks?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

PHYSICAL ACTIVITY POSSIBLE SELVES

9. Over the 8 weeks, how confident are you that you can schedule your physical activity around your daily activities?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

10. Over the next 8 weeks, how confident are you that you will develop plans to reach your level of physical activity?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

11. Over the next 8 weeks, how confident are you that you will view any missed physical activity as challenges to overcome rather than failures?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

12. Over the next 8 weeks, how confident are you that you can set realistic goals for maintaining your level of physical activity?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident				Completely confident		

PHYSICAL ACTIVITY POSSIBLE SELVES

13. Over the next 8 weeks, how confident are you that if you do not do your exercise for a few days, you can readjust your goals to resume physical activity?

0	1	2	3	4	5	6	7	8	9	10
Not at all confident				Moderately confident			Completely confident			

Appendix L: Social Desirability Questionnaire

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is true or false as it pertains to you personally. As a reminder, your responses will remain confidential and will not be traced back to you.

1. I like to gossip at times. T/F
2. There have been occasions when I took advantage of someone. T/F
3. I'm always willing to admit it when I make a mistake. T/F
4. I always try to practice what I preach. T/F
5. I sometimes try to get even rather than forgive and forget. T/F
6. At times I have really insisted on having things my own way. T/F
7. There have been occasions when I felt like smashing things. T/F
8. I never resent being asked to return a favor. T/F
9. I have never been irked when people expressed ideas very different from my own.
T/F
10. I have never deliberately said something that hurt someone's feelings. T/F

PHYSICAL ACTIVITY POSSIBLE SELVES

Appendix M: Physical Activity Possible Self Self-Efficacy and Perceived Importance of Achieving One's Physical Activity Possible Self Questionnaire

Please circle the number that best represents your perceived capability of and importance to achieve your physical activity possible self.

1. How capable do you feel of achieving your physical activity possible self?

1	2	3	4	5	6	7
Not at all						Completely
capable						capable

2. How important is it you to to achieve your physical activity possible self?

1	2	3	4	5	6	7
Not at all						Very
important						important

3. How likely is it that you will achieve your physical activity possible self?

1	2	3	4	5	6	7
Not at all						Very
likely						likely

Appendix N: Physical Activity Possible Selves Reflection Questions

Adapted from Murru and Martin Ginis (2010)

Now that you have formed a physical activity possible self, please take some time to reflect upon and to answer the following questions. Please remember that while it is not imperative that you write a lot for each question, it is important that you try to answer each one.

* Question # 8 will only be given to the participants in the self-regulatory PA possible selves condition.

1. What was the first thing that came to mind when you imagined yourself as someone who regularly engages in physical activity? Please describe this image with as much detail as possible.
2. What does this image look like? Can you describe your appearance?
3. Can you describe the general health of this image of yourself?
4. Describe the energy level of this image.
5. What kind of attitude towards life does this image have?
6. What type of achievements do you see this image of yourself accomplishing?
7. Describe the relationships that this image may have.
- 8. Describes steps you could take and strategies you could use to achieve your physical activity possible self.**
- 9. Describes steps you could take and strategies you could use to help yourself achieve your physical activity possible self when challenging setbacks arise.**
10. Is there anything else that comes to mind when you think of this image?

PHYSICAL ACTIVITY POSSIBLE SELVES

Appendix O: Action and Coping Planning Questionnaire

Please reflect about the LAST TWO WEEKS and indicate the degree to which you agree with each of the following statements.

Over the last two weeks, I made detailed plans regarding when to engage in physical activity.

1	2	3	4
Completely Disagree	Disagree	Agree	Totally Agree

Over the last two weeks, I made detailed plans regarding where to engage in physical activity.

1	2	3	4
Completely Disagree	Disagree	Agree	Totally Agree

Over the last two weeks, I made detailed plans regarding how to engage in physical activity.

1	2	3	4
Completely Disagree	Disagree	Agree	Totally Agree

Over the last two weeks, I made detailed plans regarding how often to engage in physical activity.

1	2	3	4
Completely Disagree	Disagree	Agree	Totally Agree

Over the last two weeks, I made detailed plans regarding with whom to engage in physical activity.

1	2	3	4
Completely Disagree	Disagree	Agree	Totally Agree

PHYSICAL ACTIVITY POSSIBLE SELVES

Over the last two weeks, I made detailed plans regarding what to do if something interferes with my plans.

1	2	3	4
Completely Disagree	Disagree	Agree	Totally Agree

Over the last two weeks, I made detailed plans regarding how to cope with possible setbacks.

1	2	3	4
Completely Disagree	Disagree	Agree	Totally Agree

Over the last two weeks, I made detailed plans regarding what to do in difficult situations in order to act according to my intentions.

1	2	3	4
Completely Disagree	Disagree	Agree	Totally Agree



Over the last two weeks, I made detailed plans regarding which good opportunities for action to take.


1	2	3	4
Completely Disagree	Disagree	Agree	Totally Agree

Over the last two weeks, I made detailed plans regarding when I have to pay extra attention to prevent lapses.


1	2	3	4
Completely Disagree	Disagree	Agree	Totally Agree

Appendix P: Recruitment Slips

 uOttawa	<p>PARTICIPATE IN PHYSICAL ACTIVITY RESEARCH!</p> <p>(Even if you aren't active!)</p> <p>Researchers at the School of Human Kinetics at UOttawa are seeking volunteers for a research study.</p> <p>Give roughly 1 hour of your time to complete <u>online</u> questionnaires. To thank you, you will receive a \$ 10.00 gift card for Starbucks or Chapters-Indigo.</p> <p><u>You MAY be eligible if:</u></p> <ul style="list-style-type: none">• You are an adult living in Canada• You have had trouble maintaining a physically active lifestyle over the past year but would like to be more active• Your health status is such that you may increase your physical activity level• Only one person per household may participate <p>To verify your eligibility, visit: www.health.uottawa.ca/epsychology/survey/psfirst For questions or comments, contact Meghan: 613-562-5800 ext. XXXX or email XXX@uottawa.ca</p>	 Ottawa
--	---	---



Appendix Q: Newspaper Advertisement

 **Struggling to be active?**

uOttawa

If so, **YOU** may be a great participant for physical activity research being done at the University of Ottawa. Give roughly 1 hour of your time to complete 5 online questionnaires over 2 months. To thank you, you will receive a **\$10.00 gift card for Starbucks or Chapters-Indigo!**


You MAY be eligible if:

- You are an adult living in Canada
- You have had trouble maintaining a physically active lifestyle over the past year but would like to be more active
- Your health status is such that you may increase your physical activity level
- Only one person per household may participate

Note:
A few eligibility questions will be asked to ensure that individuals meet the study's eligibility criteria.

To verify your eligibility, visit:
www.health.uottawa.ca/epsychology/survey/psfirst

For questions or comments, contact Meghan:
613-562-5800 ext. _____ or email _____@uottawa.ca



10578287

Appendix R: Recruitment poster
(printed on legal size paper)



uOttawa

L'Université canadienne
Canada's university

Participate in physical activity research!

Give roughly **1 hour** of your time to complete the online study (questionnaires). To thank you, you will receive a:

\$ 10.00 gift card from Starbucks or Chapters-Indigo.

You MAY be eligible if:

- You are an adult living in Canada
- You have had troubling maintaining a physically active lifestyle over the past year but would like to be more active
- Your health status is such that you may increase your physical activity level
- One person per household may participate



Note: A few eligibility questions will be asked to ensure that individuals meet the study's eligibility criteria.

Your help is greatly appreciated!

To learn more about this study and/or to participate, please contact the Meghan at:

613-562-5800 ext. XXXX or XXX@uottawa.ca

Or go to: www.health.uottawa.ca/epsychoology/survey/psfirst

Physical activity study

Visit: www.health.uottawa.ca/epsychoology/survey/psfirst
Or contact Meghan @ XXXX@uottawa.ca

Physical activity study

Visit: www.health.uottawa.ca/epsychoology/survey/psfirst
Or contact Meghan @ XXXX@uottawa.ca

Physical activity study

Visit: www.health.uottawa.ca/epsychoology/survey/psfirst
Or contact Meghan @ XXXX@uottawa.ca

Physical activity study

Visit: www.health.uottawa.ca/epsychoology/survey/psfirst
Or contact Meghan @ XXXX@uottawa.ca

Physical activity study

Visit: www.health.uottawa.ca/epsychoology/survey/psfirst
Or contact Meghan @ XXXX@uottawa.ca

Physical activity study

Visit: www.health.uottawa.ca/epsychoology/survey/psfirst
Or contact Meghan @ XXXX@uottawa.ca

Physical activity study

Visit: www.health.uottawa.ca/epsychoology/survey/psfirst
Or contact Meghan @ XXXX@uottawa.ca

Physical activity study

Visit: www.health.uottawa.ca/epsychoology/survey/psfirst
Or contact Meghan @ XXXX@uottawa.ca

Physical activity study

Visit: www.health.uottawa.ca/epsychoology/survey/psfirst
Or contact Meghan @ XXXX@uottawa.ca

Appendix S: Facebook Recruitment Text

Hello! Welcome to this group about my research on physical activity. I am in the process of recruiting participants to complete my online study, and would greatly appreciate if you would take a few minutes to read the description of the study and consider becoming a participant. Also, feel free to invite others to join this group so they learn about the study.

Purpose of the Study: The goal of the study is to examine the effects of a brief physical activity intervention on subsequent physical activity behaviour. Study participants will complete online activities and questionnaires that will inform about physical activity and inquire about their habits, thoughts, and behaviours regarding physical activity. No lab sessions are required.

Participation: Participants will be asked to complete online activities and questionnaires at five time-points. There will be a few questionnaires directly following the eligibility screening for those individuals who are eligible. Then, the next time-point will require roughly 25 to 35 minutes, and the following time-points (2, 4, and 8 weeks later) will require around 10 to 15 minutes each. Participants will be asked to read information about physical activity and complete questionnaires. Since all of the activities and questionnaires will be online, they can be completed wherever one has Internet access.

Eligibility: Individuals MAY be eligible if:

- They are an adult living in Canada
- They have had trouble maintaining a physically active lifestyle over the past year but would like to be more active
- Their health status is such that they may increase their physical activity level
- Only one person per household may participate

Risks: 1) It is possible that some participants experience mild discomfort upon disclosing personal information, such as body weight, employment status, and level of physical activity. However, this information will be collected as part of a demographics questionnaire and will not be the focus of the study. Also, the subject matter of these questions is not entirely unusual and should not arouse anxiety or discomfort more than stimuli that people would encounter in their day-to-day lives. Participants' data will remain confidential.

2) Participants may be motivated to engage in more physical activity than they might otherwise. Physical activity can sometimes lead to physical discomfort and tiredness. However, the participants will not be instructed to engage in physical activity; if they do, it will be of their own volition.

3) Finally, completing the study may require roughly 45 to 70 minutes in total (divided over 5 time-points). This may be an inconvenience for some participants.

Benefits: To thank participants for completing the study, they will receive a **\$ 10.00 gift card for Starbucks or Chapters-Indigo** at the end of the study. Furthermore, they may help to contribute to the understanding of factors that influence physical activity participation and adherence. They may also learn more about physical activity.

PHYSICAL ACTIVITY POSSIBLE SELVES

Confidentiality and anonymity: Information that the participants share will remain confidential and anonymous.

If you are interested in participating in the study, please contact me, Meghan Marcotte, at:
(613) 562-5800 ext. XXXX or XXX@uottawa.ca.

Thank you! Your time and consideration are appreciated. If you know of anyone who might like to that part in this study, invite them to this group and/or pass along the study information and my contact information.

Appendix T: Information Sheet

Physical Activity Study - Description

Thank you for your interest in this study about physical activity. This section contains information about the study, the consent form with study details, and a few questionnaires. It should take roughly 10 to 15 minutes for you to complete.

Below is a brief description of the study. To begin the questionnaires, click on the button at the bottom of the page.

The purpose of this study is to collect information about people's physical activity and their thoughts regarding physical activity. To do so, participants will complete online questionnaires on this website. No lab sessions are required.

Participants will complete questionnaires at 5 time-points over 8 weeks. The total time commitment is roughly 55-80 minutes. The questionnaires can be answered wherever you have Internet access. If you complete this study, we will thank you by giving you a \$ 10.00 gift card for either Starbucks or Chapters-Indigo (your choice).

Thanks again for your interest in this research! If you have questions, don't hesitate to contact me:

Meghan Marcotte
Master's candidate, University of Ottawa, School of Human Kinetics
(613) 562-5800, ext. XXXX
XXX@uottawa.ca

Appendix U: Consent Form (English and French)

You have just completed the eligibility screening. We are pleased to inform you that you are eligible to participate in the study! Below is the consent form containing important information about the study. It is important that you indicate your consent at the bottom. Although the study is entirely in English, the consent form is in both English and French to ensure that it is will understood by participants with either official language as their primary language. After this, there are a few more questionnaires to complete, and then you will have finished Time 1!

Physical Activity Study - Consent Form

Please read this form carefully and feel free to contact the researchers via phone or email if you have any questions. /S'il vous plaît lisez cet formulaire attentivement et n'hésitez pas à contacter les chercheuses par courriel ou téléphone si vous avez des questions.

Principal investigator/Chercheure:

Meghan Marcotte:

Master's candidate, University of Ottawa, School of Human Kinetics

Candidate à la maîtrise, École des sciences de l'activité physique, Université d'Ottawa

(613) 562-5800, ext. XXXX

XXX@uottawa.ca

Supervisors/Superviseures:

Dr. Shaelyn Strachan:

Adjunct Professor, University of Ottawa, School of Human Kinetics

Assistant Professor, University of Manitoba, Faculty of Kinesiology and Recreation Management

Professeure auxiliaire, École des sciences de l'activité physique, Université d'Ottawa

PHYSICAL ACTIVITY POSSIBLE SELVES

Professeure adjointe, Faculty of Kinesiology and Recreation Management, University of Manitoba

(204) 474-XXXX

Invitation to Participate: I am invited to participate in the research study conducted by Meghan Marcotte and Dr. Shaelyn Strachan.

Invitation à participer: Je suis invité à participer au projet mené par Meghan Marcotte et Dre Shaelyn Strachan.

Purpose of the Study: The purpose of this study is to collect information about people's physical activity and their thoughts regarding physical activity. To do so, participants will complete online questionnaires. No lab sessions are required.

But de cette étude: La présente étude a l'objectif de rassembler de l'information sur l'activité physique des gens et de leurs pensées vis-à-vis l'activité physique. À ces fins, les participants devront compléter des questionnaires en ligne. Des sessions en laboratoire ne seront pas requises.

Participation: My participation will consist of completing online questionnaires at 5 time-points. The first time-point will require approximately 15 minutes to complete, the second time-point will require roughly 25-35 minutes to complete, and the following 3 time-points, which will be 2, 4, and 8 weeks after the second time-point, will require approximately 5 to 10 minutes each. Thus, the study will require roughly 55 to 80 minutes to complete in total, and this will span over 8 weeks. All of the questionnaires will be online so I can complete them wherever I have Internet access.

I will be asked to complete the questionnaires at each time-point at my earliest convenience after receiving the link in my e-mail (preferably within 48 hours).

Participation: Pour participer à cette étude, je devrai compléter des questionnaires en ligne à 5 moments (étapes) différents. La première étape nécessitera environ 15 minutes de votre temps, la deuxième étape nécessitera environ 25-35 minutes de votre temps, et les 3 prochaines étapes, qui seront 2, 4, et 8 semaines après la deuxième, nécessitera environ 5 à 10 minutes chaque. En tout, le projet nécessitera environ 55 à 80 minutes de votre temps, et ce, sur une période d'environ 8 semaines. Toutes les questionnaires seront en ligne donc je pourrai les compléter là où j'ai accès à l'Internet.

On me demandera de compléter les questionnaires le plus rapidement possible après l'envoi du lien via courriel (idéalement, dans un délai de 48 heures).

PHYSICAL ACTIVITY POSSIBLE SELVES

Risks: My participation in this study will involve the disclosure of personal information, for example my age, weight, and occupational status, and this may cause me to feel slightly uneasy. However, I acknowledge that all of the information that I provide will be kept in strict confidence, and no one other than the researchers will be able to trace my answers back to me.

Although participation in physical activity is not part of the study, some people may want to engage in physical activity as a result of their participation in the study. I understand that for some people, participating in physical activity may lead to temporary physical responses such as muscular discomfort or fatigue. Furthermore, physical activity may aggravate underlying medical conditions.

These risks associated with this study are not expected to surpass the risks associated with daily life.

A final risk is that the time commitment (approximately 55 to 80 minutes in total) may be an inconvenience for some participants.

Risques: Ma participation dans cette étude inclut le partage d'informations personnelles, comme par exemple, mon âge, mon poids corporel, et mon statut professionnel. Dès lors, certaines personnes pourraient se sentir un peu anxieuses. Par contre, je reconnais que toute l'information fournie restera confidentielle et que seulement les chercheuses seront capables de relier les réponses à mon identité.

Tandis que la participation à l'activité physique n'est pas une partie requise de l'étude, la participation à l'étude pourrait inciter des personnes à en faire. Je comprends que pour certaines personnes, faire de l'activité physique pourrait entraîner des effets secondaires tels que la douleur musculaire ou de la fatigue. Ainsi, l'activité physique pourrait aggraver des affections médicales sous-jacentes.

Il faut toutefois noter que les risques associés à ma participation à ce projet ne dépassent pas les risques encourus dans la vie quotidienne.

Finalement, le temps requis pour compléter l'étude (environ 55 à 80 minutes en total) pourrait être inconfortable pour certains participants.

Benefits: To be thanked for completing the study, I can choose to receive a \$ 10.00 gift card from Starbucks or from Chapters-Indigo. If I withdraw from the study, my participant number will be entered into a draw for a chance to win one of three \$ 10.00 gift cards for Starbucks or Chapters-Indigo.

Furthermore, I may be helping to contribute to the understanding of factors that influence physical activity participation and adherence. If I am interested, I can ask for the study results once they are available. Finally, I may also learn more about physical activity. It should be noted that these benefits are not guaranteed.

PHYSICAL ACTIVITY POSSIBLE SELVES

Bénéfices: Je serai remercié pour compléter l'étude avec une carte-cadeau de 10.00 \$ pour soit Starbucks ou Chapters-Indigo (à mon choix). Si je décide de me retirer de l'étude, mon numéro de participant sera mis dans un tirage pour la chance de gagner une de trois cartes-cadeaux de 10.00 \$ pour soit Starbucks ou Chapters-Indigo.

Ma participation peut contribuer au savoir relatif aux facteurs qui influencent la participation et le maintien de l'activité physique. Si je suis intéressé, je pourrai demander pour une copie des résultats de l'étude (une fois disponibles). Finalement, ma participation à cette étude pourrait augmenter mes connaissances relatives à l'activité physique. Il est important de noter que ces bénéfices ne sont pas garantis.

Confidentiality and anonymity: If I participate in this study, the information that I share will remain strictly confidential. I understand that my information and data will only be used to examine how a brief intervention effects subsequent physical activity behaviour and physical activity related variables. My data will remain confidential as the online Canadian server that will be used to collect the data is secure and password-protected. Also, the principal researcher will merge my data with that of the other participants and once the data analyses have been completed and the project is finished, my contact information will be dissociated from my responses. My contact information and my responses will be kept on a password-protected computer in the principal investigator's locked office. Any hard copies of my data will be kept in a locked filing cabinet in the principal investigator's locked office as well. Neither my name nor my contact information will appear in any publications stemming from this research.

The sole exception is that my first name and email address may be submitted to the Financial and Physical Resources Officer withing the Department of Human Kinetics at the University of Ottawa to complete the payment process for the gift card that I may receive.

Confidentialité et anonymat: Si je participerai à ce projet, l'information que je partagerai restera confidentielle et sera utilisée seulement pour examiner les effets de cette brève intervention sur l'activité physique et des variables reliées à l'activité physique. Ma confidentialité sera protégée puisque le serveur canadien qui serait utilisé pour la collecte de données est sécurisé et protégé avec un mot de passe. La chercheuse principale joindra mon information avec celle des autres participants. Une fois que les analyses des données seront complétées et le projet terminé, mes coordonnées seront dissociées de mes réponses. Mon information personnelle et mes réponses seront gardées sur un ordinateur protégé par un mot de passe et situé dans le bureau verrouillé de la chercheuse principale. Toutes versions papier des données seront gardées dans un classeur barré à clé dans le bureau verrouillé de la chercheuse principale. Ni mon nom ni mes coordonnées paraîtront dans des publications liées à ce projet. À la fin du projet, les données seront gardées pendant cinq ans dans un classeur barré à clé dans le bureau verrouillé de la superviseure Dre Shaelyn Strachan, en format papier et sur une clef USB. Après ce temps, toutes les données électroniques seront supprimées de façon permanente et les

PHYSICAL ACTIVITY POSSIBLE SELVES

papiers seront déchiquetés. La seule exception à cette confidentialité serait la possibilité que mon prénom et mon courriel pourraient être soumis à l'agente des ressources financières et physiques de l'école des sciences de l'activité physique à l'University d'Ottawa afin de compléter le processus de paiement pour ma carte-cadeau.

Conservation of data: As explained above, the electronic data will be stored on the principal researcher's password-protected computer and on a USB mass storage device in her locked office. The USB key will also be kept in a locked filing cabinet in her office, as will any hard copies of the data. When the project will be completed, the electronic data files stored on the computer will be destroyed. The USB mass storage device with original data and any hard copies of this data will then be stored in a locked filing cabinet in Dr. Shaelyn Strachan's locked office for five years. The principal investigator and the two supervisors will have access to this data. After this five-year period, all electronic data will be permanently deleted and any hard copies will be cross-shredded.

Conservation des données : Tel que décrit ci-haut, les fichiers de données électroniques seront gardées sur l'ordinateur de la chercheuse principale qui est protégé avec un mot de passe et sur une clef USB, qui seront dans le bureau verrouillé de la chercheuse. La clef USB sera gardée dans un classeur verrouillé dans ce bureau, ainsi que seront les versions papier des données. Lorsque le projet sera terminé, les données seront effacées de façon permanente de l'ordinateur. La clef USB et les versions papiers resteront barrées dans un classeur verrouillé dans le bureau barré de la superviseuse Dre Shaelyn Strachan pour cinq ans. La chercheuse principale et les deux superviseuses auront accès aux données. Après les cinq ans de conservation, les documents en papier seront déchiquetés et les données électroniques seront supprimées de façon permanente.

Incentive: If I complete the study's five time-points, I will be thanked by receiving a \$ 10.00 gift card for either Starbucks or Chapters-Indigo. At the end of the fifth time-point, I will be asked from which of the two merchants I would like to receive a \$ 10.00 gift card. The gift cards will be sent to me by email as this is a service that the two merchants offer and the researcher will have my email address already.

If I withdraw from the study without completing the five time-points, I will not necessarily receive a \$ 10.00 gift card. Instead, I will be thanked for completing some of the time-points by having my participant number put into a draw. Through this draw, I will have the chance to win one of three \$ 10.00 gift cards for either Starbucks or Chapters-Indigo. The winners will be drawn once all of the data collection is complete. I will only be notified if my participant number is chosen. The gift cards will be sent to the participants by email.

Prime : Si je complète les cinq étapes de l'étude, on me remerciera en me donnant une carte-cadeau de 10.00 \$ pour soit Starbucks ou Chapters-Indigo. À la fin de la cinquième étape de l'étude, on me demandera duquel marchand j'aimerais recevoir une carte-cadeau de 10.00 \$. La

PHYSICAL ACTIVITY POSSIBLE SELVES

carte-cadeau me sera envoyée par courriel puisque c'est un service offert par les deux marchands et la chercheuse aura déjà mon courriel.

Voluntary Participation: I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, I can ask that all of my data gathered until the time of withdrawal be deleted from computer files and the USB mass storage device, for hard copies to be cross-shredded, and for none of my data to be used in data analyses. If I withdraw from the study, the draw entries that I had accumulated up to that point will remain in the draw.

Participation volontaire et retrait du projet: Ma participation est entièrement volontaire et si je décide de participer, je pourrai me retirer du projet à tout moment et/ou refuser de répondre à des questions sans aucune pénalité. Si je décide de me retirer de l'étude, je pourrai demander que toutes les données à mon sujet soient supprimées de l'ordinateur et la clef USB, que les copies papiers soient déchiquetées, et qu'aucune de mes données soient utilisées dans les analyses des données. Si je me retire du projet, the coupons que j'avais accumulés jusqu'à ce point resteront dans le tirage.

Acceptance: I agree to participate in the above research study conducted by Meghan Marcotte of the School of Human Kinetics in the Faculty of Health Sciences at the University of Ottawa. This research is being done under the supervision of Dr. Shaelyn Strachan from the School of Human Kinetics in the Faculty of Health Sciences at the University of Ottawa.

Acceptation : J'accepte de participer à cette recherche menée par Meghan Marcotte à l'École des sciences de l'activité physique à l'Université d'Ottawa. Cette recherche est supervisée par Dr. Shaelyn Strachan à l'École des sciences de l'activité physique à l'Université d'Ottawa.

If I have any questions about the study, I may contact the researcher or her supervisors.

Pour toute question relative à ce projet de recherche, je pourrais contacter la chercheure principale ou les superviseuses.

Appendix V: Standard Physical Activity Possible Selves Intervention Script

(Adapted from Murru and Martin Ginis, 2010)

Please read carefully.

We are interested in your impression of yourself 5 to 10 years from now. More specifically, we would like you to think about yourself in the future as a person who is active and participates regularly in physical activity. You follow a lifestyle that includes physical activity on most days of the week at a moderate to vigorous intensity. When you think about yourself five to ten years from now as regularly engaging in physical activity (we will call this your physical activity possible self), what images come to mind? ***Please take a few minutes to imagine and think about this image before turning the page.*** On the following pages, you will be asked to answer some questions about this image.

Reminder: Moderate intensity physical activity is that which requires more than minimal effort but which is not exhausting, for example, fast walking, tennis, badminton, easy swimming, etc. Vigorous intensity physical activity produces a rapid heartbeat, for example, running, soccer, cross country skiing, vigorous swimming, etc. (Godin & Shephard, 1985).

Appendix W: Self-Regulatory Physical Activity Possible Selves Intervention Script

(Adapted from Murru and Martin Ginis, 2010)

The section in bold is that which differs from the version of the script that will be given to the standard PA possible selves intervention group.

Please read carefully.

We are interested in your impression of yourself 5 to 10 years from now. More specifically, we would like you to think about yourself in the future as a person who is active and participates regularly in physical activity. You follow a lifestyle that includes physical activity on most days of the week at a moderate to vigorous intensity. When you think about yourself five to ten years from now as regularly engaging in physical activity (we will call this your physical activity possible self), what images come to mind? Please take a few minutes to imagine and think about this **image and steps that you would take toward achieving this possible self, including what you will do, and how, when, where, with whom, as well as any other pertinent details. Also, consider the challenges that you may face in trying to become more physically active and to achieve your possible self, as well as how you will cope with these setbacks.** On the following pages, you will be asked to answer some questions about this image.

Reminder: Moderate intensity physical activity is that which requires more than minimal effort but which is not exhausting, for example, fast walking, tennis, badminton, easy swimming, etc. Vigorous intensity physical activity produces a rapid heartbeat, for example, running, soccer, cross country skiing, vigorous swimming, etc. (Godin & Shephard, 1985).

Appendix X: 2011 Canadian Physical Activity Guidelines for Adults (18-64 years; CSEP, 2011)

FOR ADULTS - 18 – 64 YEARS

Guidelines



To achieve health benefits, adults aged 18-64 years should accumulate at least 150 minutes of moderate- to vigorous-intensity aerobic physical activity per week, in bouts of 10 minutes or more.



It is also beneficial to add muscle and bone strengthening activities using major muscle groups, at least 2 days per week.



More physical activity provides greater health benefits.

Let's Talk Intensity!

Moderate-intensity physical activities will cause adults to sweat a little and to breathe harder. Activities like:

- Brisk walking
- Bike riding

Vigorous-intensity physical activities will cause adults to sweat and be 'out of breath'. Activities like:

- Jogging
- Cross-country skiing

Being active for at least 150 minutes per week can help reduce the risk of:

- Premature death
- Heart disease
- Stroke
- High blood pressure
- Certain types of cancer
- Type 2 diabetes
- Osteoporosis
- Overweight and obesity

And can lead to improved:

- Fitness
- Strength
- Mental health (morale and self-esteem)

Pick a time. Pick a place. Make a plan and move more!

- Join a weekday community running or walking group.
- Go for a brisk walk around the block after dinner.
- Take a dance class after work.
- Bike or walk to work every day.
- Rake the lawn, and then offer to do the same for a neighbour.
- Train for and participate in a run or walk for charity!
- Take up a favourite sport again or try a new sport.
- Be active with the family on the weekend!

**Now is the time. Walk, run,
or wheel, and embrace life.**



Appendix Z: Debriefing Form

Debriefing form

Thank you very much for participating in this study! Your participation is very valuable and contributes greatly to this research.

We ask that you please not share the information in this form with others who may be participating in this study. It is important that participants complete the study without knowledge of its specific purpose.

Up until this point, you have been told that the purpose of this study was to collect information about people's physical activity and their thoughts regarding physical activity. Now that the study is over, we can give you more specific information about it. We were examining the differences between three different conditions (2 intervention conditions and 1 control condition) on physical activity levels and related measures (such as physical activity intentions) following the computer-based interventions. Thus, the true purpose of the study was slightly different than that which had been communicated. As finding ways to increase physical activity levels has long been a focus in health and kinesiology research, this study was developed to contribute to this important line of research.

The three conditions were different as one group (the 'control' group) was asked to read a copy of the Canadian Physical Activity Guidelines for Adults, another group (the standard physical activity possible selves group) received these guidelines and a physical activity possible selves image generation task with eight questions to answer about their generated image, while the third group (the self-regulatory physical activity possible selves group) received the guidelines and a similar image generation task but which had an added emphasis on forming action and coping plans that would help people advance towards their physical activity possible self. This last group also had two additional questions to answer about their image, which had them describe the action and coping plans they had formed.

The comparison of these different interventions was inspired by past research on possible selves, particularly in the physical activity domain. *Possible selves* are mental images of one's self in the future that can take the form of what individuals expect, want, or fear becoming. These vivid images have been theorized and found to influence one's motivation, self-regulation, and behaviour. In the realm of youth academics, interventions using the possible selves construct have been shown to increase motivation to achieve academic success, to increase engagement in positive academic behaviours (e.g., greater school attendance, participation in class, more time spent doing homework), and to ultimately lead to great academic success. In the domain of physical activity, interventions that have used the possible selves construct to increase physical activity in their participants have shown moderate success. Thus, in this study, we sought to

PHYSICAL ACTIVITY POSSIBLE SELVES

compare the protocol used in past physical activity possible selves interventions with a similar, self-regulatory intervention that may lead to even better results. The function of the control condition was to compare both of these interventions to a simple task that may also be used to promote physical activity, but that does not include the possible selves construct. We also explored whether this type of intervention could be effective when delivered online instead of in person.

We do not yet have all of the study results, but we look forward to seeing how our research may contribute to the knowledge about physical activity interventions.

As some information about the true purpose of the study has been kept from you until this point, you have the right to withdraw your data. In this case, your data will be destroyed and not used in the analyses. Choosing to withdraw will not lead to any negative consequences for you and you will still receive a \$ 10.00 gift card if you have completed the whole study. If you want your data removed, please contact the principal investigator.

Also, as you were in one of the study's three conditions, you may ask to complete the intervention materials of one of the other two conditions if you so desire. To do so, please contact the principal investigator.

If you have questions or comments about this study, please contact the researcher or the research supervisors, whose contact information is listed below. Again, we ask that you not share the information presented here. It is possible that if participants know the whole purpose of the study, the results may be affected.

Thanks again!

Principal investigator:

Meghan Marcotte, Masters candidate:

University of Ottawa, School of Human Kinetics

(613) 562-5800, ext. XXXX

XXXI@uottawa.ca

Supervisor:

Dr. Shaelyn Strachan:

University of Manitoba, Faculty of Kinesiology and Recreation Management

PHYSICAL ACTIVITY POSSIBLE SELVES

(204) 474-XXXX

We would also like to assure you that the University of Ottawa Social Science and Humanities Research Ethics Board has approved of this research. If you have any questions regarding your rights as a participant, you may contact the:

Protocol Officer for Ethics in Research

University of Ottawa

550 Cumberland Street, Room 159

Ottawa, ON

K1N 6N5

(613) 562-5841 or ethics@uottawa.ca

Chapter IX: Tables and Figures

Table 1: Transformed variables

Transformed variables, by type of skewness and kurtosis

Type of skewness/kurtosis		Transformation equation	Variables transformed
Positive skewness/kurtosis	Moderate	$NEWX = \sqrt{X}$	Baseline, Time 3, and Time 4 levels of moderate, strenuous, and moderate plus strenuous PA
	Substantial	$NEWX = LG10(X)$	Age
Negative skewness/kurtosis	Moderate	$NEWX = \sqrt{K - X}$	Pre and post-intervention intentions to increase PA over the next 8 weeks
			Post-intervention importance of achieving PA possible self.

Note: only transformed variables that were used in final analyses were included in this table.

C = a constant added to each score so that the smallest score is 1.

K = a constant from which each score is subtracted so that the smallest score is 1; usually equal to the largest score +

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 2: Descriptive statistics and baseline variables

Between-Condition Comparison on Demographic and Baseline Variable Conditions

Variable	Control Condition (n=86)	Standard Condition (n=81)	Self-Regulatory Condition (n=77)	Total	p-value
<u>Demographics</u>					.788
Sex					
Male (%)	15 (17.4)	16 (19.8)	12 (15.6)	43 (17.62)	
Female (%)	71 (82.6)	65 (80.2)	65 (84.4)	201 (82.38)	
Cultural Status					.199
White (%)	68 (79.1)	56 (69.1)	52 (67.5)	176 (72.13)	
Other (%)	18 (20.9)	25 (30.9)	25 (32.5)	68 (27.87)	
Marital Status					.003
Single (%)	51 (59.3)	64 (79.0)	42 (54.5)	157 (64.34)	
Married (%)	35 (40.7)	17 (21.0)	35 (45.5)	87 (35.66)	
Level of education					.776
High school (%)	23 (26.7)	26 (32.1)	19 (25.0)	68 (27.87)	
College/vocational/ undergraduate degree (%)	39 (45.3)	38 (46.9)	38 (50.0)	115 (51.34)	
Postgraduate (%)	24 (27.9)	17 (21.0)	19 (25.0)	60 (24.59)	
Employment Status					.229
Full-time (%)	35 (41.2)	19 (23.5)	26 (33.8)		
Part-time (%)	12 (14.1)	16 (19.8)	9 (11.7)		
Self-employed (%)	7 (8.2)	5 (6.2)	5 (6.5)		
A student	28 (32.9)	34 (42.0)	28 (36.4)		
Other	3 (3.5)	7 (8.6)	9 (11.7)		
				<i>Mean (SD)</i>	
Age (SD)	30.14 (10.95)	28.47 (10.77)	30.01 (10.84)	29.55 (10.84)	.551
BMI (SD)	26.19 (5.56)	24.85 (6.01)	25.28 (5.31)	25.46 (5.64)	.291
<u>Social Cognitions</u>					
CFC (SD)	3.46 (.60)	3.50 (.64)	3.40 (.55)	3.46 (.60)	.555
Social Desirability (SD)	4.84 (2.25)	4.63 (2.05)	4.57 (2.21)	4.68 (2.17)	.713
Imagery Ability (SD)	66.59 (18.57)	64.24 (21.19)	69.77 (24.41)	66.81 (21.44)	.268
Baseline PA Task SE (SD)	6.18 (2.34)	5.85 (2.54)	6.10 (2.58)	6.05 (2.49)	.664
Baseline SR SE (SD)	6.38 (1.62)	6.16 (1.69)	6.10 (1.71)	6.22 (1.67)	.515
<u>Baseline Variables</u>					
No. bouts of 15 mins stren PA per week (SD)	2.07 (2.38)	2.25 (2.31)	1.87 (2.02)	2.06 (2.24)	.567
No. bouts of 15 mins mod PA per week (SD)	3.66 (3.60)	3.19 (3.13)	3.25 (2.67)	3.37 (3.13)	.578
No. bouts of 15 mins mild PA per week (SD)	4.89 (4.30)	4.65 (4.32)	5.34 (4.31)	4.96 (4.31)	.597
Intentions to increase PA over the next 8 weeks	5.49 (1.30)	5.38 (1.60)	5.58 (1.49)	5.48 (1.46)	.694

Note. CFC = consideration of future consequences; PA = physical activity; SE = self-efficacy; SR = self-regulatory

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 3: Results: Physical Activity Task Self-Efficacy

Ns, Means and Standard Deviations of Self-Reported PA Task Self-Efficacy Pre- and Post- the Intervention, by Participant Condition, Marital Status, and Education Status

Participant Condition ^a	Marital Status ^b	Education Status ^c	<i>N</i>	Pre <i>M (SD)</i>	Post <i>M (SD)</i>
Control condition	Single	High school or less	21	6.83 (1.66)	7.39 (1.42)
		College/university	20	6.20 (2.25)	6.53 (2.17)
		Beyond college/university	10	6.28 (2.78)	6.65 (2.70)
		Total	51	6.47 (2.13)	6.91 (2.02)
	Married	High school or less	2	4.92 (4.36)	4.83 (3.54)
		College/university	19	5.47 (2.40)	5.71 (2.64)
		Beyond college/university	14	6.26 (2.93)	6.54 (2.65)
		Total	35	5.76 (2.66)	5.99 (2.65)
Total	Total	86	6.18 (2.37)	6.53 (2.33)	
Standard condition	Single	High school or less	24	6.44 (2.28)	6.81 (2.29)
		College/university	28	5.96 (2.44)	6.42 (2.35)
		Beyond college/university	12	6.07 (2.12)	6.20 (2.21)
		Total	64	6.16 (2.33)	6.53 (2.28)
	Married	High school or less	2	1.25 (1.30)	1.42 (1.53)
		College/university	10	5.67 (2.56)	6.52 (2.53)
		Beyond college/university	5	4.00 (3.47)	4.27 (3.59)
		Total	17	4.66 (3.00)	5.25 (3.18)
Total	Total	81	5.85 (2.54)	6.26 (2.53)	
Self-Regulatory condition	Single	High school or less	15	6.84 (2.04)	7.13 (2.27)
		College/university	18	5.46 (2.77)	6.08 (2.38)
		Beyond college/university	8	7.27 (2.20)	7.19 (2.38)
		Total	41	6.32 (2.49)	6.68 (2.34)
	Married	High school or less	4	5.29 (.39)	5.88 (.50)
		College/university	20	6.21 (2.64)	6.72 (2.58)
		Beyond college/university	11	5.05 (3.03)	5.08 (3.29)
		Total	35	5.74 (2.62)	6.10 (2.74)
Total	Total	76	6.05 (2.55)	6.42 (2.53)	

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 4: Results: Physical Activity Self-Regulatory Efficacy and Intentions to Increase Physical Activity

Ns, Means, and Standard Deviations of PA Self-Regulatory Efficacy and Intentions to Increase PA over the Next Eight Weeks Before and After the Intervention and Control Condition Materials, by Participant Condition

Participant Condition	PA self-regulatory efficacy		Intentions to increase PA		
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	
	<i>N</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	
Control Condition	86	6.38 (1.62)	6.48 (1.72)	5.49 (1.30)	5.63 (1.16)
Standard Condition	81	6.16 (1.69)	6.47 (1.80)	5.38 (1.59)	5.74 (1.43)
Self-Regulatory condition	77	6.10 (1.71)	6.50 (1.96)	5.58 (1.49)	5.82 (1.31)
Total	244	6.22 (1.67)	6.48 (1.82)	5.48 (1.46)	5.73 (1.30)

Note. PA = physical activity.

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 5: Results: Physical activity over the 4 Weeks Post-Intervention

Ns, Means and Standard Deviations for PA Levels at Baseline and over the Four Weeks Post Intervention, by Participant Condition and Marital Status

Participant Condition	Marital Status	Mean weekly MVPA over the past year		Mean weekly MVPA over the four weeks post intervention	
		<i>N</i>	PA (<i>SD</i>)	<i>N</i>	PA (<i>SD</i>)
Control Condition	Single	51	6.76 (5.96)	44	7.23 (5.96)
	Married	35	4.49 (4.72)	34	4.47 (3.64)
	Total	86	5.84 (5.57)	78	6.03 (5.23)
Standard Condition	Single	64	5.84 (5.12)	54	8.17 (7.37)
	Married	17	4.38 (4.32)	17	5.95 (5.37)
	Total	81	5.54 (4.97)	71	7.63 (6.98)
Self-Regulatory Condition	Single	42	5.71 (4.36)	38	9.58 (7.85)
	Married	35	4.56 (3.63)	31	6.81 (5.53)
	Total	77	5.14 (4.07)	69	8.33 (7.00)

Note. MVPA = moderate plus strenuous physical activity; PA = physical activity.

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 6: Results: Physical Activity over the Four Weeks Post Intervention (Combined Intervention Conditions)

Ns, Means, and Standard Deviations of PA Levels at Baseline and Four Weeks Post Intervention, Comparing the Combined Intervention Conditions^a to the Control Condition, by Marital Status

Participant Condition	Marital Status	Mean weekly MVPA over the past year		Mean weekly MVPA over the four weeks post intervention	
		<i>N</i>	<i>PA (SD)</i>	<i>N</i>	<i>PA (SD)</i>
Control Condition	Single	51	6.76 (5.96)	44	7.23 (5.96)
	Married	35	4.49 (4.72)	34	4.47 (3.64)
	Total	86	5.84 (5.57)	78	6.03 (5.23)
Combined Intervention Conditions	Single	106	5.79 (4.81)	91	8.76 (7.60)
	Married	52	4.43 (3.83)	48	6.50 (5.43)
	Total	158	5.34 (4.54)	139	7.98 (6.99)

Note. MVPA = moderate plus strenuous physical activity; PA = physical activity.

^a The standard and self-regulatory conditions were combined to compare the effects of both intervention conditions to the control condition.

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 7: Results: Action and Coping Planning

Ns, Means and Standard Deviations for Degree of Action Planning and Coping Planning Over the 2 and 4 weeks Post Intervention, by Participant Condition

Participant Condition	<i>N</i>	Action Planning ^a		Coping Planning ^a	
		Over the 2 weeks post intervention <i>M (SD)</i>	Over the 4 weeks post intervention <i>M (SD)</i>	Over the 2 weeks post intervention <i>M (SD)</i>	Over the 4 weeks post intervention <i>M (SD)</i>
Control Condition	77	2.59 (.67)	2.60 (.74)	2.29 (.58)	2.36 (.69)
Standard Condition	69	2.51 (.81)	2.61 (.81)	2.22 (.68)	2.34 (.75)
Self-Regulatory Condition	67	2.49 (.80)	2.56 (.79)	2.17 (.71)	2.19 (.73)
Total	213	2.53 (.76)	2.59 (.78)	2.23 (.66)	2.30 (.72)

^a Action and coping planning values represent composite scores of several items. On the scales, 1 represents no planning and 4 represents a lot of planning. See Appendix O.

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 8: Results: Possible Self Self-Efficacy, Importance of Achieving One’s PA Possible Self

Ns, Means, and Standard Deviations of PA Possible Self Self-Efficacy and Importance of Achieving one’s PA Possible Self, by Participant Condition.

Participant Condition	<i>N</i>	<u>PA possible self self-efficacy</u> <i>M (SD)</i>	<u>Importance^a</u> <i>M (SD)</i>
Standard Condition	81	5.53 (1.17)	6.05 (1.20)
Self-Regulatory Condition	77	5.25 (1.41)	5.88 (1.27)
Total	158	5.40 (1.30)	5.97 (1.23)

Note. PA = physical activity.

^a The values noted under *importance* reflect the untransformed variable, whereas the transformed importance variable was used in the analysis.

Table 9: Variables Used in the Mediation Analyses

Variables used in the Mediation Analyses Testing Action Planning and Coping Planning as Potential Mediators between Participant Condition and PA Four Weeks Post-Intervention

Mediation analysis	Predictor	Mediator	Outcome	Covariates	Moderators
Action planning as a mediator between participant condition and PA ^a	Participant condition	Action planning at two weeks	PA ^a	Steps 1, 3 and 4: Age, BMI, baseline PA Step 2: No covariates	Steps 1, 3 and 4: Marital status Step 2: No moderators
Coping planning as a mediator between participant condition and PA ^a	Participant condition	Coping planning at two weeks	PA ^a	Steps 1, 3 and 4: Age, BMI, baseline PA Step 2: Imagery ability	Steps 1, 3 and 4: Marital status Step 2: No moderators

Note. PA = physical activity; BMI = body mass index

^aTotal of the participants' average number of weekly moderate and strenuous PA sessions of more than 15 minutes over the four weeks post intervention.

Figure 1: Results: Mediation Analysis with Action Planning

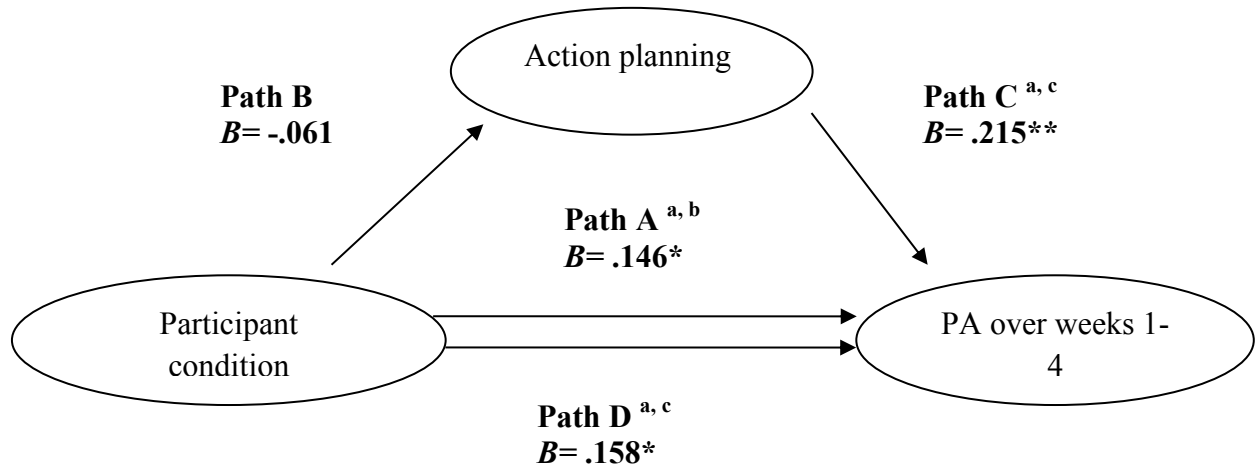


Figure 1 – Model testing action planning as a possible mediator between participant condition and PA over the four weeks following the intervention.

^a Controlling for baseline PA, BMI and age.

^b Baseline PA was a significant covariate: $\beta = .350$, $p \leq .001$

^c Baseline PA was a significant covariate: $\beta = .316$, $p \leq .001$

* $p \leq .05$, 2-tailed.

** $p \leq .001$, 2-tailed.

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 10: Results: Mediation Analysis with Action Planning

Table 10. Results of mediation analysis with action planning.

Step	R^2	R^2 change	F	F change	p
1 (Path A)	.173	.021	8.860	5.413	.021
2 (Path B)	.004	.004	.828	.828	.364
3 (Path C)	.197	.045	10.143	11.610	.000
4 (Path D)	.222	.025	9.770	6.545	.000

$N = 244$.

Figure 2: Results: Mediation Analysis with Coping Planning

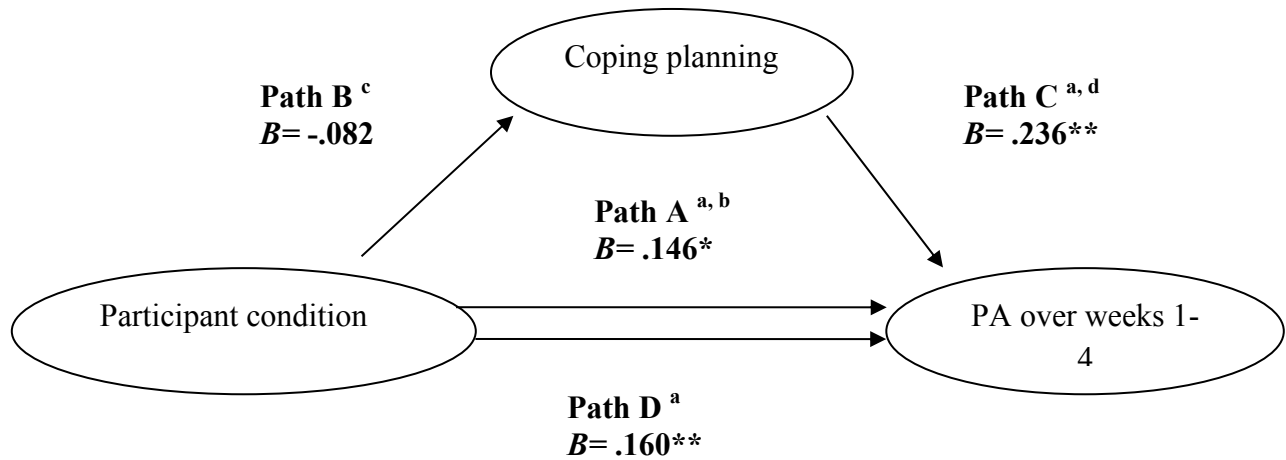


Figure 2 – Model testing coping planning as a possible mediator between participant condition and PA over the four weeks following the intervention.

^a Controlling for baseline PA, BMI and age.

^b Baseline PA was a significant covariate: $\beta = .350$, $p \leq .001$

^c Imagery ability was a significant covariate: $\beta = .197$, $p \leq .01$

^d Baseline PA was a significant covariate: $\beta = .299$, $p \leq .001$

* $p \leq .05$, 2-tailed.

** $p \leq .001$, 2-tailed.

PHYSICAL ACTIVITY POSSIBLE SELVES

Table 11: Results: Mediation Analysis with Coping Planning

Table 11. Results of mediation analysis with coping planning.

Step	R^2	R^2 change	F	F change	p
1 (Path A)	.173	.021	8.860	5.413	.021
2 (Path B)	.044	.007	5.097	1.590	.209
3 (Path C)	.204	.053	10.635	13.697	.000
4 (Path D)	.230	.025	10.234	6.751	.010

$N = 244$.