

**Back to the Future: The Role of Possible Selves in Developing a Physical Activity Identity in
Newly Retired Individuals**

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Thesis submitted to the
Faculty of Graduate and Postdoctoral Studies
in partial fulfillment of the requirements
for the Doctorate in Philosophy degree in Human Kinetics

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GENERAL ABSTRACT

Retirement affords retirees increased time for participation in salutary activities like physical activity. Yet, evidence is mixed as to whether or not retirees use this time to increase their participation in physical activity. Greater knowledge of the factors affecting physical activity participation in retirement is needed. Retirement is also a life transition ripe with opportunity to redefine one's identity and place greater attention on health-enhancing behaviours. Thereupon, this dissertation was rooted in the self literature, as self perceptions such as *identity* and *possible selves* may be particularly relevant for understanding physical activity in retired individuals. As a result, the first aim of this dissertation sought to confirm, in a preliminary study (*Study 1*), the relationship between possible selves, physical activity identity and physical activity in retirees. Through questionnaire data collected concurrently, *Study 1* showed that identity and possible selves were related to physical activity (*Article 1*). Moreover, positive associations were found between possible selves focused on physical activity and physical activity identity. Subsequently, the relationships between these variables were further probed to determine whether exercise identity mediated the relationship between physical activity possible selves and physical activity (*Article 2*). Questionnaire data collected across three time points (one month apart) showed that identity mediated the relationship between possible selves and behaviour - all related to physical activity. Together, these findings represented an important first step toward designing a relevant intervention for retirees which informed the second aim of this dissertation (*Study 2*). A possible selves intervention designed to increase physical activity identity and physical activity was tested (*Article 3*). Changes in these variables were compared across three groups of an experimental design: a *repeated* possible selves intervention, a *one-time* possible selves intervention, and a control group. All groups reported marginally higher levels of physical activity and physical activity identity, inconsequential to group assignment. Overall, the present dissertation makes

contributions to the self literature especially with regards to new retirees. Nevertheless, limitations are acknowledged and discussed. Finally, future research avenues are presented.

ACKNOWLEDGMENTS

I suspect that most Ph.D candidates look forward to writing their acknowledgments. I'm no exception. As I was inching closer to finishing my dissertation, my thoughts turned to the lines you are now reading. After focusing on the serious, intellectual side of my dissertation, enjoying the fun side that is thanking my support squad was finally within reach (and yes, Ph.D dissertations are just like *Frosted Mini-Wheats* cereal with both fun and serious sides). Writing this section, however, generated a fair dose of stress. Many people duly merit acknowledgment. I hope the following lines can fully express how thankful I am for all the support and opportunities I received.

While completing a Ph.D is most obviously an academic pursuit, I must start by thanking people *outside* academe. I express mucho gratitude to my mother Ginette and my father Dennis. Your support was (and still is) immeasurable and unshakeable. I won't lie: there were some tough days on my Ph.D journey. On a few occasions, I came home early from the lab and said, semi-jokingly: "Today I either quit early or quit altogether". Unfazed by my comment - it appears I don't have Meryl Streep's dramatic panache - you encouraged me to never, ever give up. Thank you, too, for the many batches of spaghetti and cheese with cut up pieces of hot dogs. Spaghetti makes everything better! You're also the original retirees who inspired my research program. Thanks for the insight! On the home front, I would be remiss if I didn't acknowledge a few people . . . with fur. Karo, thank you for rolling around on my clothes every morning, providing the purr therapy, and being a fun *little ball of fur*¹. Warm-hearted thoughts go out to the late, great Poutine (1994-2009) and Katou (1994-2015). You were cherished companions for the greater part of my

¹ Fans of *The Big Bang Theory* will recognize the reference to *Soft Kitty*, a comforting song for Dr. Sheldon Cooper.

life. You are most certainly not forgotten. I must also thank the rest of my familia. Thank you to Grandpa René, Grandma Georgette, Uncle Gilles, Aunt Manon, Aunt Sylvie, and my cousins.

Friends near and dear to my heart warrant a big thank you. I thank my official travel companions Martin Côté and Stéphane Doucet. Thank you for your incredible support and friendship. Whether by train, plane, or automobile, you are the curators of fun, laughter, and awesome food finds! I extend warm thanks to Flora Nassrallah. Our conversations about academe and *Survivor* are always so interesting! Thank you to Phil Boulay and Matthew Wakim for being so awesome and supportive! I also thank Catherine Welsh. Thank you for the many lunches and for sharing my obsession for *Kind* bars! Finally, I have friendly and incredibly loyal supporters in Sylvia de Bruycker and Sylvio Granger as well as in Francine Séguin and Yves Dubé. Your perpetual curiosity, flair, and kindness are inspiring. Thank you for being in my life!

Turning now to academic people, I thank my doctoral co-supervisors, Drs. Shaelyn Strachan and Michelle Fortier. Shae, I must admit I panicked for a moment when you announced that you were moving back to Winnipeg. I was afraid that our long-distance arrangement would make things challenging. I'm happy we made it work! You are a kind, thoughtful, and generous person. I really enjoyed working with you. Thank you for the advice, ninja editing skills, and tireless support. Our passion for *Saje Natural Wellness* products and *Purdys Chocolatier* goodies is also pretty epic! Michelle, what can I say? You're like the Grand Jedi Master Yoda of the School of Human Kinetics. It's been a joy having you as a co-supervisor. Thank you for your wisdom and perspective through the years. I can feel the Force. Thank you for the many fits of laughter and the intense conversations about *John Fluevog* shoes and footwear in general! Turning to my thesis committee, I want to thank Drs. Tanya Forneris and Bradley W. Young. From day one, you were part of my dream team. I thank Dr. Alex Dumas for coming on board as internal-external reviewer. Finally, I thank Dr. Steven Bray, external reviewer extraordinaire. I extend my gratitude to the

professors of the School of Human Kinetics for their encouragement over the years. I would be remiss if I didn't thank the inimitable Anne Millette. Thank you for your support and all the sweet treats - especially your cheesecake. Thank you to Bettyna Belizaire, Rabéa Naceri, Patricia Laliberté, Catherine Coulombe, and Annik St-Jean: you keep us grad students organized with our many forms! I also salute Lise O'Reilly, the larger-than-life (now retired) academic assistant. At the Teaching and Learning Support Service, I thank Nancy Vézina for the inspiring course on undergraduate teaching and for inviting me year after year to the teaching assistants' orientation days. On the subject of teaching, it was a real privilege and pleasure to teach APA 6905. I thank my squad of 18 remarkable students. Thank you to all the students with whom I interacted as part of my TA duties! At the research ethics board, I tip my hat metaphorically (I don't wear hats) to Catherine Paquet, Dr. Daniel Lagarec, Riana Marcotte, Dr. Kim Thompson, Germain Zongo, Mélanie Rioux, and my peeps on the board. It was truly gratifying to serve on the board as student member.

I've had the great fortune of working alongside remarkable colleagues. In particular, I express my appreciation to Margaret Dupee. I've enjoyed our countless conversations on academic matters, meditation, or feng shui. I'm happy to have you as a friend, colleague, and neighbour. I thank my former office mate Meghan Marcotte. I miss your uncontrollable fits of laughter. I also thank Kara Stelfox. Our talks were always so uplifting. And girl, you can bake! Thank you for the many pies and brownies. Many thanks go out to Kylie McNeil. I enjoyed our lunches together and our conversations about make-up and *Sephora*! My support crew is extensive and I would be remiss if I didn't thank the following people, whose presence on the fourth floor of Montpetit Hall was vastly appreciated. My sincerest thanks go out to (in no particular order): Nick Speranzini, Stephanie Saunders, Erin Wing and Amanda Wurz (thank you, ladies, for your help with the "load bearing contraption"), Jean-Christian Gagnon, Ana Vrzic, Katie Eastman, Karam Chima, Taylor

McFadden, Courtney Post, Rafael Tedesqui, Scotty Rathwell, Kelsey Kendellen, Colin Deal, Corliss Bean, Rob Williamson, Alex Lithopoulos, James Vallerand, Tanya Halsall, and Bryce Barker.

Finally, I thank people who have no idea who I am! I want to acknowledge the people at SSHRC for the Joseph-Armand Bombardier Canada Graduate Scholarship. A big thank you also goes out to the Government of Ontario for the Ontario Graduate Scholarship. Let there be no doubt: the financial support was significant and much appreciated. Likewise, CUPE local 2626 and the Faculty of Health Sciences provided valuable funds for conference trips. My dissertation acknowledgements wouldn't be complete if I didn't thank a rock star². This time around, I thank singer-songwriter and guitar extraordinaire, Brian Ray. Your group's *The Bayonets* boisterous debut album, *Crash Boom Bang*, was a steady companion during my writing sessions. I thank Dr. Lorie Owens, Dr. Jennifer Polk, and Dr. Nathan C. Hall for the insight, humour, and inspiration shared daily on Twitter! At long last, I thank the numerous retirees who participated in my studies. Thank you for your time and for sharing your retirement experiences. I was touched by your many words of support and encouragement.

Dear readers, are you still with me? By now you probably realized that I'm a dessert-loving, cosmetics-obsessed, meditating yet talkative pet parent. I'm also a bit of a rebel, disregarding APA style rules - especially the one on conciseness! Above all else, I hope I conveyed how appreciative I am for the support and opportunities I received that, in some form or another, helped me push through my Ph.D program.

Mélanie

² Some people in my squad will no doubt remember that I dedicated my Master's thesis to and thanked Sir Paul McCartney.

DEDICATION

For my parents, Ginette and Dennis Perras.

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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

Benefits of Physical Activity

It is no secret that physical activity³ is associated with preventive benefits against several chronic health conditions like cardiovascular disease, type 2 diabetes, high blood pressure, and premature mortality in general (Janssen, Carson, Lee, Katzmarzyk, & Blair, 2013; Warburton, Charlesworth, Ivey, Nettlefold, & Bredin, 2010). Likewise, an ever-increasing body of research draws attention to the benefits of physical activity for older adults. While the preventive benefits against all-cause mortality extend to this group (Gebel, Ding, Chey, Stamatakis, Brown, & Bauman, 2015), other benefits concerning physical and cognitive functioning are emerging from the literature (Carvalho, Rea, Parimon, & Cusack, 2014; Yorston, Kolt, & Rosenkranz, 2012). Above all else, one particularly encouraging finding for older adults is that the uptake of physical activity later in life can benefit overall health (Hamer, Lavoie, & Bacon, 2014).

Physical Activity in Retirement

While findings show that physical activity rates usually decline with age (Milanović, Pantelić, Trajković, Sporiš, Kostić, & James, 2013; Schrack et al., 2014), retirement is a life transition that tenders the opportunity - and perhaps even the "favourable circumstances" to adopt or increase health behaviours like physical activity (McDonald, O'Brien, White, & Sniehotta, 2015). As Lahti, Laaksonen, and Rahkonen (2011) highlight, lack of time for physical activity - a known barrier to physical activity for working individuals (i.e., Trost, Owen, Bauman, Sallis, & Brown, 2002) - may become less relevant for retirees. What more, Barnett, Guell, and Ogilvie (2012) reviewed evidence suggesting that retirement coalesces with increased concerns and awareness about maintaining health and forestalling physical and mental decline. Moreover, and

³ Throughout this dissertation, I focus on *physical activity* in lieu of *exercise*. Previous work by Strachan, Brawley, Spink, and Glazebrook (2010) demonstrate that older adults find physical activity more self-descriptive of their active pursuits than exercise. Hence, the term physical activity was deemed more inclusive. As far as how physical activity is defined, I retain the definition proposed by Caspersen, Powell, and Christenson (1985) - "any bodily movement produced by skeletal muscles that results in energy expenditure" (p. 126).

most fundamentally, retirement represents an exit from the workplace, which will most likely bring about changes in daily routines, social interactions, and perhaps even feelings of threat/instability to one's sense of self; one's roles at work may have been a strong part of one's self-definition (Teuscher, 2010). Incidentally, previous research by Beck, Gillison, and Standage (2010) found that physical activity pursuits may represent a means through which retirees bring purpose and meaning to their life.

Against this backdrop, though, the evidence regarding the impact of retirement on physical activity is mixed. When considering studies examining self-reported physical activity data, some report decreases in physical activity following retirement (Barnett, Van Sluijs, & Ogilvie, 2012; Slingerland et al., 2007; Chung, Domino, Stearns, & Popkin, 2009) while others document increases in physical activity (Berger, Der, Mutrie, & Hannah, 2005; Lahti, Laaksonen, Lahelma, & Rahkonen, 2011; Touvier et al., 2010; Mein, Shipley, Hillsdon, Ellison, & Marmot, 2005; Evenson, Rosamond, Cai, Diez-Roux, & Brancati, 2002). Berger et al. (2005), though, opine that increases in reported physical activity, when they occur, likely do not correspond to levels of engagement needed to accrue salutary benefits for health. A recent study by Godfrey et al. (2014) confirmed this idea through objective measurement. For these authors, only 21% of retirees were sufficiently active to meet public health guidelines.

It appears that retiring may aid some but not all individuals in achieving greater physical activity levels. In an effort to understand this paradoxical finding, researchers have turned their attention to work/pre-retirement characteristics, according to Van Dyck, Cardon, Deforche, and De Bourdeaudhuij (2015). Understanding the "personal factors" which coalesce with physical activity participation in retirement was identified as in need of more attention (e.g., Slingerland et al., 2007; Van Dyck et al., 2015). In addition, a call for more theoretical investigations has been advocated as theories allow researchers to identify causal determinants of behaviour change which

can in turn help inform interventions (McDonald, O'Brien, White, & Sniehotta, 2015). Thus, it can be surmised that a program of research rooted in self may contribute to our understanding of physical activity in new retirees.

The Self

According to Leary and Price Tangney (2003), the self "allows people to think consciously about themselves" (p. 9) and has been advocated as being central in understanding behaviour and behaviour change (Stein & Markus, 1996). Indeed, the self is critical for the processing of information and is the motivator or "regulator of purposive behaviour" (p. 378). Contrada and Ashmore (1999) extend the idea that self influences behaviour to the health behaviour context. Specifically, how one perceives oneself can influence the enactment of behaviours that either thwart or facilitate good health. As such, self-related variables are critical in the enactment of health behaviours including physical activity (Fox & Wilson, 2008; Orleans, 2000). One self-related variable which retains our attention is *identity*.

Identity Matters

The concept of identity is ubiquitous across various lines of inquiry (Strachan, 2014). As a result, definitions and conceptualizations of identity abound. In psychology, for instance, Erik Erikson's identity work concerned the very internal "subjective sense of continuous existence" (Deaux, 2000, p. 222). Sociologists, on the other hand, may argue that identity is a "product" of external factions like gender, race, and class (Kirk, Cooke, Flintoff, & McKenna, 2008). Hence, a few clarifications as per how identity is considered in the present dissertation seem warranted. Herein, identity is informed by identity theory (Burke & Stets, 2009; Stets & Burke, 2003). For identity theorists, identity can be conceptualized in a variety of forms: group identity, role identity, and person identity (Burke & Stets, 2009). Role identity - of which individuals hold many - will be the focus of this dissertation. Burke and Stets (2009) view role identities as a set of meanings

tied to a given role. Identity meanings concern what it means for someone to be, for example, a physically active person. It is worth noting that the content of identity meanings was not probed in this dissertation; it was assumed that retirees shared a *common* understanding of a "physical activity identity" (for a discussion on commonality and variation in identity meanings in the exercise purview, see Strachan, Perras, Forneris, & Stadig, 2015). Rather, the discussion around physical activity identity - or self-identification with physical activity - centered on the degree to which retirees identified with the role of "physically active retiree". Thus, references to identity increase or change are limited to changes in the strength of identification as a physically active person (role identity).

Identity is worthy of exploration as it functions, within identity theory, as a self-regulatory control system. Identity meanings essentially form behavioural standards one must meet to verify a given identity (Burke, 2006). Verification is achieved through carrying out behaviours consistent with identity meanings. Seeking consistency between identity meanings and behaviour is said to be a continuous process; this likely confers the robustness associated with identities like physical activity identity. As a result, identities are persistent and difficult to change. However, identity related to physical activity can change over time (Carraro & Gaudreau, 2010). This will be further discussed in the context of *Article 3*. A review of physical activity identity as it relates to physical activity follows.

Physical Activity and Physical Activity Identity

The extant research has shown that the degree to which an individual identifies⁴ him/herself as an "exerciser" or as a "physically active person" has positive affective, behavioural and cognitive consequences relative to exercise. In particular, individuals whom identify

⁴ Given the similarities between schema and identity (Kendzierski, 1988), the term "identity" will be used in reference to both identity and self-schema literatures.

themselves as exercisers exercise more frequently (Petosa, Suminski, & Hartz, 2003; Yin & Boyd, 2000), act on their exercise intentions (Estabrooks & Courneya, 1997) and put strategies in place to increase the likelihood of exercise (Kendzierski, 1988) compared to their lower-identity counterparts. Further, self-defined exercisers report negative affect when their exercise levels are not in line with their personal identity standards (Strachan, Brawley, Spink, & Jung, 2009), and report greater self-efficacy (Strachan, Flora, Brawley, & Spink, 2011) and intentions to "step up" future exercise (Strachan & Brawley, 2008; Yin & Boyd, 2000).

The support for the relationship between identity and physical activity has been extended to older adults ($M_{\text{age}} = 79.6$; Strachan, Brawley, Spink, & Glazebrook, 2010) and middle-aged, minority women with chronic health conditions ($M_{\text{age}} = 64.1$; Hays, Damush, & Clark, 2005), and explored through qualitative inquiry in older men ($M_{\text{age}} = 60\text{--}70$; Liechty, Dahlstrom, Sveinson, Stafford Son, & Rossow-Kimball, 2014). Yet, we do not know with certainty if this relationship holds in retirement-age individuals or individuals experiencing their first few years of retirement. As such, research to date does not inform retirees' propensity to self-identify as physically active and how such identification impacts their involvement in physical activity.

The transition from work to retirement can impact one's sense of identity and can be viewed as a period for identity exploration (e.g., Liechty, Yarnal, & Kerstetter, 2012; Liechty, Dahlstrom, Sveinson, Stafford Son, & Rossow-Kimball, 2014). Hence, this period is ripe with opportunity to develop *new* identities, including one focused on physical activity. Further, identity may be particularly benefitting for this group, especially in light of the fact that health and independence may become increasingly salient (e.g., Barnett, Guell, & Ogilvie, 2012). One of the aims of this dissertation was to confirm whether the relationship found between identity and physical activity hold for this population.

The evidence presented previously demonstrates how identifying with an activity, like physical activity, leads to favourable affective, behavioural, and cognitive proclivities. Fostering physical activity identities may offer a promising way to increase the likelihood that retirees are active during this life stage. Indeed, Grant (2008) argues that physical activity interventions with older adults (which could include retirees) should encourage a focus on physical activity behaviour as a reflection of one's self image (attributed to Conner & Norman, 2005). Such a focus on identity and its development is not trivial; researchers argue that sustainable behaviour change requires a shift in how one views or defines him or herself (Carraro & Gaudreau, 2010; Marsh, Papaioannou & Theodorakis, 2006; Stein & Markus, 1996). Despite the recognition of the importance of identity in behaviour change, suggestions as to how to encourage a physically-active identity do not abound (Kendzierski & Morganstein, 2009). However, another self-related construct, *possible selves* has been argued to be related to and have implications for the fostering of identity (Hoyle & Sherrill, 2006; Strachan & Whaley, 2013).

Back to the Future: The Promise of Possible Selves

Possible selves are "representations of the self in the future" and pertain to "how individuals think about their potential and about their future" (Markus & Nurius, 1986, p. 954). Lithopoulos, Rathwell, and Young (2015) recently emphasized that possible selves (in their *hoped-for* form) can be conceptualized as broad life goals (i.e., Hooker, 1999) as well as goals (or standards) consistent with control theory (Carver & Scheier, 1982). Since possible selves are anchored in the future - and thus are not confined by what is factual in the present - they are the elements of the self which can "most easily assume a new form" (Cross & Markus, 1991, p. 233). However, Markus and Nurius (1986) have noted that possible selves are not just *any* "imagined roles or states of being"; they usually hone in on individuals' enduring hopes and fears for the future. Furthermore, "these ideas about what is possible for us to be, to think, to feel, or to

experience provide a direction and impetus for action, change, and development" (Markus & Nurius, 1986, p. 960). Specifically, possible selves are said to serve two functions. First, they provide a vivid snapshot of what is possible for someone (good or bad) which, in turn, sets up a course of action to guide one's behaviour toward a desired goal (or, inversely, toward the avoidance of a goal; Markus & Nurius, 1986). This is often accomplished through detecting an "observable gap" or discrepancy between present and future self (Markus & Nurius, 1986; Oyserman & James, 2009). Secondly, possible selves provide a context to evaluate or interpret current behaviour, often through noting a discrepancy between one's actions and goals.

Possible Selves and Physical Activity

A few studies have examined the possible selves construct relative to physical activity. Harju & Reed (2003) examined the descriptive content of undergraduate students' possible selves for exercise. Those students entertaining an "accomplished exerciser" possible self also reported greater self-efficacy, exercise, and fitness. Conversely, students who considered a "non exerciser" possible self spent quite a bit a time reflecting on how to avoid this possible self yet felt less capable of avoiding it. Further, these students were less fit. Whaley (2003) demonstrated how possible selves could distinguish inactive and active, middle-age women. Whaley and Schrider (2005) even showed that older adults ($Age_{range} = 60-79$) participating in a 10-week exercise program had well-articulated possible selves related to physical activity. As demonstrated by these studies, physical activity possible selves appear to be positively related to aspects of physical activity but, to the best of my knowledge, physical activity possible selves have not been examined among retirees. Do retirees mention possible selves focused on physical activity when asked to imagine possible selves? The present dissertation has tended to this question and helped determine whether possible selves may be pertinent and important to retirees.

Possible Selves and Identity

Possible selves may be related to identity and prove helpful in bringing about changes to identity. Packard and Conway (2006) asserted:

We view identity as a dynamic process involving a search for self-definitions in the present. In other words, people seek coherence in their present or immediate self-definitions by drawing on both their physical past, remembered selves (retrospective) as well as their future, imagined selves (prospective selves), which are structured around and through identity elements, including goals, values and beliefs. This definition highlights the dynamic, temporal, and integrative aspects of identity, for which possible selves provide a generative framework (p. 252).

Research shows that as individuals negotiate new identities, they manifest some fluctuations in the number of possible selves they generate. As such, possible selves allow for the exploration of different identities (Dunkel, 2000; Dunkel & Anthis, 2001; Dunkel, Kelts & Coon, 2006). Further, Markus and Nurius (1986, p. 964) asserted that changes in current self-view can occur while thinking about possible selves. These possible selves can affect both the working self-concept (immediate self-knowledge available to the self) and also infuse enduring changes to self-view (i.e., schema, identity). Finally, Hoyle and Sherrill (2006; attributed to Norman & Aron, 2003) assert that chronically activating a possible self and honing in on the consequentiality of this possible self may impact one's current self representations. While these assertions are speculative, it seems reasonable to suggest that possible selves may be related to and prove useful in developing or strengthening an identity (Dunkel, Kelts & Coon, 2006; Strachan & Whaley, 2013).

In the physical activity domain, Whaley and Schrider (2005) examined changes in both identity (i.e., current self) and possible selves (i.e., future self) related to physical activity in a group of older adults ($N=19$; Age_{range} = 60-79) participating in a 10-week exercise program. In comparing reported current and possible selves at Time 1 and Time 2, the authors noticed that while possible selves (future-directed) increased the most, there were some noticeable increases in

identity or current selves. The observed "changeability" in self-perceptions is in line with the notion of the "dynamic self" (Markus & Wurf, 1987). Such results imply that interventions can be designed with the goal of increasing or developing identity related to physical activity (Strachan & Whaley, 2013).

Retirement can be theorized as a potent period in which to examine possible selves. Indeed, Hooker (1999) asserted: "Goals in later life may be less normatively structured than early and midlife, which makes sense if differences between individuals increase with age. Thus, social cognition researchers interested in goals and self-directedness would be well advised to examine older adults because their activities are the most likely to be motivated by their own personal agendas" (p. 111). Against this backdrop, retirement is also theorized as a period where retirees may ponder making changes to benefit their health and well-being, further enhancing the value of possible selves in this population (e.g., Barnett, Guell, & Ogilvie, 2012).

Given that possible selves are theorized to be related and potentially lead to the development of identities, it is surprising that physical activity researchers have not examined the relationship between physical activity possible selves and identity. Determining if physical activity possible selves are related to identity is an important first step that would i) allow us to determine if these two constructs are associated, and ii) inform the potential of possible selves in fostering physical activity identities (through an intervention). Consequently, another aim of this dissertation was to examine whether there is a relationship between physical activity possible selves and identity. Further, and given that possible selves are theorized to promote identification with a behaviour which in turn has been shown to promote that behaviour, possible selves may exert their influence on physical activity through first promoting physical activity identification. Another aim of the present study was to examine the relationships of physical activity possible selves and identity with physical activity specifically by testing the proposed mediational

relationship among retirees. Conducting mediation analyses would heed recommendations by Baranowski and colleagues (2005; 2009) to fully test the interplay between variables (i.e., purported mechanisms of change) before delivering an intervention.

Back to the Future, Part II: Turning to Possible Selves to Increase Physical Activity Identity and Physical Activity

Possible selves have been included in *interventions*, notably to increase physical activity. Ouellette, Hessling, Gibbons, Reis-Bergan, and Gerrard (2005) randomly assigned university students to a prototype (i.e., the other) or possible selves condition centering on exercise or non exercise. Students wrote about themselves or others, exercising or not. Results showed that images can impact behaviour but the impact was moderated by personal characteristics. Those students reporting higher tendencies for social comparison reacted more favourably to the prototype condition. Conversely, those students concerned with considerations for future consequences reported more physical activity when assigned to the possible selves condition. While efforts to confirm the moderating effect for personal characteristics led to mixed results, the study highlights the importance of potential moderator variables. Moreover, it also suggests that images, including possible selves, could impact physical activity behaviour. Furthermore, and most interestingly, this study showed that a *one-time* lab session yield increases in physical activity four weeks later.

Expanding on these results, Murru and Martin Ginis (2010) ran a possible selves intervention for inactive university students. This intervention featured a control group and two possible selves conditions related to physical activity – hoped-for and feared-for possible selves. Physical activity participants had to imagine themselves in five or ten years after reading a vignette illustrating the effects of exercising (or not). Pre-to-post measures showed that the single intervention yielded greater physical activity four and six weeks after the intervention. A recent experiment by Strachan, Marcotte, Giller, Brunet, and Schellenberg (in press) extended these

results. Insufficiently-active adults (aged 18-64) were randomized to either a self-enhancing possible selves intervention (congruent with Murru & Martin-Ginis, 2010) or an enhanced “self-regulatory” possible selves intervention. In this latter intervention group, participants’ possible self image also included self-regulatory steps needed to achieve their possible self. Participants in both conditions reported significantly higher physical activity than their control counterparts (specifically at 4- and 8-week follow-up for the self-regulatory condition, and at eight weeks for the self-enhancing condition). One recent study, though, failed to observe significant increases in physical activity following a possible selves intervention (Gunnell, Crocker, Mack, & Zumbo, 2015). However, in general there is promise for possible selves interventions having a positive impact on physical activity.

While interventions based on possible selves may be effective at increasing physical activity, to my knowledge, no such intervention has been attempted to increase *identity* related to physical activity. An intervention that incorporates a focus on physical activity possible selves may be a reasonable way to impact identity given the theorized role that possible selves play in the fostering of identities. Further, understanding if a physical activity possible self intervention can lead to increases in identity represents an important pursuit when one considers the established association between physical activity identity and physical activity. A purpose of this dissertation was to determine if a possible selves intervention can not only increase physical activity (as demonstrated in previous research) but also identity related to physical activity among new retirees.

That said, it can be theorized that a one-session intervention based on possible selves (in line with the interventions reviewed above) may not be sufficient or optimal to foster changes in identity. Markus (1977) and Burke (1980) have both commented on the robustness of self; identities are resistant to change. That being said, Stein and Markus (1996) proposed that

individuals can experience shifts and changes in self-views, sometimes in a matter of days. In the physical activity domain, numerous studies have documented how identification with physical activity can increase over the span of a few weeks or months (Cardinal & Cardinal, 1997; Carraro & Gaudreau, 2010; Hardcastle & Taylor, 2005; Whaley & Schrider, 2005). Accordingly, the effectiveness of a possible selves intervention may be maximized by providing *multiple* occasions to reflect on a physically-active possible self and its consequentiality for retirement which could yield greater physical activity and identity. This position is consistent with that of Hoyle and Sherill (2006) who argue that the chronic activation of a possible self can impact current self-representations (e.g., identity). Another purpose of this dissertation is to determine if a physical activity possible selves intervention involving multiple opportunities to reflect on a physical activity possible self will enhance the effectiveness of the intervention.

Meditations on Mediation

In terms of examining both physical activity and identity as outcomes of a physical activity possible selves intervention, this effort offers the opportunity to explore the complex relationship between physical activity identity and physical activity behaviour. A possible selves intervention might lead to increases in physical activity through strengthening physical activity identification. Stein and Markus (1996) posit that behaviour change must become self-definitional in order to be sustained. Further, Kearney and O'Sullivan (2003) examined shifts in various health identities and found that behaviour change was cemented by a process of identity revision. Based on this reasoning, changes in identity that stem from a possible self intervention may be responsible for increases in physical activity.

However, researchers also acknowledge that while identities fuel behaviour change, their development is also fuelled by behavioural engagement (Kearney and O'Sullivan, 2003) with some researchers viewing engagement in physical activity as initiating the relationship between

the two constructs. Indeed, a reciprocal relationship between identity and behaviour has been supported in the physical activity research (Anderson & Cychosz, 1995; Cardinal & Cardinal, 1997). Therefore it also seems possible that changes in identity associated with the intervention may be due to changes in physical activity. Simultaneously examining the role of physical activity and identity as outcomes and mediating mechanism of a possible selves intervention offered the opportunity to further explore the complex relationship between behaviour and identity.

Summary

The current program of research is rooted in *self*, as self-related variables such as identity and possible selves may be particularly potent in understanding physical activity in retired individuals. Indeed, retirement is a life transition ripe with opportunity to redefine one's identity and perhaps place greater attention on health-enhancing behaviours like physical activity. As a result, the proposed dissertation seeks to confirm, in a preliminary study, the relationship between possible selves, physical activity identity and physical activity in retirees. The second focus of this dissertation is to implement a possible selves intervention designed to increase physical activity identity and physical activity and to evaluate and explain its effectiveness.

Purposes and Hypotheses

The overarching aim of this dissertation was twofold. The first aim, accomplished through Study 1, and discussed in *Article 1 (Chapter II)* and *Article 2 (Chapter III)*, was to examine the relationships between possible selves, identity, and physical activity. Specifically, in *Article 1*, I explored the *concurrent* relationships between possible selves, identity, and physical activity in a sample of new retirees. In *Article 2*, I expand on these findings by taking a *prospective* approach to examine the same relationships over time.

Relative to *Article 1*, the purpose was to examine the cross-sectional relationships between possible selves, identity (both related to physical activity), and physical activity itself in newly

retired individuals. This examination would allow us to ascertain whether identity and possible selves were related and relevant to physical activity in this population, and whether the relationships between these self-perceptions and physical activity could be leveraged in an intervention for retirees. We expected to find support for following relationships: i) identity would positively relate to physical activity; ii) possible selves would positively relate to physical activity, and iii) possible selves would positively relate to identity.

With regards to *Article 2*, the purpose was to employ a prospective design to determine if purported relationships discussed in *Article 1* between possible selves, identity and behaviour (all related to physical activity) were supported. Specifically, a mediational relationship where holding a physically active possible self at Time 1 would positively relate to identity at Time 2 which, in turn, would positively associate with physical activity at Time 3 was hypothesized. Examining identity and possible selves relative to their relationship to physical activity could help us understand physical activity among retirees. Support for a mediational relationship would also tender the opportunity to design and test an intervention focused on possible selves as a means of increasing identity and subsequent physical activity.

This brings us the second aim of this dissertation, which was the subject of *Study 2* (presented in *Chapter IV - Article 3*). This study sought to determine whether a possible selves intervention would increase identity and physical activity behaviour in a sample of newly-retired individuals. The focus was to compare physical activity identity and physical activity among the three arms of the experimental design: a *repeated* possible selves intervention (three sessions), a *one-time* possible selves intervention (one session only), and a control group. It was hypothesized that participants in the *repeated* possible selves group would report higher levels of physical activity and identity over the course of the intervention than the *control* group and the *one-time*

possible selves group. The *one-time* condition was expected to report higher levels in physical activity identity and physical activity over the course of the intervention than the control group.

Such an intervention also tendered the opportunity to examine relationships between the intervention, physical activity identity and physical activity. As described earlier, theory and past research suggest that the self (i.e., identity) can impact behaviour; hence, the possible mediating role of identity was examined. Conversely, there is also theoretical and empirical support suggesting that physical activity engagement may influence self (i.e., identity). This potential mediating role of physical activity was also examined.

Organization of the Dissertation

The chapters of the present dissertation are organized to reflect the order in which the studies were conducted and as well as how the findings were devised and discussed in three articles. To this end, *Study 1* yielded two articles (*Article 1* and *Article 2*). *Chapter II* focuses on *Article 1* which was accepted for publication in *Activities, Adaptation & Aging* (and is now available online). *Chapter III* houses *Article 2*, which was accepted and published (online, at this time) in *Research on Aging*. With respect to *Study 2*, one article (*Article 3*) was written; it is presented in *Chapter IV*. At the time of submitting the final version of this dissertation, *Article 3* was under review at a peer-reviewed journal. It must be noted that the articles presented in *Chapters II* through *IV* may display style and formatting requirements consistent with the journals to which they were submitted. In addition to the three articles, I have included a section of supplementary analyses related to *Article 3*. They are featured in *Chapter V*. These analyses are mostly exploratory in nature so they were deemed better suited as a supplement outside of *Article 3*. The references for this *Introduction (Chapter I)* as well as the *General Discussion (Chapter VI)* are presented at the end of the dissertation.

CHAPTER II

ARTICLE 1 - BACK TO THE FUTURE: ASSOCIATIONS BETWEEN POSSIBLE SELVES, IDENTITY, AND PHYSICAL ACTIVITY AMONG NEW RETIREES

Running head: NEW RETIREES AND PHYSICAL ACTIVITY

Back to the Future: Associations between Possible Selves, Identity, and Physical Activity among
New Retirees⁵

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⁵ This is an accepted manuscript of an article published by Taylor & Francis in *Activities, Adaptation & Aging* on December 3rd, 2015, available at www.tandfonline.com/10.1080/01924788.2015.1090279. Very minor edits (e.g., typos, grammatical mistakes, formatting) based on my thesis committee's feedback were made to the accepted manuscript presented here while preparing the final version of this dissertation.

Abstract

Retirement is not always associated with increased physical activity. We examined the inter-relationships between two physical activity self-perceptions - *identity* and *possible selves* and physical activity in 548 new retirees. The aims were to understand why retirement coalesces with increased physical activity for some but not all retirees and inform future interventions. Cross-sectional data were collected via online questionnaire. Identity and possible selves were related to physical activity. Moreover, we found positive associations between possible selves focused on physical activity and physical activity identity. Our findings on self-perceptions represent an important first step toward designing relevant physical activity interventions for retirees.

KEY WORDS: Retirement; physical activity; possible selves; identity; older adults

Back to the Future: Associations between Possible Selves, Identity, and Physical Activity among New Retirees

Through affording people increased time for physical activity (PA), retirement represents a life phase where retirees are well-positioned to improve their health through engaging in regular PA. Indeed, PA procures health benefits for older adults such as greater cardiovascular, musculoskeletal and mental health; even the late up-take of PA is beneficial to their health (Hamer, Lavoie, & Bacon, 2014; Taylor et al., 2004). While some scholars document increases in PA following retirement (Godfrey et al., 2014; Lahti, Laaksonen, Lahelma, & Rahkonen, 2011; Touvier et al., 2010), others report no or insignificant increases in PA (Chung, Domino, Stearns, & Popkin, 2009; Slingerland et al., 2007). Hence, retirement is associated with increased PA for some but not all retirees. Thus, researchers should uncover the factors which coalesce with PA in retirement as this information may help us understand PA participation in new retirees (Slingerland et al., 2007). In this study, we examined the inter-relationships between two PA self-perceptions - *identity* and *possible selves* and PA. Examining these relationships will allow us to determine if these two self-perceptions associate with PA among retirees and could inform future intervention efforts among this population.

Experts view the transition from work to retirement as a period for self-exploration and enhancement during which retirees may self-reflect on their health and who they are (Chen, 2011; King, 1991; Price, 2002). Therefore, health-related *self*-perceptions are likely salient for this population. Scholars credit aspects of self as being central to their efforts to understand behaviour and behaviour change (Stein & Markus, 1996) and this notion has been extended to the PA context (Fox & Wilson, 2008; Orleans, 2000). Self-perceptions, therefore, are important concepts that may relate to understanding and promoting greater engagement in PA in retirees. Two PA self-

perceptions - identity and possible selves – warrant further research in the PA context (Strachan & Whaley, 2013). *Identities* are meanings tied to a role (Burke & Stets, 2009) while *possible selves* are "representations of the self in the future" pertaining to "how individuals think about their potential and about their future" (Markus & Nurius, 1986, p. 954). Below we outline how these self-perceptions influence behaviour and review research which addresses identity and possible selves as they relate to PA.

Through assessing identity, researchers can uncover information about the extent to which an individual presently views themselves as holding a given role. This information can help them understand the likelihood that an individual will engage in identity-relevant behaviour. Indeed, identity meanings provide individuals with personal goals which they aim to realize through corresponding behaviour (Burke & Stets, 2009). Researchers demonstrated the ameliorative influence of identities in the PA/exercise context (for a review, see Strachan & Whaley, 2013). In short, strength of exercise identity positively relates to self-efficacy for exercise (Strachan, Flora, Brawley, & Spink, 2011), exercise frequency (Petosa, Suminski, & Hartz, 2003; Yin & Boyd, 2000), and the ability to articulate and act on exercise intentions (Estabrooks & Courneya, 1997; Strachan & Brawley, 2008; Yin & Boyd, 2000). Further, researchers have demonstrated the positive relationship between PA identity and PA in older adults (Strachan, Brawley, Spink, & Glazebrook, 2010) and middle-aged, minority women with chronic health conditions (Hays, Damush, & Clark, 2005).

Researchers have also articulated the implications that another self-perception - possible selves - has for behaviour. Possible selves are “ideas about what is possible for us to be, to think, to feel, or to experience” (Markus & Nurius, 1986, p. 960) in the future; they can take the form of hoped-for or feared-for iterations. Possible selves serve a regulatory purpose in two ways. First, possible selves provide individuals with a vivid snapshot of what they could become (good or bad)

which can guide one's behaviour toward a desired goal (or, inversely, toward the avoidance of a goal; Markus & Nurius, 1986). Secondly, possible selves provide a context for the evaluation of current behaviour (Markus & Nurius, 1986). A few researchers have examined the possible selves construct relative to PA. Harju and Reed (2003) found that undergraduate students entertaining an "accomplished exerciser" possible self also reported greater self-efficacy, exercise, and fitness. Whaley (2003) demonstrated that the possession of possible selves pertaining to body image distinguished inactive and active middle-age women. Whaley and Schrider (2005) even showed that older adults ($\text{Age}_{\text{range}} = 60\text{-}79$) participating in a 10-week exercise program had well-articulated possible selves related to physical activity. As demonstrated by these studies, physical activity possible selves appear to be positively related to aspects of physical activity.

While both identity and possible selves appear useful in understanding physical activity, there is a dearth of evidence vis-à-vis these two self-perceptions and retirees' physical activity. Examining whether these two self-related variables are associated with physical activity participation among new retirees may provide knowledge about factors that may influence why some, but not all individuals exploit the time retirement affords them to participate in physical activity. Given theory and existing evidence, we surmise that both identity and possible selves will be associated with physical activity in retirees.

Examining the relationships between physical activity identity, possible selves and behaviour also presents an occasion for us to 'test the waters' for a physical activity intervention among retirees. Fostering PA identities may offer a way to increase physical activity among this group. As previously outlined, there is an established association between physical activity identity and physical activity (Strachan & Whaley, 2013). Further, researchers argue that sustainable PA behaviour change requires shifts in self-views (Carraro & Gaudreau, 2010; Marsh, Papaioannou, & Theodorakis, 2006). Retirees may be especially receptive to the development of new identities,

including one focused on physical activity; retirement impacts identities and is a time for self-exploration (Chen, 2011; Price, 2002). Other authors surmise that older individuals' physical activity pursuits should reflect or be consistent with their image (Conner & Norman, 2005). Finally, identification with physical activity may befit this group in light of salience of health and independence for this cohort (King, 1991).

Although researchers make a strong case for identity-building as a means to increase physical activity, suggestions about how to encourage a physically-active identity are scarce (Kendzierski & Morganstein, 2009). The self-related construct of possible selves may coalesce with identity formation (Hoyle & Sherrill, 2006). Packard and Conway (2006) asserted that identity is informed by both past and future selves. Hence possible selves offer a “generative framework” for identity exploration (Packard & Conway, 2006). Further, Markus and Nurius (1986) posited that changes in current self-view (identity) can occur while thinking about possible selves. These possible selves can affect working self-concept (immediate self-knowledge) and also infuse enduring changes to self-view (i.e., schema, identity). Finally, it is surmised that honing in on the consequentiality of possible selves may impact one's current self-representations (Hoyle & Sherrill, 2006; Norman & Aron, 2003). These assertions have received scant empirical validation (see Dunkel, 2000; Dunkel & Anthis, 2001), but, in light of both empirical and theoretical support it seems reasonable for us to suggest that the act of reflecting upon possible selves may be related to and prove useful in developing or strengthening identity (Dunkel, Kelts, & Coon, 2006) among retirees. Nurturing physical activity possible selves represents a promising avenue through which newly-retired individuals' physical activity identities may be strengthened, which should in turn positively influence physical activity. However, preliminary examination of inter-relationship between physical activity identity, possible selves and behaviour among new retirees represent an

important first step in determining whether resources should be invested in interventions (Baranowski, Anderson, & Carmack, 1998).

In this study, our overall objective was to examine two physical activity self-perceptions – identity and possible selves – and PA behaviour among retirees. We examined the cross-sectional relationships between PA possible selves, PA identity, and PA in new retirees. This examination would allow us to determine i) whether PA identity and possible selves were related to PA in this population, and ii) whether the relationships between these self-perceptions and physical activity were supportive of future intervention efforts. We expected to find the following relationships: i) PA identity would positively relate to PA, ii) PA possible selves would positively relate to PA, and iii) possible selves would positively relate to PA identity.

Method

Participants and Design

Participants in this cross-sectional study consisted of 548 retired individuals. Eligibility was restricted to those retirees who were within their first three years of retirement in an effort to capture the PA and self-perceptions of *new* retirees. This criterion is consistent with past research on new retirees' leisure experiences (Floyd et al., 1992; Nimrod, 2007; Stephan, Fouquereau, & Fernandez, 2008). Participants were, on average, 61.99 years old and had been retired for 1.55 years ($SD = 1.03$). The sample was Caucasian (95%), and predominantly female (64%), and married (65%). Participants were also highly educated; 55.9% reported having a bachelor's degree or higher university degree. On average, retirees reported 226.50 minutes of weekly moderate-to-vigorous PA ($SD = 204.27$). The body mass index (BMI) for the group was 27.43 ($SD = 5.34$).

Measures

Socio-demographic information. Participants provided basic socio-demographic information (i.e., age, gender, marital status, ethnicity, education level, BMI, and years in retirement; see Appendix A3).

PA. The Godin Leisure Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985; see Appendix A4) was used to assess participants' recent PA. The GLTEQ is a valid self-report measure of PA (Jacobs Jr, Ainsworth, Hartman, & Leon, 1993) and has been used with older adult samples (e.g., Kim, Newton, Sachs, Giacobbi Jr, & Glutting, 2011; Strachan et al., 2010). Participants indicated the number of bouts of 15 minutes or more of PA performed at two intensities (strenuous and moderate) over a recent 7-day period. Participants were also asked to provide the average duration of their PA sessions at each intensity level, allowing us to gather a more detailed estimate of the duration of the physical activity bouts reported by participants than provided by the scale (reported sessions are of 15 minutes or more in duration). Precedent for use of this amendment to the GLTEQ has been established (e.g., Courneya, Jones, Rhodes, & Blanchard, 2004). To estimate participants' amount of moderate-to-vigorous PA, we multiplied the number of bouts of moderate and vigorous PA per week for each participant by its corresponding duration in minutes and added those two numbers together. Our focus on moderate and vigorous PA was informed by the most recent Canadian PA guidelines (Tremblay et al., 2011) where it is recommended that adults (18-64) and older adults (65+) engage in a minimum of 150 minutes of moderate-to-vigorous PA weekly.

PA identity. To assess PA identity, we slightly modified the Exercise Identity Scale (EIS; Anderson & Cychosz, 1994) for use in the present study. The original scale is comprised of nine items and uses a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Sample items include: *I consider myself an exerciser* and *When I describe myself to others, I*

usually include my involvement in exercise. Anderson and Cychosz (1994) reported a strong Cronbach's alpha and test-retest reliability for this scale. To modify the exercise identity scale in order to capture PA identity, we simply changed terms that pertained to exercise to those that pertained to PA. For example, the item *I consider myself an exerciser* became *I consider myself a physically active person*. All other aspects of the original scale were retained. We based our decision to modify the scale on past research. Researchers have found that older adult exercisers (Strachan et al., 2010) and a sample of adults with an average age similar to that of our sample (Hardcastle & Taylor, 2005) find the term “physically active person” more self-descriptive than “exerciser”. The modified scale (see Appendix A5) has proven reliable (Cronbach's α of .90) and supports the primary, single factor structure of the exercise identity scale (Strachan et al., 2010). Based on this past research and consideration of the age of our sample we feel that our choice to presently employ this modified version of the scale is justified. In this study, items of the scale proved reliable ($\alpha = .92$) and support was found for a primary, single factor.

The original paper associated with the Exercise Identity Scale supported a single-factor model assessed by all nine items (Anderson & Cychosz, 1994); other researchers found support for this single-factor structure (Vlachopoulos, Kaperoni, Moustaka, & Anderson, 2008). Recent evidence called the unifactorial nature of the scale into question. Specifically, researchers presented data supporting a two-factor structure consisting of exercise beliefs and role identity (Vlachopoulos, Kaperoni, & Moustaka, 2011; Wilson & Muon, 2008). Given these conflicting findings, we conducted a principal component analysis (PCA) to determine the appropriate factor structure within the present data. The analysis revealed a single-factor model, which was further confirmed via a parallel analysis (via Monte Carlo PCA for parallel analysis; Watkins, 2000). Consequently, for the present data, all nine items were deemed indicative of PA identity.

Possible selves. Data on retirees' possible selves were collected following procedures consistent with past possible selves research in general as well as older adult possible selves research specifically (e.g., Whaley, 2003; Cross & Markus, 1991). The present study focused on hoped-for possible selves. We predicated this decision on evidence that these possible selves may be optimal in fostering health behaviours and designing interventions (i.e., striving toward attainment of positive outcomes in lieu of trying to avoid negative ones; Hooker & Kaus, 1994; Ruvolo & Markus, 1992). Hooker (1999) advances that possible selves can be measured both in terms of *content* (i.e., the types of possible selves people possess) and the *self-regulatory processes* associated with a possible self. (i.e., "the extent to which self-regulatory processes operate in service of a specific possible self"; Hooker, 1999, p. 103) We drew upon this conceptualization of possible selves and its measurement in our assessment. First, to assess *content* of possible selves we sought to identify the prevalence of freely reported possible selves that were focused on PA. Participants were instructed: *In thinking about what you hope you will be like in the future, list up to seven (7) hoped-for possible selves.* Along with these instructions, participants were provided with a description of 'hoped for possible selves' ("selves we hope to become in the future"). In this description, a distinction was drawn between possible selves (e.g., becoming a writer) and behaviours (writing a book) in order to ensure that participants provided possible selves. See Appendix A6 for full instructions.

Retirees' possible selves for the future (i.e., content) were coded to determine the number of possible selves focused on PA. Coding was consistent with categories outlined by Cross and Markus (1991) and revisited by Whaley (2003) in the physical domain. As such, possible selves depicting activity (i.e., specific sports, physical activities, or athletic pursuits) were accepted. Vague references to health, for instance, were not accepted given the lack of reference to activities/behaviours. As a result, some participants had zero PA possible selves in their list.

For the purpose of determining inter-rater reliability, the main author and a research assistant coded approximately 25% of total responses (i.e., 137 randomly selected participant responses). An intraclass correlation (ICC; two-way mixed model with absolute agreement type) was performed to assess inter-rater reliability for the selected responses. The ICC was .88 ($p < .01$) suggesting very good homogeneity between raters. Given the favourable intraclass correlation, the main author pursued the coding of the remaining data.

It was expected that not all participants would list a possible self related to PA. In order to examine the relevance of possible selves focused on PA in the *full* sample, we subsequently presented participants with a hoped-for possible self centered on PA, namely a *physically active retiree* (see Appendix A6). Specifically, participants were asked: *Now, please take a few minutes and think about the following possible self: "BE A PHYSICALLY ACTIVE RETIREE". As a physically active retiree, you incorporate PA into your lifestyle on most days of the week at a moderate to vigorous intensity. You have the energy to carry out your daily tasks and all your personal goals for retirement.* This practice of asking participants to consider a physically active possible self has been employed previously (Whaley, 2003). For this specific possible self, participants answered three questions from the Possible Selves Instrument (Cross & Markus, 1991) which allowed us to assess the *self-regulatory processes* (Whaley, 2003) associated with that possible self. These self-regulatory processes were assessed in terms of the importance (*How important is it to you to achieve this possible self?*), perceived self-efficacy (*How capable do you feel of accomplishing this possible self?*), and outcome expectancy (*How likely do you think it is that this possible self will be achieved?*) associated with the PA possible self. Each of these three items was rated on a seven-point Likert-type scale ranging, for example, from 1 (*not at all important*) to 7 (*very important*).

Whaley (2003) suggested that participants cannot distinguish between their capability of achieving a possible self and the likelihood of the possible self materializing. Upon examining a strong relationship between these two self-regulatory processes in her research, Whaley (2003) collapsed them into one scale. Thus, we considered the extent to which these two processes were related (i.e., multicollinearity) before deciding whether to treat them as two separate processes or combine them into one process for use in analyses. The relationship between two possible selves self-regulatory processes trended towards multicollinearity ($r = .89$). As a cautionary move, and consistent with Whaley's (2003) procedures, we collapsed the two variables into one composite self-efficacy variable.

Procedure

We obtained ethical clearance for this study from the university's research ethics board (see Appendix C for ethics certificates). Next, we recruited participants through various retirees' associations as well as newspaper and online advertisements. The advertisements for the study featured the Internet link for the secure data collection website. The survey platform Fluid Surveys hosted our survey. There, participants could access information about the study. If interested, participants completed a short eligibility questionnaire (see Appendix A1). Those meeting eligibility criteria were directed to the consent form (see Appendix B1) and, upon "clicking" their consent, the questionnaire. For their participation, participants received an entry for a draw; 10 prizes of CAD 100\$ were awarded.

Analytical Plan

To test the first hypothesis of the paper, several hierarchical multiple regressions were used to examine the relationship between PA, possible selves, and PA identity. We examined whether identity for PA would relate to PA. Age and gender were added in the first block (as they have been found to relate to possible selves previously; Hooker & Kaus, 1992). Subsequently, we

examined whether PA possible selves would positively relate to PA. Age and gender were entered in the first block. Next, we entered the number of PA possible selves in another block, reflecting the content of the possible selves. Finally, we entered a block comprising of the two self-regulatory processes associated with the PA possible self (i.e., importance and composite self-efficacy). Lastly, a regression was performed to examine whether possible selves for PA would relate to PA identity. The same above-mentioned steps were used when entering possible selves data.

Results

Data Management and Preliminary Analyses

Data management. We checked and treated all quantitative data as per steps outlined by Tabachnick and Fidell (2007). Univariate outliers were changed to one unit larger or smaller than the next extreme score. Missing data were not an issue since less than five percent of data was missing (Schafer, 1999). Missing data were imputed using estimation maximization. Variables were transformed if linearity and homoscedasticity were problematic. No issues were found vis-à-vis singularity. Multivariate outliers were detected, and upon investigation, the cases were removed. With respect to multicollinearity diagnostics, no issues were detected.

Retirees' possible selves focused on PA. In terms of the content of possible selves, retirees reported between zero and two possible selves focused on PA. A third of the sample ($N=183$; 33.7%) reported at least one possible self related to PA. As per the self-regulatory processes associated with the physically active possible self presented to participants, the mean score for importance was 6.35/7 ($SD = .93$), and the mean score for the composite perceived self-efficacy variable was 5.84/7 ($SD=1.17$).

Main Analyses

The association between PA identity and PA. Hierarchical multiple regression was used to assess the ability of PA identity to relate PA, after controlling for the influence of gender and age. Preliminary analyses revealed no violation of assumptions for this test. Gender and age were entered at step 1, explaining only 0.1% (n.s) of the variance in PA. In step 2, we entered PA identity in the model. This step boosted the total variance explained in PA to 21.9%, $F(532, 3) = 49.81, p < .001$. As expected, PA identity positively and significantly related to PA (beta = .47, $p < .001$).

The association between PA possible selves and PA. Hierarchical multiple regression was used to assess how two possible selves measures – number of possible selves and self-regulatory processes - relate to PA, after controlling for the influence of gender and age. The same preliminary analyses as above were conducted. Gender and age were entered at Step 1, explaining 0.1% (n.s.) of the variance in PA. The number of possible selves entered at step 2, explained an additional 2.3% (beta = .15, $p < .001$) of the variance. After entry of the self-regulatory processes, at step 3, the total variance explained by the model as a whole was 14.2%, $F(5, 528) = 17.41, p < .001$. The self-regulatory processes explained an additional 11.8% of the variance in PA, after controlling for gender, age, and number of PA possible selves, $R^2 \text{ change} = .118, F \text{ change}(2, 528) = 36.22, p < .001$. In the final model, the number of possible selves made a marginal contribution (beta = .09, $p = .03$); the contribution of the composite self efficacy variable - i.e., self-regulatory process tied to possible selves – was statistically significant (beta = .36, $p < .001$). The self-regulatory process tied to importance did not make a significant contribution.

The association between PA possible selves and PA identity. Finally, a third hierarchical regression was used to ascertain whether PA possible selves related to PA identity, after controlling for the influence of gender and age. Preliminary analyses revealed no violation of

assumptions. Gender and age were entered at step 1, explaining only 0.1% (n.s.) of the variance in PA. At step 2, the number of possible selves focused on PA was entered in the regression, making a significant contribution (additional 2.8% of the variance in PA identity; $\beta = .17, p < .001$). After entry of the self-regulatory processes, at step 3, the total variance explained by the model as a whole was 35.4 %, $F(5, 528) = 57.88, p < .001$. The self-regulatory processes explained an additional 32.6% of the variance in PA identity, after controlling for gender, age, and number of possible selves, $R^2 \text{ change} = .326, \text{ change}(2, 528) = 133.14, p < .001$. In this final model, both self-regulatory processes tied to possible selves were statistically significant: composite self-efficacy ($\beta = .40, p < .001$) and importance ($\beta = .24, p < .001$). No other variable made a significant contribution to the variance in physical activity identity.

Discussion

The purpose of the present study was two-fold. First, we examined whether two PA-related self-perceptions - identity and possible selves - were related to PA in a sample of new retirees. Second, we considered whether the inter-relationships between these self-perceptions and PA were supportive of future intervention efforts. We hypothesized that there would be an association between PA possible selves and identity, and that each of these self-perceptions would positively relate to PA. Our findings support our hypotheses.

Among our sample of new retirees, PA identity was associated with PA. This finding aligns with identity theory; identities carry meanings or expectations - oft behavioural in nature - tied to specific roles (e.g., a physically-active person). In the present sample, retirees who identify as being physically-active may engage in PA in an effort to confirm and uphold their identity (Burke & Stets, 2009). The finding that PA identity strength and PA are related is also consistent with the literature. Indeed, individuals with a strong PA identity (or exercise identity) engage in more PA, be it in terms of frequency (Petosa, Suminski, & Hartz, 2003; Yin & Boyd, 2000),

intensity (Anderson, Cychosz, & Franke, 1998), or duration (Strachan, Woodgate, Brawley, & Tse, 2005). Our results also align with those obtained in older adult samples. For example, Hays, Damush, and Clark (2005) found relationships between exercise self-definitions and exercise participation over time among middle-aged, minority women with chronic health conditions. Similarly, Strachan et al. (2010) found a relationship between PA identity and PA in older adults living in congregate living facilities. The older adults in these studies likely included retirees, however, new retirees were not specifically targeted. Our findings suggest that the identity-behaviour relationship found among other populations is also relevant among people who have just retired from the work force.

Possible selves related to PA were also found to positively associate with the PA of retirees. In particular, one self-regulatory possible self variable, the composite self-efficacy variable – which reflected retirees’ expected likelihood that the possible self would be achieved and capability to accomplish the possible self - was positively associated with PA minutes. The association between this *self-regulatory* aspect of possible selves and PA is not surprising considering that possible selves, by their nature, aid in self-regulation. Possible selves provide individuals with a vivid snap-shot of what they could become which can guide behaviour towards this desired goal-state (Markus & Nurius, 1986). When new retirees are able to envision this future goal-state (themselves as physically active) as a likely state that they are capable of achieving, they may be motivated to pursue this goal as reflected in their PA behaviour.

Our results are somewhat consistent with those of Hooker and Kaus (1992). Among older adults whose most hoped for possible self was “healthy person”, one self-regulatory aspect of possible selves – thoughts on the likelihood of the possible self being achieved - was associated with health behaviour. In our study, however, the expectations of success coalesced with efficacy toward the possible self; the resulting composite “self-efficacy” variable was associated with PA.

In her study of middle-aged women, Whaley (2003) found that the above-mentioned composite self-efficacy variable was associated with possible selves pertaining to exercise. Collectively this past and present research underscores the importance of self-regulatory aspects of possible selves. Practically, these converging findings suggest that retirees may benefit from envisioning a PA possible self that includes self-regulatory characteristics associated with that possible self. This suggestion is consistent with recent findings that showed that a PA possible selves intervention that focuses on self-regulatory content was an effective way to increase physical activity, especially among people low on self-efficacy (Strachan, Marcotte, Giller, Brunet, & Schellenberg, in press).

The number of freely reported PA possible selves (i.e., content of possible selves) showed a significant albeit small relationship with PA. As participants reported a greater number of PA-related possible selves they also reported recently engaging in more minutes of PA. However, this content-related aspect of possible selves accounted for only a small amount of variance in PA (2.3%) in comparison to that accounted for by self-regulatory aspect of possible selves (32.6%). The self-regulatory aspects of possible selves may do a better job of capturing the functional aspect of possible selves (their ability to aid in self-regulation) – and thus relate to behaviour more so than the sheer number of PA-related possible selves that participants list. The finding of a weak relationship between the content of possible selves and PA may also be due to possible variations in how specific or general participants were when reporting their PA possible selves. For instance, retirees may have provided a very general “physically active person” possible self which captured all their possible selves (e.g., gardening, golfing, walking, etc.). Conversely, others may have provided more specific possible selves (e.g., gardener, golfer, and walker). If participants differed in the specificity they applied to reporting PA possible selves this variable’s ability to associate with physical activity may have been compromised.

Through our first purpose, our findings lead us to suggest that two self-perceptions - identity and possible selves - relate to PA in new retirees. Identifying with PA and viewing oneself as an active person in the future may assist these new retirees in engaging in PA. This possibility seems plausible given the acknowledged influence of the self on behaviour (de Ridder & de Wit, 2006; Leary & Tangney, 2012; Stein & Markus, 1996), notably in the PA context (Fox & Wilson, 2008; Orleans, 2000). However, the concurrent nature of the relationships precludes us from confirming the direction of the associations; in the present sample, PA may influence these self-perceptions. A likely possibility is that these self-perceptions and PA are reciprocally related given the acknowledged mutually reinforcing relationship between PA self-perceptions and PA (e.g., Marsh et al., 2006). What we can advance is that self-perceptions appear relevant to retirees' engagement in PA. Few meaningful factors common to physically active retirees are identified in the existent research. Our findings highlight modifiable psychological factors of PA in retirees, which, in turn, could inform PA interventions in this population.

The second purpose of this study was to lay the groundwork for a possible intervention to increase PA among retirees. Before researchers invest in an intervention it is recommended to know if key relationships are supported. Given the established relationship between PA/exercise identity and PA, one way to increase PA among retirees may be through targeting identity (Carraro & Gaudreau, 2010; Marsh et al., 2006; Stein & Markus, 1996; Strachan & Whaley, 2013).

Honing PA possible selves may offer a meaningful "self" avenue from which to operate and impact identity, and PA, subsequently. Prior to pursuing this line of intervention, we first wanted to establish that possible selves and identity related to PA are associated and, in our sample of retirees this association was supported. Both self-regulatory processes (i.e., importance and composite self-efficacy) made significant contributions to PA identity. The finding that *self-regulatory* aspects of possible selves are associated with identifying with PA is consistent with

speculation on how possible selves may impact identity. Whaley and Schrider (2005) and Ruvolo and Markus (1992) advance that thinking about a possible self may aid in self-regulation through prompting people to generate strategies and plans to make the possible self a reality (*becoming* the possible self). This “becoming by doing” approach is consistent with existent research documenting greater identification with a behavior through increased effort and behavioural persistence (e.g., Cardinal & Cardinal, 1997) and the reciprocal relationship between behaviour and identity. Other authors advance a more narrative and reflective route where the simple act of honing in on the consequentiality of a possible self may impact one's current self-representations (identity). Similar theorizing has also been advanced relative to other self future projections (see D’Argembeau, Lardi, & Van der Linden, 2012). In view of that, possible selves may serve as a road through which people come to identify with PA. Given that this road has not yet been travelled, future intervention efforts are warranted.

This study offers strengths and in so doing, makes contributions to the understanding of PA pursuits in new retirees. To wit, the present findings are based on the responses of a large sample of new retirees. An important aspect of this sample is that all participants represented “new” retirees, consistent with past research examining new retirees’ leisure practices (i.e., 1-5 years into retirement; Floyd et al., 1992; Nimrod, 2007; Stephan, Fouquereau, & Fernandez, 2008). While there is no definite agreement, to our knowledge, as to what constitutes a new or recent retiree, accessing people close to retirement is likely important in order to capture the experiences of retirees adjusting to retirement, where changes to daily routines and lifestyle are expected (Atchley, 2000; King, 1991). Finally, this study was unique as through it we were able to test and, by ricochet, bring together conjectures from both the perspectives of possible selves and identity. As such, our study represents a first step in heeding recommendations by Strachan and Whaley (2013) to consider both self-perceptions in intervention efforts.

Our findings should also be considered in light of study limitations. The cross-sectional nature of this study limits our ability to suggest the directionality or causal nature of the relationship between variables. Furthermore, the sample was fairly active and may not be representative of all retirees. Our large sample size and online setting precluded us from assessing physical activity objectively. Future research may wish to replicate these findings prospectively in a more representative sample and using objective physical activity measures.

By pursuing an understanding of self-related variables associated with PA participation among retirees, the current research heeds recommendations to recognize the importance of self in understanding health behaviour (Contrada & Ashmore, 1999; Marsh et al., 2006). While preliminary, the results suggest that how one's see him or herself *now* (currently) and *in the future* explains variance in PA. These findings give credence to the idea that these self-perceptions could be a useful avenue to carry out PA interventions in retirees. Self-evaluation and discovery as well as self-views on aging (Chen, 2011; Wolff, Warner, Ziegelmann, & Wurm, 2014) appear to conflate with PA in this life-phase. As such, customizing interventions, through the presentation of relevant and meaningful content, may prove effective in increasing PA engagement (Wolff et al., 2014).

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CHAPTER III

ARTICLE 2 - POSSIBLE SELVES AND PHYSICAL ACTIVITY IN RETIREES: THE MEDIATING ROLE OF IDENTITY

Running head: PHYSICAL ACTIVITY IN RETIREES

Possible Selves and Physical Activity in Retirees: The Mediating Role of Identity⁶

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Acknowledgments:

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by internal funding received from the University of Ottawa (Research Development Program and the Faculty of Health Sciences).

⁶ This is an accepted manuscript of an article published online before print by SAGE Publications in *Research on Aging* on September 24, 2015, available at <http://roa.sagepub.com/content/early/2015/09/24/0164027515606191.abstract>. Very minor edits (e.g., typos, grammatical mistakes, formatting) based on my thesis committee's feedback were made to the accepted manuscript presented here while preparing the final version of this dissertation.

Abstract

Many retirees remain insufficiently physically active for health benefits. Self-perceptions can influence physical activity. Possible selves and identity are two self-perceptions that, when examined relative to physical activity, may help explain physical activity levels among retirees. Scholars claim that a focus on possible selves may impact identity, which, in the physical activity domain, is a known physical activity correlate. The aim of this study was to examine the relationship between these variables, and more specifically, to determine whether exercise identity mediates the relationship between physical activity possible selves and physical activity. We examined the proposed mediation relationship in 531 new retirees. Data were collected across three time points (one month apart). We conducted mediation analyses with bootstrapping. Identity mediated the relationship between possible selves (content and processes) and behaviour - all related to physical activity. These findings represent an important first step toward designing relevant physical activity interventions for retirees.

KEY WORDS: Retirement; physical activity; possible selves; identity; older adults; mediation

Possible Selves and Physical Activity in Retirees: The Mediating Role of Identity

Engaging in regular physical activity⁷ – defined as “any bodily movement produced by skeletal muscles that results in energy expenditure” (Caspersen, Powell, & Christenson, 1985, p. 126) - yields well-documented, salutary effects (i.e., Paterson & Warburton, 2010). Barnett, van Sluijs, and Ogilvie (2012) recognize retirement as a life event that may have implications for physical activity behaviour. Indeed, retirement may present older adults with an opportunity to contest the age-related decline in physical activity by affording them increased time to be physically active (Barnett et al., 2012; Rice, Lang, Henley, & Melzer, 2010). While a few studies document self-reported decreases in physical activity following retirement (Barnett et al., 2012; Slingerland et al., 2007; Chung, Domino, Stearns, & Popkin, 2009), several studies convey self-reported increases (Berger, Der, Mutrie, & Hannah, 2005; Lahti, Laaksonen, Lahelma, & Rahkonen, 2011; Touvier et al., 2010; Mein, Shipley, Hillsdon, Ellison, & Marmot, 2005; Evenson, Rosamond, Cai, Diez-Roux, & Brancati, 2002). Yet these self-reported increases may not represent a level of physical activity that is sufficient for health benefits (Berger et al., 2005); a finding that is confirmed by a recent study by Godfrey et al. (2014) who employed objective measures of physical activity. According to these authors, only 21% of retirees are sufficiently active to meet public health guidelines. In response to such findings, researchers have called for a better understanding of “personal factors” or determinants related to physical activity among retirees (Slingerland et al., 2007; Van Dyck, Cardon, Deforche, & De Bourdeaudhuij, 2015); this information could, in turn, be used to positively impact the likelihood that retirees transition into a physically active retirement (Slingerland et al., 2007; Zantinge, van den Berg, Smit, & Picavet,

⁷ In this study, we focus on *physical activity* instead of *exercise* because we felt that the former concept is more inclusive than the latter. Previous inquiries show that older adults find physical activity more self-descriptive of their active pursuits than exercise (Strachan, Brawley, Spink, & Glazebrook, 2010).

2014). In fact, retirement may represent a “critical window” for physical activity intervention efforts (Barnett et al., 2012).

One category of personal factors that is useful in understanding the physical activity behaviour of retirees is *self-perceptions*. Scholars credit these aspects of self as being central to their efforts to understand behaviour and behaviour change (Stein & Markus, 1996) and this notion has been extended to the physical activity context (Fox & Wilson, 2008). Self-perceptions may be particularly useful in understanding and increasing physical activity in retirees. The transition from work to retirement is viewed as a period for self-exploration and enhancement during which retirees may self-reflect on their health and who they are (Chen, 2011; Price, 2002).

Identity

One self-perception associated with physical activity (or exercise) adherence is *identity*. Identity entails the meanings tied to a role (Burke & Stets, 2009). When people endorse an identity, these meanings provide them with personal goals which they aim to maintain through engaging in corresponding behaviour (Burke & Stets, 2009). For example, people who identify with physical activity may have internalized the expectations that they engage in physical activity regularly, discuss their physical activity pursuits with other like-minded individuals, and purchase suitable apparel. Through engaging in such identity-consistent behaviours, individuals confirm their identity. Individuals can vary in the extent to which they endorse a given identity (e.g., physical activity identity) and the extent to which they do will influence the likelihood that they will engage in identity-relevant behaviour (Burke & Stets, 2009).

Researchers have demonstrated the ameliorative influence of identities in the physical activity/exercise context (for a review, see Strachan & Whaley, 2013). Succinctly, strength of exercise identity positively relates to self-efficacy for exercise, exercise frequency, and the articulation and carrying out of exercise intentions (see Strachan & Whaley, 2013). This positive

relationship between physical activity identity and related behaviour is demonstrated in middle-aged and older adults (Hays, Damush, & Clark, 2005; Liechty, Dahlstrom, Sveinson, Stafford Son, & Rossow-Kimball, 2014; Strachan, Brawley, Spink, & Glazebrook, 2010) and among recent retirees (Perras, Strachan, & Fortier, 2015). Purportedly, fostering retirees' identity for physical activity may, in turn, aid in increasing retirees' physical activity. Yet, how do we increase identity among this population?

Strengthening Identity

Suggestions about *how* to foster identities are scarce (Kendzierski & Morganstein, 2009⁸). Researchers argue that *possible selves* - another self-perception - may relate to identity formation (Hoyle & Sherrill, 2006). Possible selves – whether feared-for or hoped-for - are “ideas about what is possible for us to be, to think, to feel, or to experience” in the future (Markus & Nurius, 1986, p. 960). Several scholars argue that the consideration of possible selves can affect and lead to enduring changes in current self-views (i.e., identity; Hoyle & Sherrill, 2006; Markus & Nurius, 1986; Norman & Aron, 2003). Therefore, possessing a possible self related to physical activity may be related to and influence how retirees currently see themselves with respect to physical activity identity. In turn, exercise identity should be associated with physical activity engagement, thus serving as a mediator between physical activity possible selves and physical activity.

Despite conceptual support for this mediated relationship, very little research has been conducted to test these propositions. Recent work by Perras, Strachan, and Fortier (2015) offers preliminary support. These researchers found positive, cross-sectional associations between physical activity possible selves, physical activity identity and physical activity behaviour in a

⁸ Kendzierski and Morganstein (2009) offer a model of physical activity self-definition. This model has received initial support and, consistent with the authors' perspective, could represent a useful model through which researchers could intervene to increase physical activity self-definition/identity.

sample of new retirees. However the cross-sectional nature of the examination did not allow the authors to establish the sequential nature of the relationships between these variables.

The purpose of the present study was to employ a prospective design to determine if purported relationships between possible selves, identity and behaviour (all related to physical activity) are supported. Specifically, we hypothesize a mediational relationship where holding a physically active possible self at Time 1 will positively relate to physical activity identity at Time 2 which, in turn, will positively associate with physical activity at Time 3. This study will contribute to research by examining identity and possible selves, and the nature of their relationship to physical activity, which could help us understand physical activity among retirees. Further, if the proposed mediation relationship is supported, researchers will have a basis for interventions that focus on possible selves as a means of increasing physical activity identity and subsequent physical activity.

Method

Participants and Design

A total of 531 recently retired individuals took part in this prospective study. We considered people to be retired if they viewed themselves as such (i.e., self-identification) and were not in the labour force. In recognition that retirees may hold employment, some employment was permitted if the participant was also collecting a pension indicative of retirement. To allow for a focus on *newly-retired* individuals, we restricted eligibility to retirees within three years of retirement. This cut-off is consistent with past research on new retirees' leisure experiences (e.g., Stephan, Fouquereau, & Fernandez, 2008). Further, we focused on recently-retired, as opposed to all retired individuals, based on the assumption that the physical activity patterns and self-perceptions related to this role of newly-retired individuals should be less entrenched than those of more “seasoned” retirees.

Measures

Socio-demographic information. Participants provided basic socio-demographic information (i.e., age, gender, marital status, ethnicity, education level, body mass index, and years in retirement; see Appendix A3).

Physical activity. The Godin Leisure Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985) was used to assess physical activity (see Appendix A4). Participants were provided with definitions (i.e., Canadian Society for Exercise Physiology, 2011) and examples (i.e., Godin & Shephard, 1985) of moderate and vigorous physical activity. Participants then indicated the number of bouts of 15 minutes or more of physical activity they had performed at these two intensities over a recent 7-day period. Participants also provided the average duration (in minutes) of their physical activity sessions for each intensity level (as per Courneya, Jones, Rhodes, & Blanchard, 2004). Consistent with Courneya et al. (2004), we multiplied frequency and duration data for each intensity to calculate the total weekly minutes of moderate-to-vigorous physical activity (MVPA). The focus on MVPA was informed by the Canadian Physical Activity Guidelines which suggest that adults (18-64) and older adults (65+) should engage in 150 minutes per week of MVPA (Tremblay et al., 2011).

Self-report measures of physical activity, like the GLTEQ, have shown to be imprecise (Barnett et al., 2012) and in their place, the use of objective measures has been advocated (e.g., Helmerhorst, Brage, Warren, Besson, & Ekelund, 2012; Hansen, Ommundsen, Holme, Kolle, & Anderssen, 2014). Nonetheless, the use a self-report measure herein was predicated on practical considerations. First, given the large sample size and the online nature of the study, objective measurement was impractical. Further, the GLTEQ has been validated against objective measures of physical activity (e.g., aerobic capacity markers, accelerometers) and has been shown to be reliable (through test-retest method). We invite readers to see Kriska and Caspersen (1997) for the

results of validation and reliability studies of the GLTEQ. We also note that the GLTEQ has been used with older adult samples (e.g., Kim, Newton, Sachs, Giacobbi Jr, & Glutting, 2011; Strachan et al., 2010). In light of these studies advocating for the validity/reliability and use within an older population, we felt that the GLTEQ was an appropriate choice given our practical constraints. We included specific instructions emphasizing the importance of accurate reporting that have been shown to improve reporting accuracy (Gagné & Godin, 2005). Further, Vanhees et al. (2005) argue that electronic surveys (used herein) may encourage more honest reporting of physical activity. Finally, we focus on moderate and vigorous physical activity. Cust et al. (2008) posit that vigorous and ‘well-defined’ light-to-moderate intensity activity are easier to recall as they are routine or likely require planning/scheduling.

Physical activity identity. Physical activity identity was assessed via a slightly modified Exercise Identity Scale (EIS; Anderson & Cychosz, 1994). The original scale comprises nine items and uses a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). A sample item includes: *I consider myself an exerciser*. The items of this scale proved reliable previously ($\alpha = .94$); test-retest reliability was also demonstrated ($r = .93$; Anderson & Cychosz, 1994). In order to assess *physical activity* identity (as opposed to exercise identity), we substituted terms pertaining to exercise with those pertaining to physical activity. Past research suggests that older adults find the term “physically active person” more self-descriptive than “exerciser” (Strachan et al., 2010). The items of this modified scale (featured in Appendix A5) have proven reliable previously ($\alpha = .90$; Strachan et al., 2010) and they also proved to be reliable within the present sample ($\alpha = .92$). Scholars have debated whether the EIS is comprised of one (i.e., exercise identity) or two factors (i.e., exercise identity and exercise beliefs; Anderson & Cychosz, 1994; Vlachopoulos, Kaperoni, & Moustaka, 2011). The modified scale used by Strachan et al. 2010 supported a primary, single factor structure. Through principal component analysis and parallel

analysis, we determined that the primary, single factor (i.e., exercise identity) was also supported with our data.

Possible selves. Data on retirees' possible selves were collected following procedures consistent with past research (e.g., Whaley, 2003; Cross & Markus, 1991). The present study focused on *hoped-for* possible selves related to physical activity. Researchers opine that the attainment of positive outcomes (hoped-for possible selves) is “motivationally stronger” than the avoidance of negative health outcomes (feared-for possible selves; Hooker & Kaus, 1994).

Possible selves have been conceptualized both in terms of their *content* (i.e., the types or category of possible selves people possess) and the *self-regulatory processes* associated with a possible self (i.e., “the extent to which self-regulatory processes operate in service of a specific possible self”; Hooker, 1999, p. 103) and this approach to their measurement has occurred in past research (Hooker, 1999). First, to assess *content* of possible selves, we examined the prevalence with which retirees freely reported possible selves focused on physical activity (see Appendix A6). Participants were instructed: *In thinking about what you hope you will be like in the future, list up to seven (7) hoped-for possible selves.* Along with these instructions, participants were provided with a description of ‘hoped for possible selves’ (“selves we hope to become in the future”). In this description, a distinction was drawn between possible selves (e.g., becoming a writer) and behaviours (writing a book) in order to ensure that participants understood and therefore reported possible selves. To yield the number of physical activity possible selves, these responses were coded using categories outlined by Cross and Markus (1991) and Whaley (2003). As such, possible selves depicting physical activity (i.e., specific sports, physical activities, or athletic pursuits) were accepted as representing physical activity possible selves. The first author and a research assistant each separately coded approximately 25% of total responses (random selection)

to assess inter-rater reliability. Given the favourable intraclass correlation (.91, $p < .01$), the first author pursued the coding of the remaining data.

To assess *self-regulatory processes* tied to physical activity possible selves, we presented participants with a hoped-for possible self centered on physical activity, namely a *physically active retiree* (see Appendix A6). Participants were asked: *Now, please take a few minutes and think about the following possible self: “BE A PHYSICALLY ACTIVE RETIREE”. As a physically active retiree, you incorporate physical activity into your lifestyle on most days of the week at a moderate to vigorous intensity. You have the energy to carry out your daily tasks and all your personal goals for retirement.* This practice of asking participants to consider a physically active possible self has been employed previously (Whaley, 2003). For this specific possible self, participants answered three questions from the Possible Selves Instrument (Cross & Markus, 1991) which allowed us to assess the *self-regulatory processes* associated with that possible self. Specifically, the importance (*How important is it to you to achieve this possible self?*), perceived self-efficacy (*How capable do you feel of accomplishing this possible self?*), and outcome expectancy (*How likely do you think it is that this possible self will be achieved?*) associated with the physical activity possible self were assessed. Each of these three items was rated on a seven-point Likert-type scale ranging, for example, from 1 (*not at all important*) to 7 (*very important*).

Whaley (2003) notes that people have difficulty distinguishing between the self-efficacy item (their capability of accomplishing a possible self) and the outcome expectancy item (likelihood of the possible self being achieved). Thus, we considered the extent to which these two self-regulatory processes were related (i.e., multicollinearity) before deciding whether to treat them as two separate processes or combine them into one process for our analyses (as per Whaley, 2003). The relationship between these two processes trended towards multicollinearity ($r = .89$).

As a cautionary move, we collapsed the two processes into one composite variable (self-efficacy for achieving the possible self).

Procedure

Upon attaining ethical clearance (see Appendix C for ethics certificates), the first author delivered print signage/flyers and sent recruitment texts electronically to local libraries, various retirees' associations, newspapers/magazines, mailing lists, and social media (i.e., Facebook). Administrators of these venues agreed to display signage/flyers or send recruitment texts electronically to their membership/readership on the researchers' behalf. Advertisement was also conducted by the authors via word-of-mouth. The advertisements invited interested participants to visit the secure data collection website hosted by Fluid Surveys and answer a few eligibility questions (see Appendix A1). The exact URL for the website was indicated on printed advertisements and was “clickable” in the case of online advertisements. Ineligible participants were led to a webpage confirming their ineligibility and thanking them for their interest. If eligible, as per eligibility criteria described earlier, participants were directed to the consent form (see Appendix B1) and, upon “clicking” their consent, the first questionnaire. Subsequent questionnaires (T2 and T3) were sent four weeks apart from each other. Participants received entries for a draw for participation; 10 prizes of CAD 100\$ were awarded.

To access online questionnaires, participants were required to provide their e-mail address, first name, and month of birth (see Appendix A2). These fields were mandatory. The e-mail address collected was used to send links for subsequent questionnaires. With the above-mentioned information, it was possible to check whether participants completed questionnaires more than once and delete duplicate entries. Data were time-stamped; the time to complete each questionnaire was as follows: Time 1 (median = 45 minutes), Time 2 (median = 30 minutes), and Time 3 (median = 30 minutes). Participants had the option of saving their unfinished questionnaire

and completing it later (by e-mailing themselves a link for the questionnaire bookmarked at the last completed page).

Analytical Plan

Attrition analysis. A total of 966 participants completed Time 1 measures; 696 participants completed Time 2 measures (72.1 % retention), and 565 participants completed Time 3 measures (58.5 % retention). We performed an attrition analysis to verify any potential differences between those participants who completed all measures and those participants who dropped out. No differences between the groups were found on the main variables of interest. We did detect a modest difference for age, ($t(837.18) = 3.52, p < .01$), where participants who completed the study were slightly younger ($M = 62.00, SD = 4.74$) than participants who discontinued participation ($M = 63.16, SD = 5.23$). The significant difference yields a difference between the means of 1.16 years. We have no reason to believe that this difference in age is practically meaningful, and concluded that there are no real differences between participants that stayed in the study and those who dropped out.

Main analyses. After running descriptive statistics for the main study variables and correlations to ascertain the relationships between variables, we conducted three mediation analyses with bootstrapping resampling methods (for an overview, see Hayes, 2009). As per specifications outlined in Hayes (2013), the PROCESS macro v. 2.13 for SPSS (model 4 for simple mediation) was used. Hayes (2013) recommends simulations of at least a few thousands; 5000 simulations were used in the present analyses. For each analysis, a facet of possible selves (i.e., number of possible selves, importance of possible self, and composite self-efficacy for attaining possible self) was entered as the independent variable (X), physical activity identity as the mediator variable (M), and physical activity was entered as the criterion variable (Y) in the models. As per Weinstein (2007), past physical activity (i.e., Time 1) was entered as a covariate in

all three models. The newest iteration of the PROCESS macro yields measures of effect size for mediation models including covariates. Of interest, the completely standardized indirect effect of X on Y (or index of mediation) is reported for each mediation test and can be interpreted as per Cohen's (1988) usual standards, squared (so, .01, .09, and .25, denoting small, medium, and large effect sizes, respectively).

Results

Participants

Our final sample featured 336 women (63.6%) and 192 men (three participants omitted reporting their gender). Participants were, on average, 61.93 years old ($SD = 4.73$) and had been retired for 1.55 years ($SD = 1.03$). The average body mass index (BMI) for participants in the sample was 27.48 ($SD = 5.34$) which falls into the overweight range (25.0-29.9). Most participants identified themselves as Caucasian (94.7%) and reported being married (65.5%). Slightly more than half of the sample (55.7%) reported having completed a bachelor's degree or higher university degree.

Data Management

To conduct mediation analyses, we retained data from participants who completed all three time points ($N = 565$). A cursory examination of the data revealed that nine participants were retired for more than three years (based on actual retirement date provided); their data were removed. Subsequently, data management was carried out as per steps outlined in Tabachnick and Fidell (2007). Specifically, missing data were examined and determined to be minimal ($< 3\%$) and occurring completely at random. Hence, missing values were imputed through estimation maximization in the missing values analysis option of IBM SPSS Statistics 22. Univariate outliers were decreased by one unit higher than the second-highest value. A total of 25 unique multivariate outliers were detected, examined, and subsequently deleted. This deletion brought the analytic

sample size to 531. Skewness, kurtosis and linearity were also examined; no major issues were found. Multicollinearity was not detected between the various facets of possible selves (i.e., number, importance, and composite self-efficacy).

Descriptive Statistics and Correlations

Descriptive statistics and correlations for the study variables are presented in Table 1.

 Insert Table 1

Mediation Analyses

Three tests of simple mediation were conducted in Hayes's PROCESS, using 5000 bootstrap simulations (see Table 2). In all models, physical activity identity was entered as the mediator variable (M). Models of both M and Y include physical activity at Time 1 as a covariate.

Model 1. In the first model, bootstrap simulations revealed that the total effect between possible selves-self-efficacy and physical activity was positively and significantly associated ($effect = 18.79, SE = 8.38, p = .03$ [95% CI 2.33, 35.25]). Furthermore, possible selves-self-efficacy exerted an indirect effect on physical activity through physical activity identity ($effect = 16.38, SE = 4.22, p < .001$ [95% CI 8.40-25.21]) while the direct relationship between possible selves-self-efficacy and physical activity was not significant ($effect = 2.41, SE = 9.24, p = .79$ [95% CI -15.74, 20.55]). The indirect effect did significantly differ from zero, as per the 95% bias-corrected bootstrap confidence interval. Therefore, physical activity identity mediated the relationship between possible selves-self-efficacy and physical activity. This represents an almost medium effect size, $P_M = .08$, 95% BCa CI [.05, .13].

Model 2. In the second model, bootstrap simulations revealed that the total effect between possible selves-importance and physical activity was positively albeit not significantly associated

(*effect* = 13.91, *SE* = 9.95, *p* = .16 [95% CI -5.64, 33.46]). Moreover, possible selves-importance exerted an indirect effect on physical activity through physical activity identity (*effect* = 20.19, *SE* = 4.82, *p* = .01, [95% CI 12.19, 31.74]) while the direct relationship between possible selves-importance and physical activity was negative and not significant (*effect* = -6.28, *SE* = 10.82, *p* = .56, [95% CI -27.53, 14.96]). The indirect effect did significantly differ from zero, as per the 95% bias-corrected bootstrap confidence interval. Therefore, physical activity identity mediated the relationship between possible selves-importance and physical activity. This represents a medium effect size, $P_M = .09$, 95% BCa CI [.05, .14]. This particular model points to either inconsistent mediation, where one mediated effect is opposite in sign to the other mediated effects (MacKinnon, Fairchild, & Fritz, 2007) and/or suppression (Shrout & Bolger, 2002). The negative direct effect in this mediation model is non-significant and suppression was not theoretically expected (Shrout & Bolger, 2002). Thus, we speculate that the negative direct effect is probably attributable to sampling fluctuations and that mediation exists.

Model 3. Finally, in the third model, bootstrap simulations revealed that the total effect between possible selves-number and physical activity was positively albeit not significantly associated (*effect* = 11.01, *SE* = 14.36, *p* = .44 [95% CI -17.20, 39.22]). Possible selves-number exerted an indirect effect on physical activity through physical activity identity (*effect* = 7.02, *SE* = 3.02, *p* = .03 [95% CI 2.19, 14.29]) while the direct relationship between possible selves-number and physical activity was not significant (*effect* = 3.99, *SE* = 14.17, *p* = .78 [95% CI -23.84, 31.81]). The indirect effect significantly differed from zero, as per the 95% bias-corrected bootstrap confidence interval. Therefore, physical activity identity did mediate the relationship between possible selves-number and physical activity. However, this represents a small effect size, $P_M = .02$, 95% BCa CI [.01, .04].

 Insert Table 2

Discussion

By drawing on two literatures focused on physical activity self-perceptions – namely possible selves and identity – we examined identity as a mediator between facets of possible selves and physical activity behaviour over time in a sample of new retirees. The findings support our hypotheses as we found that physical activity identity mediates the relationship between physical activity possible selves and physical activity behaviour. By confirming the mediational relationship between possible selves, identity and physical activity, we offer support for theory and for the role of these two self-perceptions in understanding physical activity among retirees. Further, our findings provide foundational support for the development of self-perception-based physical activity interventions for new retirees.

Contributions to Theory

In examining identity as a mediator between physical activity possible selves and physical activity behaviour, we considered three facets of possible selves, namely, self-efficacy for and importance of achieving, and number of physical activity possible selves. These facets represent both self-regulatory processes and content of possible selves (Cross & Markus, 1991). In the case of each of these possible selves aspects, identity was supported as a mediator. These findings suggest that the number of physical activity-related possible selves that retirees report possessing, as well as the associated self-regulatory processes are indirectly related to physical activity behaviour through their association with physical activity identity. Consistent with the views of self theorists, the present results suggest that thinking about one's possible self (in this case as a physically active retiree) may encourage related identification (physical activity identity; Hoyle &

Sherrill, 2006; Norman & Aron, 2003; Markus & Nurius, 1986). In turn, this physical activity identification may encourage identity-consistent physical activity behaviour (Strachan & Whaley, 2013). However, we note that the associations supporting these possible relationships do not allow us to infer causality. This is the first study, to our knowledge, to test these relationships via mediation in a sample of new retirees.

When participants felt it was *important* to achieve their possible self as a physically active retiree, and when they believed themselves to be *capable* of and *likely* to achieve this possible self, they also reported identifying as a physically active retiree one month later. These findings align with both the possible selves and identity literatures. According to possible selves theorists such as Norman and Aron (2003) and Hoyle and Sherrill (2006), contemplating the consequences of a possible self (e.g., why achieving that possible self might be important) can impact one's current self-representation (identity). Further, identity researchers (or researchers interested in related constructs such as physical activity self-definition) have established that feeling confident/competent about physical activity is a correlate of identifying with that behaviour (e.g., Kendzierski & Morganstein, 2009; Strachan, Brawley, Spink, & Jung, 2009). Therefore, it is not surprising that participants in the present study who felt they were capable/likely to achieve their possible self as a physically active retiree also reported identifying with this role in the near future. Though we cannot infer causation, the self-regulatory beliefs that people have when asked to entertain a physically active possible self relate to how strongly they identify themselves as a physically active retiree.

The significant positive, prospective relationship between physical activity identity and physical activity behaviour that made up an aspect of the mediated relationships is offered a possible explanation through identity theory and past research. According to identity theory, individuals should seek to behave consistently with meanings or expectations relevant to a

personally-endorsed identity (Burke & Stets, 2009). Retirees in this study who identify as being physically active may engage in physical activity in an effort to confirm and uphold their identity (Burke & Stets, 2009), though we can only advance this as a possibility and not a causal relationship. The association between physical activity identity strength and physical activity is also consistent with the literature. Indeed, individuals with a strong physical activity identity (or exercise identity) engage in more physical activity, be it in terms of frequency, intensity, or duration (see Strachan & Whaley, 2013). Our results replicate those obtained in older adult samples (which may have included retirees). For example, Hays, Damush, and Clark (2005) found relationships between exercise self-definitions and exercise participation over time among middle-aged, minority women with chronic health conditions. Similarly, Strachan et al. (2010) found a relationship between physical activity identity and physical activity in older adults living in congregate living facilities.

Our prediction that identity would mediate the relationship between *possible selves-content* (number of physical activity possible selves) and physical activity materialized but the effect size was small. We speculate that the measure used to capture this possible self facet may have resulted in participants reporting their physical activity possible selves with varying sensitivity or detail. For instance, some retirees may have provided one very general “physically active person” possible self to encompass *all* their active possible selves (e.g., gardening, golfing, walking, etc.). Conversely, others may have itemized each specific possible self (e.g., gardener, golfer, and walker). If the number of possible selves that participants reported varied due to differences in how specific or general participants were in reporting their physical activity possible selves, this variable’s ability to correlate with identity and in turn, physical activity may have been compromised.

Practical Implications

Our results have implications for future intervention efforts. Through observing a pattern of associations supporting mediation, we suggest that having individuals focus on physical activity possible selves may offer a means through which we can strengthen their physical activity identity, which, in turn, encourages identity-consistent physical activity behaviour. Individuals could be exposed to possible selves vignettes or scenarios (e.g., Murru & Martin Ginis, 2010; Ouellette, Hessling, Gibbons, Reis-Bergan, & Gerrard, 2005) wherein they are prompted to contemplate a physically active possible self. Physical activity possible selves interventions of this nature have led to increases in physical activity (Murru & Martin Ginis, 2010; Ouellette et al., 2005); future research should examine whether such a physical activity intervention would *also* lead to increases in physical activity identity, and in turn, physical activity behaviour in retirees. An important consideration of these research efforts would be to also examine the longevity of these effects. Indeed, Hobbs et al. (2013) remind us that in the interest of public health, interventions should yield changes that are maintained overtime (e.g., ≥ 12 months). To date, possible selves interventions support increases in physical activity over short-term (up to eight weeks). It may be that the effects of this one-time intervention weaken over time. If the effects are confirmed to be short-lived, researchers may want to explore how to best extend these intervention effects. For example, might repeated generation of a physically active possible self image extend the endurance of intervention effects?

A physical activity intervention that targets self-perceptions - namely physical activity identity through a focus on physical activity possible selves - may be especially suited to *new retirees*. Experts view the transition from work to retirement as a period for self-exploration and enhancement during which retirees may self-reflect on their health and who they are (Chen, 2011; Price, 2002) and, as such, may be receptive to health promotion programs and services (Wilson &

Palha, 2007). Indeed, Zantinge and colleagues (2014) surmise that pre-retirement and retirement represent transitions periods ripe for “support” initiatives toward the adoption of a healthy lifestyle. To this end, two recent systematic reviews and meta-analyses identify features and techniques to consider when designing interventions for retirees/older adults (Hobbs et al., 2013; O’Brien et al., 2015).

Strengths, Weaknesses, and Future Directions

Given the dearth of research on how to increase identity, a strength of this paper is that the presented associations support conjectures in the self literature that imagining oneself as a physically active person in the future is associated with identifying with physical activity (e.g., Hoyle & Sherrill, 2006; Markus & Nurius, 1986). An important next step is to move beyond associations so causal claims can be made. This direction could be accomplished through a randomized trial where retirees contemplate their physically active possible selves, to determine if this contemplation presents a viable way to impact their physical activity identity. This research design would also allow for a stronger test of the mediation sequence supported in this study. In suggesting future avenues for intervention with the aim of increasing physical activity identity we must acknowledge work by Kendzierski and Morganstein (2009) who outline a model of physical activity self-definition. This model could also serve as a basis for such intervention efforts.

Further, there are design and analytic strengths of this study. Our mediation analyses heeded several recommendations by Frazier, Tix, and Barron (2004). Specifically, theory and past research informed this study and the data analyzed were collected at three different time points (one month apart). Our sample size was adequate and we considered the influence of past physical activity behaviour in our analyses (Weinstein, 2007). As such, our findings give further credence to the role of self in explaining health behaviours.

The strengths of this study, however, must be assessed in light of limitations. The sample was predominantly female, Caucasian, educated, living in urban centers, and active (surpassing Canadian physical activity guidelines). As such, our study conclusions are limited to this specific population and may not represent the experiences of all retirees (especially those reporting very little physical activity). Future researchers should seek to determine if the mediation relationship supported presently holds in a broader sample of retirees as well as in other populations.

As noted by Barnett et al. (2012), imprecise measurement of physical activity among retirees (e.g., single item and custom questionnaires) is a weakness of this literature. While our choice to use a validated measure of physical activity addresses some of the measurement limitations noted by Barnett et al. (2012), our physical activity measure is limited in that it relies on self-report (Helmerhorst et al., 2012). Our large sample size and online data collection precluded us from assessing physical activity objectively. Future research should seek to employ objective measurement of physical activity when possible. An example of a study within this literature that has employed objective measurement is a recent study by Godfrey et al. (2014) who assessed various types of active and sedentary pursuits in a sample of community-dwelling older adults.

We also chose to test the present sequence of relationships between variables given the theorizing supporting such a sequence (e.g., Hoyle & Sherrill, 2006). However, we must acknowledge that this proposed sequence represents one possible sequence. Markus and colleagues (1990) offer an alternative sequence of relationships between possible selves, identity and physical activity than the one presented herein. They suggest that self-schemas (akin to identity) give way to possible selves, which in turn, leads to the organization and energization of action which culminates in effective performance (i.e., behavior) and this proposed sequence has received support (Whaley & Schrider, 2005). Further, we acknowledge that the relationships

assessed in the present sample may represent stable and reciprocally-reinforcing constructs; we cannot say that the physical activity possible selves in place among our participants at Time 1 led to increased physical activity identity at Time 2 and in turn, more physical activity at Time 3. However, the finding that these variables related over time and that the proposed sequence of mediation was supported, warrants our future intervention efforts. Another limitation of the present research is that we focused only on approach-possible selves (e.g., active retiree) given the acknowledged motivational properties of this sub-category of possible selves (Hooker & Kaus, 1994). However, feared-for possible selves are also noted for their motivational properties (Hooker, 1999).

Conclusion

Retirement represents a life phase where self, health and health-enhancing behaviours may coalesce. As such, the current research heeds recommendations to recognize the importance of self in understanding health behaviour, including physical activity (Contrada & Ashmore, 1999; Marsh, Papaioannou, & Theodorakis, 2006). Results show that identity mediated the relationship between aspects of possible selves and behaviour. In addition to a previous cross-sectional study, the results suggest that how one's see him or herself *now* (identity) and *in the future* (possible selves) can impact physical activity. These findings give credence to the idea that these self-perceptions could be a useful avenue to carry out physical activity interventions in retirees.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Table 1

Means, Standard Deviations, Ranges, and Correlations Matrix for Study Variables

Variable	Mean	SD	Range	1.	2.	3.	4.	5.
1. Number of PSs	.47	.63	0-2.00	--				
2. PSs-importance	6.36	.92	3.50-7.00	.19**	--			
3. PSs-self-efficacy	5.86	1.15	2.00-7.00	.18**	.616**	--		
4. PA identity	4.81	1.34	1.00-7.00	.16**	.49**	.56**	--	
5. PA	253.40	233.07	0-1020.00	.10*	.18**	.27**	.40**	--

Note. PSs = possible selves. PA = physical activity (in minutes). Variables 1 through 3 assessed at time 1. Variable 4 assessed at time 2. Variable 5 assessed at time 3. * $p < .05$. ** $p < .01$. Given the wide-ranging values pertaining to physical activity, the mode was also generated; the value is 195 minutes.

Table 2

Total, Direct, and Indirect Effects for all Three Models

Physical activity as criterion ⁹					
	Effect	SE	t	LLCI	ULCI
Total effect of PSs-self-efficacy	18.79	8.38	2.24 [*]	2.33	35.25
Direct effect of PSs-self-efficacy	2.41	9.24	.26 ^{ns}	-15.74	20.55
Total effect of PSs-importance	13.91	9.95	1.40 ^{ns}	-5.64	33.46
Direct effect of PSs-importance	-6.28	10.82	-.58 ^{ns}	-27.53	14.96
Total effect of PSs-number	11.01	14.36	.77 ^{ns}	-17.20	39.22
Direct effect of PSs-number	3.99	14.17	.28 ^{ns}	-23.84	31.81
	Effect	Boot SE		Boot LLCI	Boot ULCI
Indirect effect of PSs-efficacy	16.38***	4.22		8.40	25.21
Indirect effect of PSs-importance	20.19***	4.82		12.19	31.74
Indirect effect of PSs-number	7.02 [*]	3.02		2.19	14.29

Note: Number of bootstrap samples for bias corrected bootstrap confidence intervals: 5000. Level of confidence for all confidence intervals set at 95%. ns = not significant. * = significant at $p < 0.05$. *** = significant at $p < 0.001$.

⁹ Models of both M and Y include include Time 1 PA as a covariate.

CHAPTER IV

ARTICLE 3 - IMPACT OF A RANDOMIZED POSSIBLE SELVES EXPERIMENT ON NEW RETIREES' PHYSICAL ACTIVITY AND IDENTITY

Running head: PHYSICAL ACTIVITY AND IDENTITY IN RETIREES

Impact of a Randomized Possible Selves Experiment on New Retirees' Physical Activity and
Identity

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BACKGROUND: Retirement is not always associated with greater engagement in physical activity. Previous interventions informed by possible selves, a type of future-oriented self-representation, proved useful to increase physical activity in young adults. We thus wanted to explore if a similar intervention would yield favorable outcomes in new retirees. We also pondered whether possible selves could help increase identity relative to the physical activity context. Identity circumscribes the meanings which help individuals define who they are in a given role (i.e., what it means to be a physically active person). Identity increases when individuals endorse these meanings more strongly. Possible selves may be tied to identity as they allow individuals to imagine themselves as physically active, which has been argued to incite changes to one's sense of self. Hence, the overall aim of this study was to determine whether a possible selves intervention would increase physical activity behaviour and physical activity identity in a group of newly-retired individuals. **METHODS:** A total of 294 participants were randomized into one of three groups: (a) a repeated group with three possible selves image generation exposures, (b) a one-time group with one possible selves image generation exposure, or (c) a control group. Participants completed self-report measures at baseline and follow-up assessments were taken at weeks 4, 8, and 12 of the study. The measures for the outcomes of interest were: the Godin Leisure Time Exercise Questionnaire and the modified Exercise Identity Scale. **RESULTS:** Repeated measures mixed-effects models analyses with maximum likelihood estimation revealed no significant differences between groups (i.e., no group effect) on physical activity behaviour ($p = 0.34$) or physical activity identity ($p = 0.97$) at follow-up time points. There was, however, a time effect by which all groups reported marginally higher levels of physical activity ($p < .01$) and physical activity identity ($p < .01$), inconsequential to group assignment. **CONCLUSIONS:** While the intervention failed to significantly increase physical activity identity and physical activity in newly retired individuals, we suggest future research directions for interventions targeting new retired individuals.

Keywords: Intervention; possible selves; identity; physical activity; retirees

Impact of a Randomized Possible Selves Experiment on New Retirees' Physical Activity and Identity

Retirement and Self

From mid-to-late life, people's physical activity levels decline (Schrack et al., 2014). This decrease may result in older adults missing out on the benefits associated with regular physical activity (Paterson & Warburton, 2010). Retirement may present older adults with an opportunity to thwart these age-related declines by affording them increased time to be physically active (Barnett, van Sluijs, & Ogilvie, 2012; Rice, Lang, Henley, & Melzer, 2010). However, research examining the association between retirement and self-reported physical activity reveals that for many retirees, this life transition does not lead to increased physical activity (Berger, Der, Mutrie, & Hannah, 2005; Chung, Domino, Stearns, & Popkin, 2009; Fonseca & Paúl, 2003; Slingerland et al., 2007).

Researchers highlight the need to understand the “personal factors” related to physical activity among retirees (Slingerland et al., 2007) as they could be employed in interventions aimed at helping retirees transition into a physically active retirement (Slingerland et al., 2007; Zantinge, van den Berg, Smit, & Picavet, 2014). *Self-perceptions* are a category of personal factors that are central in understanding physical activity behaviour and behaviour change (Fox & Wilson, 2008; Stein & Markus, 1996) and may be especially relevant to new retirees. Indeed, the transition from work to retirement is viewed as a period for self-exploration and enhancement during which retirees may self-reflect on their health and who they are (e.g., Barnett, Guell, & Ogilvie, 2012; Liechty, Yarnal, & Kerstetter, 2012; Teuscher, 2010). As such, we turn to one type of self-perceptions: possible selves.

Possible Selves

Possible selves are future-oriented self-representations which circumscribe the thoughts people have about their future and their potential related to specific roles (Markus & Nurius, 1986). Since possible selves are anchored in the future - and thus are not confined by what is factual in the present – they represent malleable elements of the self (Cross & Markus, 1991). Possible selves are not just *any* aspect of one's imagination, rather they usually hone in on individuals' enduring hopes and fears for the future (Markus & Nurius, 1986). As per these authors, possible selves provide motivation and guidance for change. First, they provide a vivid snapshot of what is possible for someone (good or bad) which serves as a goal to be pursued or avoided. Secondly, possible selves provide a context to evaluate or interpret current behaviour.

Possible Selves and Physical Activity

The possible selves construct has been employed in physical activity/exercise research. A cross-sectional study by Harju and Reed (2003) found, in a sample of undergraduate students, that the supposed attainment of a possible self in the exercise purview positively coalesced with exercise behaviour, fitness, and self-efficacy for exercise. Additional cross-sectional findings from Whaley (2003) demonstrate how the possession of possible selves pertaining to body image can distinguish inactive and active, middle-age women. Furthermore, Whaley and Schrider (2005) showed that older adults participating in a 10-week exercise program had well-articulated possible selves related to physical activity. Recently, possible selves have been assessed relative to the physical activity levels of new retirees; Perras, Strachan, and Fortier (2015a) confirmed that newly retired individuals' possible selves pertaining to physical activity were positively associated with concurrent physical activity. And this has been recently confirmed in a prospective study (Perras, Strachan, & Fortier, 2015b). As such, physical activity possible selves appear to be positively related to aspects of physical activity.

Possible selves have also been leveraged in *interventions* designed to increase physical activity. Ouellette, Hessling, Gibbons, Reis-Bergan, and Gerrard (2005) found that university students who thought and wrote about their exercise participation from a future perspective (i.e., possible self) reported increased exercise behaviour four weeks later. Subsequently, Murru and Martin Ginis (2010) found that inactive university students who read a script to help generate images of themselves in the future as either an exerciser or an inactive person reported greater physical activity four and six weeks post manipulation than participants in the control group. Similarly Strachan, Marcotte, Giller, Brunet, and Schellenberg (in press) randomized insufficiently-active adults (aged 18-64) to either a self-enhancing possible selves intervention (consistent with Murru & Martin-Ginis, 2010) or an enhanced “self-regulatory” possible selves intervention (participants’ possible self image included the self-regulatory steps they would take to achieve their possible self). Participants in both conditions reported significantly higher physical activity than their control counterparts (at 4- and 8-week follow-up for the self-regulatory condition and at 8 weeks for the self-enhancing condition). These studies suggest that a *one-time* focus on images, including possible selves, can impact physical activity behaviour. Given the promising results of these studies, a possible selves intervention may represent a reasonable tool through which we can attempt to increase physical activity among retirees and by the same token, heed recommendations by Ouellette et al. (2005) to examine the impact of such interventions on older adults.

Possible Selves and Identity

While possible selves interventions can lead to increases in physical activity, they also hold the potential to have another important impact, that of increasing the extent to which individuals identify with physical activity *in the present* (physical activity identity). Indeed, researchers argue that the consideration of possible selves can affect and lead to enduring changes in current self-

views (i.e., identity; Hoyle & Sherrill, 2006; Markus & Nurius, 1986; Norman & Aron, 2003). Given that Markus (1977) and Burke (1980) have both commented that identities are resistant to change, individuals may require *multiple* occasions to reflect on a physically-active possible self for identity to be impacted. This assertion is consistent with that of Hoyle and Sherill (2006) who argue that the *chronic* activation of a possible self can impact current self-representations (i.e., identity). No research to date has examined the effects of a physical activity possible selves intervention on physical activity identity or considered whether multiple exposure to the possible self image is necessary for a change in identity to occur.

If imagining oneself as a physically active retiree could encourage people to identify with physical activity, this consequence may represent an important way in which sustained physical activity behaviour change could be fostered (Marsh, Papaioannou, & Theodorakis, 2006). Indeed, the ameliorative influence of identities on physical activity/exercise is well documented (for a review, see Strachan & Whaley, 2013). Strength of exercise identity also positively relates to self-efficacy for exercise, exercise frequency, and the articulation and carrying out of exercise intentions (Estabrooks & Courneya, 1997; Petosa, Suminski, & Hartz, 2003; Strachan, Flora, Brawley, & Spink, 2011). Furthermore, the positive relationship between physical activity identity and related behaviour is demonstrated in middle-aged and older adults (Hays, Damush, & Clark, 2005; Liechty, Dahlstrom, Sveinson, Stafford Son, & Rossow-Kimball, 2014; Strachan, Brawley, Spink, & Glazebrook, 2010) as well as in recent retirees (Perras, Strachan, & Fortier, 2015a, 2015b). Therefore, possible selves interventions may lead to changes in physical activity identity, a known correlate of physical activity behaviour. Further, testing the utility of possible selves interventions at increasing identity should also be of interest to scholars interested in identity change.

Experimental Purposes and Hypotheses

The overall aim of this experiment was to determine if a possible selves intervention would increase physical activity identity and physical activity behaviour in a group of newly-retired individuals. One specific aim was to compare physical activity levels and identity across three conditions of an experimental design: a *repeated* possible selves intervention, a *one-time* possible selves intervention, and a control group. We hypothesized that participants in the *repeated* possible selves group would report higher levels of physical activity and identity over the course of the intervention than the *control* group (hypothesis 1) and the *one-time* possible selves group (hypothesis 2). The *one-time* condition was expected to report higher levels in physical activity identity and physical activity over the course of the intervention than the control group (hypothesis 3).

Methods

Participants

A total of 294 newly retired men and women were randomized in the present study. Specific inclusion criteria included confirmation of retirement status (i.e., collecting pension/retirement-like income, and considering oneself "retired") and confirmation of current health status (allowing for increased physical activity). To allow for a focus on *newly-retired* individuals, we restricted eligibility to retirees within three years of retirement. This cut-off is consistent with past research on new retirees' leisure experiences (e.g., Stephan, Fouquereau, & Fernandez, 2008). Further, we focused on recently-retired, as opposed to all retired individuals, based on the assumption that the physical activity patterns and self-perceptions related to this role of newly-retired individuals should be less entrenched than those of more "seasoned" retirees. Moreover, individuals exercising four times per week or more or reporting a strong physical activity identity were excluded as they were deemed not likely to benefit from the intervention.

The average age of the participants in the sample (i.e., across conditions) was 63.4 years old. The majority of the sample was Caucasian (94%), female (68.5%), married (60%), and highly educated (with almost 30% of participants reporting having a degree higher than a bachelor's degree). The body mass index (BMI) was calculated with self-reported weight and height data; the BMI for the whole sample was 29.74, corresponding to the overweight classification (U. S. Department of Health and Human Services, n.d.). We present sociodemographic information per each condition in Table 1.

Procedures

All procedures were approved by the appropriate Research Ethics Board (see Appendix C for ethics certificates). In an effort to reach as many retirees as possible, we decided to deliver the intervention online through a web survey platform. In the health purview, internet-delivered interventions carry some notable advantages over their lab-based counterparts (for a discussion of these advantages, please see Joseph, Durant, Benitez, & Pekmezi, 2014; Marcus, Nigg, Riebe, & Forsyth, 2000). Furthermore, a growing body of research is showing that internet-delivered interventions are acceptable and/or effective in increasing physical activity in older adults (Amman, Vandelandotte, de Vries, & Mummery, 2013; Irvine, Gelatt, Seeley, Macfarlane, & Gau, 2013; Mouton & Cloes, 2015; Reinwand, Schulz, Crutzen, Kremers, & de Vries, 2015; Wijsman et al., 2013; Vroege et al., 2014).

Participants were recruited via word-of-mouth, social media and online postings, local advertisements (i.e., public libraries and notice boards, newspaper), newsletters from organizations catering to older adults, and e-mail lists. All advertisements featured the secure URL link for the online survey platform (powered by Fluid Surveys). Interested individuals could visit the platform to determine eligibility (see Appendix A7 for eligibility questionnaire), and if eligible, read and provide informed consent (see Appendix B3) to participate in the study, and complete baseline

measures. Following completion of baseline measures, participants were randomly assigned to one of three conditions: control ($n = 88$), one-time intervention ($n = 107$), and repeated intervention ($n = 99$). Randomization took place online via a single multiple choice question with nonsensical answer choices; each choice was tied to a different group assignment. To minimize order bias, the answer choices were shown in a random order every time the page was viewed. Follow-up data were collected at four, eight, and 12 weeks after baseline. At all times and for each follow-up time point, participants had the option of saving their unfinished questionnaire and completing it later (by e-mailing themselves a link to retrieve the questionnaire bookmarked at the last completed page).

Intervention

One-time possible selves intervention condition. Immediately after completing baseline measures, participants randomized to the *one-time* possible selves intervention group completed a standard image generation task (see Appendix A11) adapted from Murru and Martin Ginis (2010). Participants were invited to watch a short video embedded within the web survey platform. Before clicking on the video to start, participants were reminded to turn up the volume of their device since the video (through JavaScript) could not be stopped, paused, fast-forwarded, or played anew. Participants were also reminded of the definition of moderate-to-vigorous physical activity given its reference in the video.

The video was comprised of a series of slides (i.e., Powerpoint slides saved as a Windows Media Video file) with text presented against a solid background. A narrator also read the text as follows:

The following video is a very important component of the present study. We kindly ask you to watch and listen carefully. It is only a few minutes long. This video addresses how you see yourself in the future. We all think about the future to some extent. When doing so, we usually think about the kinds of experiences that are in store for us and the kinds of people we might possibly

become. We are interested in your impression of yourself five (5) to ten (10) years from now. More specifically, we would like you to think about yourself in the future as a physically active retiree. You incorporate physical activity to your lifestyle on most days of the week at a moderate to vigorous intensity. Five (5) to ten (10) years from now you have the energy to carry out your daily tasks and all your personal goals for retirement. When you think about yourself five to ten years from now as a retiree who is physically active on a regular basis, what images come to mind? Please take a few minutes to imagine and think about this image before moving on to the next page. On the following pages, you will be asked to answer some questions about this image.

This part of the intervention (text/narration) was 2.5 min long. Through presenting the text via video/narration we sought to solicit the participants' attention and immersion in the image generation task (and not just a quick skimming of the text). Once the sentence *Please take a few minutes to imagine and think about this image* appeared on screen, participants were given two minutes to carry out this imagining/thinking task after which the screen turned black, prompting participants to move ahead to the next page. In all, the image generation task (intervention) took about 4.5 min. The task heeds recommendations advocated in other literature as per the ideal run time (i.e., five minutes) for a video component in an Internet-delivered intervention (Vandelanotte & Mummery, 2011).

Following this task, and in line with Murru and Martin Ginis (2010), participants answered seven open-ended questions to ensure elaboration upon the image (i.e., image's appearance, energy level, attitude toward life, general health, relationships, achievements and any other comment/thought that came to mind), which also served as a manipulation check for the image generation task. Further, "compliance" checks were conducted by asking two questions about the content of the video (to confirm viewing) and by asking if (and to what extent) participants used the time provided to think about the image of themselves as a physically active retiree.

Repeated possible selves intervention condition. Participants randomized to the *repeated* intervention group completed the standard possible selves image generation task (as described

above) on three separate occasions, each one week apart. The three intervention exposures were practically identical with the exception of a few minor changes made to the video (i.e., change in background colour, narrator) and to the compliance checks (different “content” questions were posed). All told, participants in the repeated condition completed the subsequent intervention exposures before the week 4 (time 2) follow-up data collection point.

Control condition. During the 12-week study duration, participants randomized to the *control condition* only completed the follow-up measures at four, eight, and 12 weeks. The participants did not receive any intervention-like materials. The "no treatment" option was predicated on arguments that finding intervention effects can be more difficult when an active comparator (i.e., some form of intervention) is given to control participants (see Freedland, Mohr, Davidson, & Schwartz, 2011).

Measures

Eligibility measures. Eligibility was assessed and instantaneously determined online via the Fluid Surveys platform; we opted for one-item eligibility measures of physical activity and physical activity identity (see Appendix A7). The multi-item measures used during the actual intervention (described below) were not helpful for eligibility purposes because of the platform’s inability to calculate means or scores.

Physical activity. Prospective participants' physical activity level was assessed via a single item consistent with Godin and colleagues' work (Boudreau & Godin, 2014; Gionet & Godin, 1989; Godin, Jobin, & Bouillon, 1986). The item (see Appendix A7) read as follows: *How often have you participated in one or more moderate-to-vigorous physical activities for at least 30 minutes in one day during your free time in the last three months?* Definitions of leisure time, moderate and vigorous physical activity were provided. Seven answer choices were displayed and

ranged from: *Never* to *four times or more per week*. Potential participants selected one answer choice; those reporting exercising four times per week or more were excluded.

Physical activity identity. Prospective participants' physical activity identity was assessed via a single item (see Appendix A7) recently adapted for physical activity research by Carraro and Gaudreau (2010) but originally developed by Aron, Aron, and Smollan (1992). Potential participants were shown a figure with seven pairs of increasingly intertwined circles numbered from 1 (low identification) to 7 (high identification) and were asked to select the number that corresponded to their relationship with physical activity (i.e., the extent to which they think physical activity is a part of who they are). Potential participants who selected 6 or 7 were excluded.

Main measures. The main measures of the study are described below.

Sociodemographic information. As outlined in Appendix A8, information on age, sex, ethnicity, marital status, education level, body mass index, years in retirement, and perceived health (Conn, 1998) was collected and is presented in Table 1.

Godin Leisure Time Exercise Questionnaire (GLTEQ). Using the GLTEQ (Godin & Shephard, 1985) participants indicated the number of bouts of *15 minutes* or more of physical activity performed at strenuous and moderate activity performed over a 7-day period (see Appendix A4). The GLTEQ is valid (Jacobs, Ainsworth, Hartman, & Leon, 1993) and has been used in older adults (Kim, Newton, Sachs, Giacobbi Jr, & Glutting, 2011; Strachan, Brawley, Spink, & Glazebrook, 2010). To encourage more accurate reporting, we included additional instructions that normalized the difficulties of being physically active and encouraged honest reporting as recommended and proven effective by Gagné and Godin (2005). For the present study, bouts of moderate and vigorous activity were summed to obtain moderate-to-vigorous physical activity bouts. Physical activity was assessed at baseline, 4, 8, and 12 weeks.

Physical Activity Identity Scale. A slightly modified version of the Exercise Identity Scale (EIS; Anderson & Cychosz, 1994) was used to assess physical activity identity (see Appendix A5). The original scale comprises nine items and uses a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Sample items include: *I consider myself an exerciser* and *When I describe myself to others, I usually include my involvement in exercise*. The modifications made to the scale were consistent with Strachan et al. (2010) in that the word “exercise” was exchanged for “physical activity” (e.g., *I consider myself a physically active person*). This change is based on research suggesting that older adults find the term “physically active person” more self-descriptive than “exerciser” (Hardcastle & Taylor, 2005; Strachan et al., 2010). All other aspects of the original scale were retained. Anderson and Cychosz (1994) reported a strong Cronbach's alpha ($\alpha = .94$) and test-retest reliability for the original version of this scale ($r = .93$). The modified scale used by Strachan et al. (2010) also proved reliable (Cronbach's α of .90). In this study, items of the scale proved reliable at all four time points – baseline, 4, 8, and 12 weeks. (α 's: .87; .88; .91; .91, respectively).

Covariates. Given the temporal (i.e., oriented toward the future) and imaginal (i.e., image generation task) aspects of the intervention, covariates pertaining to consideration for future consequences and imaging ability were entered in the analyses.

Imaging Ability Questionnaire (IAQ). The *image generation* subscale of the IAQ (Kwekkeboom, 2000) was used to assess how vividly people generate images (see note in Appendix A9). The full IAQ (with *absorption* subscale; 21 items) boasts good internal consistency ($\alpha = .93$) and test-retest reliability ($r = .92$). The IAQ has been used in exercise imagery interventions as a control variable (e.g., Andersson & Moss, 2011) and was used in this capacity in the present study. Participants indicated, on 11 items, the extent to which they can generate certain images (e.g., *imagine clouds with a storm blowing up and flash of lightning*) using a 5-point scale

ranging from 0 (*no image at all*) and 4 (*perfectly clear and vivid*). The image generation subscale was reliable in the present sample ($\alpha = .91$). Imaging ability was entered as a covariate in the analyses.

Consideration of Future Consequences (CFC). The 12-item CFC scale (Strathman, Gleicher, Boninger, & Edwards, 1994) was used to measure the extent to which individuals consider the immediate and distal consequences of their actions and was included as a covariate in the analyses (see Appendix A10). The scale has been validated previously in a number of samples (α 's ranging between .80 and .86; test-retest reliability between .72 and .76). CFC has been previously shown to influence a possible selves intervention targeting physical activity (Ouellette et al., 2005). This scale features a Likert-type scale which ranges from 1 (*extremely uncharacteristic*) to 5 (*extremely characteristic*). A sample item reads: *I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years*. The scale was reliable in the present sample ($\alpha = .78$).

Statistical Analysis

Repeated measures. In order to test for significant changes in physical activity identity and physical activity between conditions and over time (baseline, 4, 8, and 12 weeks), we conducted repeated measures mixed-effects models analyses with maximum likelihood estimation using PROC MIXED of SAS for Windows version 9.3 (SAS Institute Inc., Cary NC). The decision to run these models was predicated on the nested nature of the data (i.e., time points nested within participants), which introduces within-subject correlation between repeated measures of the outcome. Mixed-effects models allow for statistical dependence between observations within subjects and incorporates it into the model estimation algorithm, thereby providing unbiased effect estimates and appropriate standard errors. Furthermore, mixed models are increasingly used in longitudinal studies as they allow the inclusion of participants with

missing data (Fitzmaurice, Laird, & Ware, 2004). As a result, all participants who, at minimum, completed the baseline measurement and the first follow-up measurement (i.e., time 2) were included in the analyses ($n = 221$). The three conditions (groups), time, and condition by time interaction were modeled as fixed effects. The two covariates – consideration for future consequences and imaging ability – were also entered as fixed effects. Physical activity identity was modeled as continuous using linear mixed-effects with an unstructured covariance type. Physical activity (bouts) is a count variable however, and was modeled via negative-binomial generalized linear mixed-effects with an autoregressive covariance structure. Time was modeled as a categorical effect. Various within-subjects correlation structures were explored for each model, beginning with an unstructured approach, which allows all correlations to be estimated freely. More parsimonious correlation structures were then compared via likelihood ratio tests, and on grounds of parsimony were chosen if they did not perform significantly worse than the more intensive unstructured approach. The significance level for tests was set at $p < 0.05$.

Sample size calculations. Sample size calculations were performed in G*Power (Faul, Erdfelder, Lang, & Buchner, 2007). A minimum sample size of 66 per group is needed to detect a small effect size ($d = .20$) at .80 power and at an alpha level of .05. This sample size is predicated on a repeated measured study design with three groups (i.e., control, one-time, and repeated) which are assessed at four time points (i.e., baseline, 4, 8, and 12 weeks). Given the inclusion of two covariates (i.e., CFC and imaging ability), a sample size of 80 is preferred. The present study was sufficiently powered to detect differences between groups across time.

Results

Retention and Attrition Analysis

After completing eligibility, consent and baseline measures, a total of 294 participants were randomized into one of the three groups. The detailed flow chart of the study is featured in Figure

1. We note that 21 participants chose to leave the study before completing post randomization activities related to the baseline time point. As such, 273 participants fully completed the baseline time point. At time 2 follow-up (four weeks post baseline), 237 participants continued participation and had filled out time 2 measures. At time 3 (eight weeks post baseline), 205 participants completed measures. Finally, 187 participants completed the final follow-up measures at time 4 (12 weeks post baseline). From randomization through to time 4 follow-up, we retained 63.61% of the sample. There were no significant differences in socio-demographic variables (as itemized in Table 1) between participants who completed the entire study ($n = 187$) and participants who dropped out (anytime after randomization; $n = 107$). Attrition was not influenced by group assignment.

Insert Figure 1

Manipulation Checks

A manipulation check was conducted on the data from participants in the two intervention conditions. The first and second authors conducted a review of participants' answers to manipulation check questions described previously. They checked for non-responses and appropriateness of answers (i.e., comments on point). Further, the same authors looked at the "compliance" questions to determine if participants watched the video(s) and used the time provided to think about the image of themselves as a physically active retiree. These steps prompted the removal of all data for six participants due to lack of compliance with the experimental protocol. Further data inspection prompted the removal of all data for 10 participants by reason of ineligibility (i.e., years in retirement). As a result, the removal of 16 participants led

to a final analytic sample of 221 participants, split across groups as follows: 76, control; 78, one-time, and, 67, repeated.

Data management

Prior to running the repeated measures analyses, patterns of missing data and data distribution were examined. We examined missing data against group assignment itself and all sociodemographic variables presented in Table 1. Through the expectation maximization algorithm of the missing data package in SPSS version 22, it was determined that missing data were missing completely at random (MCAR). No data distribution issues were detected.

 Insert Table 1

Intervention Outcomes

To test the hypotheses that the *repeated* possible selves group would report higher levels of physical activity identity and physical activity over the course of the intervention than the *control* group (hypothesis 1) and the *one-time* possible selves group (hypothesis 2), and that the *one-time* group would too report higher levels and greater changes in physical activity and physical activity identity over the course of the intervention than the control group (hypothesis 3), we ran mixed models analyses with restricted maximum likelihood estimates for the effects of time, group assignment, and the group*time interaction set as fixed factors. A statistically significant group*time interaction would indicate changes in outcomes over time are different in the three groups. Consideration for future consequence and imaging ability were entered as covariates.

Physical activity identity. For the physical activity identity outcome, an unstructured covariance matrix proved to be the best fit. No group*time interaction was found; only a time effect was detected (see Table 2). Simply put, the three groups displayed similar increases in their

physical activity identity over time; the increase, however, is not attributable to group assignment (given the lack of interaction). The means along with confidence intervals for each group at every time point are also presented in Table 2. Analyses showed that CFC had a significant positive influence on the prediction of physical activity identity ($p < .01$; estimate = .62 [95% CI 0.34, 0.89]). Imaging ability was not significantly related to the outcome ($p = 0.57$; estimate = -.07 [-0.30, 0.17]).

Physical activity. For this outcome, negative binomial distribution proved the best fit for the count data (i.e., bouts of physical activity). Again, no group*time interaction was found; only a time effect was detected (see Table 2). The three groups displayed similar increases in their physical activity over time; the changes, however, are not attributable to group assignment (given the lack of interaction). The means along with confidence intervals for each group at every time point are presented in Table 2. The prediction of physical activity was also significantly influenced by CFC ($p = .04$; estimate = .25 [95% CI .01, .50]). Imaging ability was not significantly related to the outcome ($p = 0.07$; estimate = -.19 [95% CI -.39, .02]).

 Insert Table 2

Discussion

The aim of this study was to determine whether a possible selves intervention would increase physical activity behaviour and identity in a group of newly-retired individuals. Using an experimental design, we compared changes in identity and physical activity across time and between three conditions: a *one-time* possible selves intervention, a *repeated* possible selves intervention, and a control group. We hypothesized that differences over time in identity and

physical activity would be found between participants in the *repeated* possible selves group as compared to the *control* group (hypothesis 1) and the *one-time* possible selves group (hypothesis 2). Participants in the *one-time* group were expected to report greater differences over time in both outcomes when compared to the control group (hypothesis 3). All hypothesized group differences did not materialize. However, over time, all three groups reported marginally higher levels of identity and physical activity irrespective to group assignment.

Effects of the possible selves intervention on physical activity identity. While identities are known to be rather stable (e.g., Burke, 1980), Stein and Markus (1996) have argued that individuals can experience shifts and changes in self-views, sometimes in a matter of days. Further, Hoyle and Sherrill (2006) argue that recurrently thinking about a possible self and its consequences can bring about changes in self-representations. From this theoretical perspective, we speculated that possible selves might bring about changes in identity and that repeated possible selves activation should have the greatest impact on identity. One possible interpretation of our findings of null effects of the intervention on identity is that a physical activity possible selves intervention is not an effective way to increase identity. Considering that no other possible selves intervention, to our knowledge, has attempted to increase identity in the physical activity purview, dismissing the possibility seems premature. Perhaps a hybrid and multifaceted approach is needed to truly impact identity. We offer a few possibilities of such approaches.

An imagery intervention conducted by Cooke, Duncan, Hall, and Rodgers (2015) shares with our study, the idea that the act of imagining oneself as an exerciser can be a fruitful way to increase identity. In their 36-week exercise program for female exercise initiates, individuals who underwent an exercise imagery intervention in addition to exercise reported significantly stronger exercise role identity at 9 weeks than those within an exercise plus attention control condition. The findings from this study lead to two pertinent observations. First, the guided imagery intervention

used in the Cooke et al. (2015) study and our possible selves image generation task shared similarities in that both involved evoking images of the self as an exerciser. Giacobbi et al. (2014) have even commented on the close ties between mental imagery and possible selves. However, the imagery intervention used by Cooke et al. (2015; i.e., script and lab procedures) provided more elaborate and multifaceted imagery sessions (e.g., more frequent exposure; conducted within the laboratory) than the present possible selves protocol; a more elaborate possible selves image generation task may have led to increases in identity in our study. Second, the study by Cooke et al. (2015) included, in addition to the imagery intervention, a physical activity component. As noted by Cooke et al. (2015), and others (e.g., Markus, 1977; Markus & Kunda, 1986), physical activity participation alone may not coalesce with increased identity and the addition of the imagery component in the study by Cooke et al. (2015) appeared to help increase identity. Indeed, previous research has pointed to the likely reciprocal relationship between physical activity and identity (Cardinal & Cardinal, 1997; Carraro & Gaudreau, 2010; Hardcastle & Taylor, 2005; Whaley & Schrider, 2005). Increases in identity are often tied to greater behavioural output - wherein physical activity levels increased significantly. Herein, the image generation tasks were not part of an exercise intervention or program. Future research should consider whether a possible selves intervention combined with a physical activity intervention/program will yield gains in identity and which one has the greatest effect.

Effects of the possible selves intervention on physical activity. Markus and Nurius (1986) argue that possible selves encourage behaviour change by providing motivation and guidance in the form of standards for comparison. Indeed, possible selves have been used with success in a few physical activity/exercise interventions (Strachan et al., in press; Murru & Martin Ginis, 2010; Ouellette et al., 2005). We are therefore surprised that, in the present study,

participants exposed to a physical activity possible selves intervention did not report more physical activity than controls.

Methodological considerations offer potential explanations for why we failed to find group differences in physical activity patterns, where others did. Ouellette et al. (2005) found that university students who participated in a exerciser possible selves intervention, and scored high on consideration of future consequences, increased exercise behaviour at four weeks post intervention. However, their study did not include a control group, so it is unclear if the effect is attributable to the intervention. Interestingly, without a control group, our findings would also suggest an effect of the possible selves interventions, as we too found changes in physical activity amongst all participants. Murru and Martin-Ginis (2010) found that university students exposed to a possible selves image generation task exercised more at 4 and 8 weeks follow-up than those exposed to a control activity. These researchers employed a more stringent eligibility criterion than we did (i.e., less than three versus less than four 30 minute bouts of physical activity per week). Our slightly more active participants had less room to increase their physical activity making it more difficult for us to detect a change due to the intervention. Recently, Gunnell, Crocker, Mack, and Zumbo (2015) also failed to find a possible selves intervention effect on physical activity in a community sample in which no limits were imposed on baseline physical activity levels. These findings suggest that physical activity possible selves interventions may work best for those who are inactive. Finally, and with a study by Strachan and colleagues (in press) we note that participants were instructed to read the Canadian Physical Activity Guidelines (Canadian Society of Exercise Physiology, 2015) prior to partaking in one of two possible selves image generation tasks. Perhaps the exposure to the physical activity guidelines (i.e., messaging), coupled with the future perspective of the PSs task (i.e., seeing oneself engaging in regular physical, five to ten years from now) highlighted participants' discrepant physical activity behaviour (or lack thereof),

which in turn galvanized their behaviour. The purported impact of being presented with physical activity guidelines is, of course, speculative.

The finding that *all* participants reported increased physical activity suggests that we cannot attribute physical activity increases to exposure to a possible selves intervention. All participants may have been disposed to a form of measurement reactivity (French & Sutton, 2010). For example, participants likely engaged in self-monitoring through self-reporting their physical activity at several time points via a questionnaire. If participants noticed low or reduced physical activity levels, this awareness may have energized them to increase their physical activity. In a similar vein, having participants complete questionnaires about physical activity (e.g., their intentions, thoughts, etc.) may have increased their chance of performing that behaviour – something known as question-behaviour effect (Sprott et al., 2006). This effect, documented in the physical activity/exercise purview, operates by making individuals' underlying attitudes about a particular behaviour more accessible which, in turn, can lead to the behaviour being enacted (Godin, Bélanger-Gravel, Amireault, Vohl, & Pérusse, 2011; Wood, Conner, Sandberg, Godin, & Sheeran, 2014). Our questionnaires, asked of all participants, included such measures. Considering that we cannot attribute the sample-wide increase in physical activity to our intervention activities, we speculate that some of these measurement aspects may be responsible for the small increase in physical activity reported across our sample.

When considering the null results for *both* identity and physical activity, we ponder whether our approach, while inspired by previous studies, was appropriate for newly retired individuals. Hooker (1999) opined: "Goals in later life may be less normatively structured than early and midlife [... and as such] their (older adults') activities are the most likely to be motivated by their own personal agendas" (p. 111). Herein, and in line with past studies targeting younger adults (e.g., Strachan et al., in press; Murru & Martin-Ginis, 2010; Ouellette et al., 2005), we

utilized the same, broadly-defined possible self (i.e., physically active retiree) across groups partaking in the image generation tasks. Perhaps the one-size-fits-all nature of our intervention materials lacked personal meaning, thus dissuading participants from engaging fully in the tasks. Two recent reviews on the features of effective physical activity interventions in older adults (Hobbs et al., 2013; O'Brien et al., 2015) point to the importance of personalizing of interventions. In the possible selves purview, this suggestion could take the form of allowing participants to articulate and or revise (Cross & Markus, 1991) their own physically active possible self for retirement. Such an individualized approach may be appropriate for retirees for whom generalized possible selves may lack relevance. Finally, we cannot dismiss the possibility that image generation/contemplation may become more complicated for older adults (Kalicinski & Lobinger, 2013).

Strengths and Limitations

The present study draws strength from its innovation. The study was the first, to our knowledge, to carry out a possible selves intervention in older, retired adults, in contrast to previous inquiries conducted in younger populations. Our research also proved innovative through its focus on physical activity identity in addition to physical activity, which has typically been the outcome of interest of physical activity possible selves interventions. Conducting the intervention entirely online was also novel as this, to the extent of our knowledge, was only the second time a possible selves intervention was delivered online (Strachan et al., in press). Finally, in terms of design and analytic strengths, we assessed and controlled for personal characteristics (i.e., imaging ability, consideration for future consequences) and data were analyzed through mixed-effects modeling, which is increasingly advocated over traditional ANOVA-based techniques (e.g., Gueorguieva & Krystal, 2004).

The strengths, however, must be considered in light of limitations. The demographics of participants (female, Caucasian, and well-educated) limit the generalizability of our findings. Further, our eligibility criteria pertaining to physical activity and identity allowed already fairly active retirees who somewhat identify as physically active to participate in the study, making it difficult for us to find effects. Another notable limitation concerns the use of a self-report physical activity measure which was predicated on practical considerations. Objective measurement was prohibitive given the online nature of the study. Further, we opted for the GLTEQ since it was previously validated against objective measures of physical activity and proven reliable in test-retest methods (for a review of these studies, please see Kriska & Caspersen, 1997). Finally, the GLTEQ has been used with older adult samples (Kim, Newton, Sachs, Giacobbi Jr, & Glutting, 2011; Strachan et al., 2010; Perras, Strachan, & Fortier, 2015a, 2015b). While our choice to use a validated measure of physical activity addresses some of the measurement limitations noted by Barnett et al. (2012), our physical activity measure is limited in that it relies on self-report (Helmerhorst, Brage, Warren, Besson, & Ekelund, 2012).

Conclusion

This study was the first, to our knowledge, to test a possible selves intervention targeting physical activity identity and physical activity in a sample of recent retirees. While we did not find the expected differences between groups, marginal improvements in physical activity identity and behavior were observed over time (regardless of group assignment). We opine that interventions based on self and self-perceptions - like possible selves - may be relevant for new retirees (i.e., exploring/revisiting different roles), and as such, warrant further investigation. We hope our intervention can serve as a launch pad for future intervention efforts.

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Table 1

Participant Demographics at Randomization (N = 294).

Characteristic	Group		
	Control (n = 88)	One-time (n = 107)	Multiple (n = 99)
Age, mean (<i>SD</i>)	63.02 (4.84)	63.84 (4.59)	63.23 (4.71)
Sex ¹			
Women	65 (74.7)	70 (66.0)	63 (65.6)
Men	22 (25.3)	36 (34.0)	33 (34.4)
Ethnicity ²			
Caucasian	86 (97.7)	94 (87.9)	95 (97.9)
Other	1 (1.10)	6 (5.5)	1 (1.1)
Aboriginal/Native	0 (0.00)	4 (3.7)	1 (1.00)
South Asian	1(1.1)	3 (2.8)	0 (0.00)
Marital status ³			
Married	45 (52.30)	67 (63.2)	63 (64.9)
Divorced/Separated	16 (18.6)	15 (14.1)	15 (15.4)
Living w/ partner	9 (10.5)	11 (10.4)	7 (7.2)
Single/Never married	10 (11.6)	7 (6.6)	6 (6.2)
Widowed	6 (7.0)	6 (5.7)	6 (6.2)
Education ⁴			
University: above B.A.	28 (32.2)	30 (28.0)	26 (26.5)
University: B.A.	18 (20.7)	26 (24.3)	23 (23.5)
College/CEGEP	22 (25.3)	17 (15.9)	14 (14.3)
No post-secondary	8 (9.2)	19 (17.8)	17 (17.3)
Other	11 (12.6)	15 (14.0)	18 (18.3)
Body mass index ⁵ , mean (<i>SD</i>)	29.98 (6.37)	28.73 (5.98)	29.97 (5.63)
Retirement ⁶ , y, mean (<i>SD</i>)	1.86 (1.15)	1.77 (1.45)	1.63 (1.38)
Perceived health ⁷ , mean (<i>SD</i>)	6.87 (.99)	7.09 (.88)	6.77 (.98)
CFC ⁸ , mean (<i>SD</i>)	3.37 (.56)	3.61 (.62)	3.52 (.56)
Imaging ability ⁹ , mean (<i>SD</i>)	34.64 (7.06)	35.70 (6.87)	33.42 (8.87)

Note: Data are presented *Count (%)* unless indicated otherwise.¹ Five participants did not report their gender; 68.5 % of the sample was female overall.² Two participants did not report their ethnicity; 94.2% of the sample was Caucasian overall.³ Five participants did not report their marital status; 60.6% of the sample was married overall.⁴ Two participants did not report their education; 28.8% of the sample had a degree higher than a BA.⁵ Two participants did not report their height. The BMI of the sample overall was 29.74 (*SD* = 6.43).⁶ The participants in the sample were retired for 1.75 years on average.⁷ Eight participants missed one of three items which comprises the scale. Scores could range between 3 and 10. The average for the sample was 6.92 (*SD* = .96) overall.⁸ Consideration of future consequences (CFC). Scores could range between 1 and 5. The average for the sample was 3.51 (*SD* = .59) overall.⁹ Scores could range between 0 and 44. The average for the sample was 34.62 (*SD* = 7.69) overall.

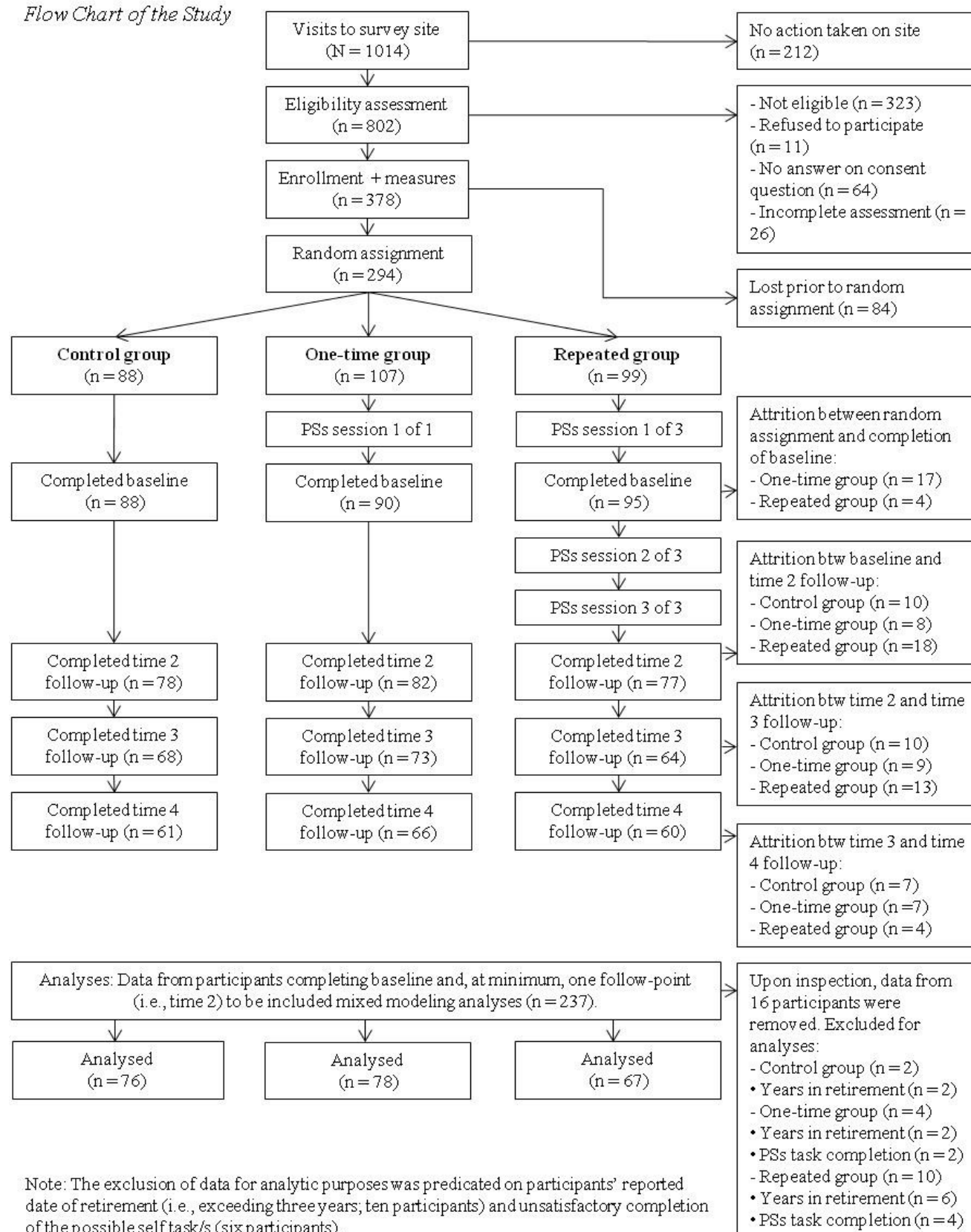
Table 2

Means and 95% CI for Three Intervention Groups (Analytic Sample N = 221)

Outcome measure	Control n = 76 (mean and 95% CI)	One-time n = 78 (mean and 95% CI)	Repeated n = 67 (mean and 95% CI)	Repeated Measures Model
PA Identity				
Baseline	3.82 (3.51-4.13)	3.68 (3.40-3.97)	3.69 (3.37-4.00)	↑ over time in all groups Time (T): <i>p</i> <.01 Group (G): <i>p</i> =0.97 T x G: <i>p</i> = 0.39
4 weeks	3.95 (3.66-4.25)	4.01 (3.74-4.29)	4.13 (3.83-4.43)	
8 weeks	3.96 (3.63-4.28)	4.01 (3.70-4.32)	3.89 (3.55-4.23)	
12 weeks	4.32 (3.99-4.64)	4.16 (3.85-4.47)	4.20 (3.86-4.53)	
PA (bouts)				
Baseline	2.41(1.73-3.37)	3.31(2.46-4.44)	2.87 (2.07-3.99)	↑ over time in all groups Time (T): <i>p</i> <.01 Group (G): <i>p</i> = 0.34 T x G: <i>p</i> = 0.97
4 weeks	3.48 (2.56-4.72)	4.87 (3.68-6.45)	4.23 (3.12-5.74)	
8 weeks	3.61(2.64-4.94)	4.53 (3.36-6.12)	3.67 (2.62-5.13)	
12 weeks	3.86 (2.79-5.34)	4.29 (3.15-5.83)	3.87 (2.77-5.41)	

Note: PA = physical activity; PA identity scores vary between 1 and 7. Covariates included: Consideration for future consequences (CFC) and imaging ability. For both PA identity and PA, CFC was significant ($p < .01$, $p = 0.04$, respectively).

Figure 1

Flow Chart of the Study

Note: The exclusion of data for analytic purposes was predicated on participants' reported date of retirement (i.e., exceeding three years; ten participants) and unsatisfactory completion of the possible self task/s (six participants).

CHAPTER V
SUPPLEMENTAL ANALYSES

The following supplemental analyses pertain to *Article 3*, related to the possible selves intervention.

Examining the Influence of Consideration of Future Consequences (CFC): Moderation

Analysis

In their paper, Ouellette et al. (2005) remind readers that possible selves are essentially *future-oriented* self-images. As such, an experimental manipulation leveraging possible selves with the aim of increasing behaviour (or identity), may work best in individuals who concern themselves with their future self. To test this possibility, Ouellette and colleagues, examined participants' consideration for future consequences (CFC) in their study. They expected a possible selves intervention to be more impactful in individuals who consider how present actions and behaviour can potentially yield future consequences; CFC was a purported moderator. While participants high in CFC randomized to the possible self image condition reported greater exercise than those participants low in CFC, the difference was not statistically significant. The researchers went on to further probe a possible image type*CFC interaction (i.e., moderation) through ANCOVA and regression analyses. The results supporting an interaction were mixed.

In any manner, the work by Ouellette et al. (2005) prompted me to consider the potential influence of CFC in the possible selves intervention described in *Article 3*. As a reminder, CFC was entered as a covariate¹⁰. CFC was a significant covariate with respect to both outcomes – physical activity identity and physical activity. In this supplemental analysis section, I wanted to examine whether CFC *moderated* the intervention-physical activity and intervention-identity relationships. To test for moderation, I used a “hack” for the PROCESS macro v. 2.13 for SPSS (Hayes, 2013). Moderation is tested with the Model 1 option.

¹⁰ It is worth reminding that a second covariate - imaging ability - was also entered as a covariate alongside CFC in the analyses presented in *Article 3*. The rationale for its inclusion is discussed in *Article 3*. Given how imaging ability did not come out as significant covariate, further probing was deemed unnecessary.

Through dummy coding, the macro can be used when the predictor variable, X , is categorical (e.g., group assignment). In the present case, two dummy variables, $d1$, and $d2$, were coded to contrast, respectively, the one-time possible selves condition to the control condition and the repeated possible selves condition to the control condition. For one moderation test, the macro must be run twice (hence the “hack”); the first time with $d1$ as the predictor variable and $d2$ as a covariate, and the second time, with $d2$ as the predictor variable and $d1$ as the covariate. Following this method, I entered the dummy coded group assignment as the independent variable (X), CFC at baseline as the moderator variable, and separate physical activity and identity outcomes, as itemized in Table 1, as the criterion variable (Y) in the models. Out of consideration for space, I report only the p value for the interaction term (see Table 1).

 Insert Table 1

Of the six pairs of moderation tests conducted, only one (i.e., pair #5) reached statistical significance in one of its “runs” (i.e., 5A). To further probe this interaction, PROCESS provides conditional effects of X on Y at values of the moderator. Simply put, the effects of X on Y are presented at the mean of zero (since PROCESS mean-centers the data), and plus/minus one standard deviation from the mean (see Table 2).

 Insert Table 2

The significant p value in Table 2 suggests that there is a significant positive relationship between the one-time possible selves intervention (by virtue of detecting a significant effect between the control group relative to the one-time group) and identity, at Time 3, when CFC scores

are high. Moderation is thus suggested. This finding must be interpreted with caution. CFC did not moderate any other outcome as can be seen in Table 1. As such, it is premature to speak of a "proper" moderation effect through and through and thus premature to assert that CFC is a definite moderator of possible selves interventions. Scholars pursuing research in the possible selves area may want to measure CFC in order to probe possible moderator effects.

Examining the Interplay between Physical Activity Identity and Physical Activity: Mediation Analyses

As discussed in the *Introduction (Chapter I)*, examining both physical activity identity and physical activity as outcomes of a possible selves intervention tenders the opportunity to explore the relationship between these variables. In particular, a possible selves intervention might lead to increases in physical activity through strengthening identity. Conversely, engaging in physical activity may in turn help increase identity. A reciprocal relationship between identity and behaviour has been supported in physical activity research.

The proposal for the present dissertation included plans for mediation. However, the inclusion of mediation analyses in *Article 3* was debatable given the lacklustre results of the intervention (i.e., no significant differences in both outcomes between groups). Therefore, the supplemental analyses herein will look at whether the effects of the intervention on physical activity are mediated by identity. I will also look at whether the impact of the possible selves intervention on identity was mediated by physical activity. I note that these analyses are exploratory in nature.

To test for mediation, I opted for bootstrapping resampling methods (for an overview, see Hayes, 2009) conducted via the PROCESS macro version 2.13 for SPSS (Hayes, 2013). Hayes and Preacher (2014) further explain that through dummy coding, the macro can be used when the predictor variable, X , is categorical (e.g., group assignment). In the present case, two dummy variables, d1, and d2, were coded to contrast, respectively, the one-time condition to the control

condition and the repeated condition to the control condition. For one mediation test, the macro must be run twice (PROCESS “hack”); the first time with d1 as the predictor variable and d2 as a covariate, and the second time, with d2 as the predictor variable and d1 as the covariate. Following this method, I entered the dummy coded group assignment as the independent variable (X), physical activity identity at four weeks as the mediator variable (M), and physical activity at eight weeks as the criterion variable (Y) in the model. I also ran a second similar model with identity and physical activity interchanged. As per arguments put forth by Weinstein (2007), Time 1 physical activity was entered as a covariate; so was Time 1 physical activity identity. Results are shown in Table 3.

 Insert Table 3

As can be seen in Table 3, the indirect effects include the presence of zero in the confidence intervals suggesting that mediation was not at play. Ergo, identity did not mediate the relationship between the intervention and physical activity. Likewise, physical activity did not mediate the relationship between the intervention and identity. These results, though, should be interpreted with prudence as it may be premature to draw conclusions from just one study.

Process Evaluation (Acceptability)

It is not uncommon for researchers to probe the acceptability of their intervention in older adults through a process evaluation (e.g., Hageman, Noble Walker, & Pullen, 2005; Mouton & Cloes, 2015). Given the novelty of the present online possible selves intervention designed for new retirees, it was deemed important to ascertain if the intervention was well-received in the target population. Such an evaluation can possibly help rule out reasons as to why the intervention did not yield the expected outcomes. Hence, I asked a few “exit” questions to participants who completed the last set of follow-up measures (Time 4). Specifically, these exit questions (presented in Table 4

and in Appendix A12) immediately followed the last intervention measures on the Fluid Surveys web platform. I note that the 187 participants who completed all study requirements answered these exit questions. Thus, the opinions expressed may not represent those of participants who decided to leave the study at some point during the 12-week duration. However, it can be surmised that the information gathered is worth sharing.

The process evaluation herein drew inspiration from Ammann, Vandelanotte, de Vries, and Mummery (2012). Simply put, I asked four questions about the acceptability of the study. An additional question focused on participants' preferences vis-à-vis the number of activities (i.e., imaging tasks, assessments). Finally, I asked participants if they would partake in this study again. The items are further described below. For each question, a chi square test was conducted to ascertain significant differences between groups. The results are presented in Table 4.

 Insert Table 4

Acceptability. Participants were asked to rank the following factors on a scale to 1 (not acceptable) to 5 (very acceptable): length of time needed to complete online surveys or activities, format of the intervention (i.e., self-paced online delivery), content of the intervention, and usefulness of this intervention.

Participants' preferences. I asked participants whether they would have preferred “fewer” activities, “more” activities or the “same” amount.

Repeat participation. I asked participants: *If given the opportunity, would you agree to participate in this research study again?* The scale had five answer choices, ranging from *definitively yes* to *definitively no*.

While this process evaluation is rudimentary (i.e., measures used have not been validated), it represents an effort to assess participants' overall acceptability of the intervention. It would appear that, in participants who completed all activities and follow-ups as planned, the intervention was acceptable and well-received. It could be surmised, too, that the lack of significant outcomes was not predicated on issues like time needed to complete activities or the online modality. What is more, there were no significant differences between groups in the elements of the intervention probed. This suggests, albeit cautiously, that the participants in the repeated condition (with the most number of activities) also accepted the intervention.

The chi-square test results concerning the usefulness of the intervention warrant further comment. Both chi-square tests failed to reveal a significant difference between control and intervention groups (combined) on the usefulness of the intervention. Such findings may give credence to the idea of mere-measurement effect brought up in *Article 3*. Indeed, with no significance difference on physical activity and identity between groups *and* no apparent difference between groups in perceived usefulness, it may be reasonable to believe that participants likely benefited from simply responding to questions about their behaviour and identity.

Finally, it is worth mentioning that participants who completed the last follow-up measures at Time 4 were asked an open-ended question which simply read: *Anything else you would like to share?* This question came after the "exit" questions. While 54% of participants chose not to leave any comments, 16 participants out of 187 - roughly 8.6% of completers - mentioned how the intervention increased their *awareness* about physical activity. A few comments included: "Thank you for making me more aware that I miss being more active. I have not worked out in seven years. I forgot how much I'm missing those benefits" and "Thank you for getting me to think about physical activity". Awareness of physical activity has been previously noted as an outcome or

mediator of online physical activity interventions for older adults (Mouton & Cloes, 2015; van Stralen, de Vries, Mudde, Bolman, & Lechner, 2011).

To summarize, the analyses presented herein imply that consideration of future consequences was not a moderator of the effect of the intervention on the outcomes of identity and physical activity. Further, mediation analyses were conducted to examine the interplay between identity and physical activity; results did not support the proposed mediational relationships. Finally, the intervention appeared acceptable to participants.

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Table 1

Summary of Moderation Tests

Test	Predictor X	Moderator (M)	Criterion (Y)	<i>p</i> interaction
1A	d1	CFC	PA bouts – Time 2	.95
1B	d2	CFC	PA bouts – Time 2	.21
2A	d1	CFC	PA bouts – Time 3	.27
2B	d2	CFC	PA bouts – Time 3	.56
3A	d1	CFC	PA bouts – Time 4	.39
3B	d2	CFC	PA bouts – Time 4	.67
4A	d1	CFC	PA identity – Time 2	.08
4B	d2	CFC	PA identity – Time 2	.61
5A	d1	CFC	PA identity – Time 3	.02*
5B	d2	CFC	PA identity – Time 3	.69
6A	d1	CFC	PA identity – Time 4	.36
6B	d2	CFC	PA identity – Time 4	.45

Note. * $p < .05$

Table 2

Conditional Effect of X on Y at Values of the Moderator (Relative to Test 5A)

CFC	Effect	SE	t	p	LLCI	ULCI
-.59	-.44	.35	-1.29	.20	-1.13	.24
.00	.10	.24	.42	.67	-.38	.58
.59	.65	.31	2.07	.04*	.03	1.27

Note. * $p < .05$

Table 3

Total, Direct, and Indirect Effects for Both Models

Physical activity bouts – Time 3 as criterion ¹¹					
	Effect	SE	t	LLCI	ULCI
Total effect of intervention (d1)	.49	.72	.68 ^{ns}	-.94	1.92
Direct effect of intervention (d1)	.23	.72	.32 ^{ns}	-1.19	1.65
Total effect of intervention (d2)	.58	.76	.76 ^{ns}	-.93	2.08
Direct effect of intervention (d2)	.31	.75	.42 ^{ns}	-1.18	1.81
	Effect	Boot SE		Boot LLCI	Boot ULCI
Indirect effect of intervention (d1)	.26	.22		-.002	.99
Indirect effect of intervention (d2)	.26	.22		-.007	.99
Physical activity identity – Time 3 as criterion ¹²					
	Effect	SE	t	LLCI	ULCI
Total effect of intervention (d1)	.14	.18	.80 ^{ns}	-.21	.49
Direct effect of intervention (d1)	.13	.18	.73 ^{ns}	-.22	.48
Total effect of intervention (d2)	.10	.18	.53 ^{ns}	-.26	.46
Direct effect of intervention (d2)	.09	.18	.49 ^{ns}	-.27	.45
	Effect	Boot SE		Boot LLCI	Boot ULCI
Indirect effect of intervention (d1)	.01	.04		-.04	.13
Indirect effect of intervention (d2)	.01	.03		-.03	.09

Note. Number of bootstrap samples for bias corrected bootstrap confidence intervals: 10000. Confidence level for all confidence interval set at 95%. ns = not significant.

¹¹ Models of both M and Y include include Time 1 PA and ID as covariates.

¹² Models of both M and Y include include Time 1 PA and ID as covariates.

Table 4

Results of Process Evaluation per Group Assignment

		Group assignment		
		Control	One-time	Multiple
Acceptability				
1. How would you rate the <i>length of time</i> needed to complete online surveys or activities?				
	1 (not acceptable)	1	0	0
	2	3	2	6
	3	14	17	14
	4	16	21	15
	5 (very acceptable)	61	66	60
$\chi^2 (8, n = 187) = 5.71, p = .68$				
2. How would you rate the <i>format</i> of the intervention (i.e., self-paced online delivery)?				
	1 (not acceptable)	0	0	0
	2	1	1	0
	3	10	15	9
	4	20	15	20
	5 (very acceptable)	30	35	30
$\chi^2 (6, n = 186) = 3.79, p = .71$				
3. How would you rate the <i>content</i> of the intervention?				
	1 (not acceptable)	0	0	1
	2	2	6	5
	3	17	13	17
	4	23	22	18
	5 (very acceptable)	19	25	19
$\chi^2 (8, n = 187) = 6.17, p = .63$				
4. How would you rate the <i>usefulness</i> of this intervention?				
	1 (not acceptable)	2	0	1
	2	5	7	7
	3	20	15	17
	4	22	16	15
	5 (very acceptable)	12	28	20
$\chi^2 (8, n = 187) = 10.74, p = .22^{13}$				

¹³ Given how this test yielded the smallest *p* value of all tests performed (i.e., was approaching significance), I further probed the results by collapsing the two groups receiving a possible selves intervention (one-time and multiple groups) and running the chi-square test again. The results for this chi-square test were: $\chi^2 (4, n = 187) = 8.99, p = .06$.

Participants' preferences

Fewer activities	10	12	10
More activities	2	5	4
Same amount	48	49	46

$\chi^2(4, n = 186) = 1.234, p = .87$

Repeat participation

Definitely yes	19	24	20
Probably yes	29	30	27
I'm not sure	9	5	8
Probably no	4	4	4
Definitely no	0	3	0

$\chi^2(8, n = 186) = 7.37, p = .50$

CHAPTER VI
GENERAL DISCUSSION

GENERAL DISCUSSION

The present general discussion is organized in multiple sections. The first section reviews the context and aims of the program of research featured in this dissertation. This is followed by a summary of each article and the supplemental analyses. A discussion of the strengths precedes an overview of the theoretical, practical, and methodological implications. Subsequently, overall limitations and future research ideas conclude this general discussion.

Review of the Context and Aims of this Dissertation

Through the present dissertation, I sought to contribute to the understanding of self-perceptions and physical activity in newly retired individuals. Retirement is known to impact physical activity participation; some studies document decreases in physical activity post-retirement (e.g., Barnett, Van Sluijs, & Ogilvie, 2012) whereas others have found increases (e.g., Lahti, Laaksonen, Lahelma, & Rahkonen, 2011). Regardless, Godfrey et al. (2014) confirm that only 21% of retirees are sufficiently active to meet public health guidelines. Given that physical activity is associated with numerous health benefits for older adults (Hamer, Lavoie, & Bacon, 2014; Paterson & Warburton, 2010), it is worthwhile to understand factors that promote physical activity in retirement (Slingerland et al., 2007; Zantinge, van den Berg, Smit, & Picavet, 2014). To undertake this goal, I focused on two promising self-perceptions - namely, identity and possible selves and their link with physical activity.

The overarching aim of this dissertation was twofold. The first aim, addressed in *Chapter II (Article 1, hereafter)* and *Chapter III (Article 2, hereafter)* was to examine the relationships between possible selves, identity, and physical activity. *Articles 1* and *2* emerged from my first study, *Study 1*. Specifically, in *Article 1*, I explored the *concurrent* relationships between possible selves, identity, and physical activity in a sample of new retirees. In *Article 2*, I expanded on these findings by taking a *prospective* approach to examine the same relationships over time. This prospective

approach also allowed me to examine a mediational model using these variables. As a logical next step, the second aim of this dissertation, presented in *Chapter IV (Article 3, hereafter)*, was to determine if a possible selves intervention would increase identity and physical activity behaviour in a sample of newly-retired individuals. *Article 3* emerged from my second study, *Study 2*. I revisit the aims, findings, and implications of the dissertation in greater detail in the next two sections (*Summary of Findings and Implications*).

Summary of Findings

Study 1. This study was conducted in a sample of new retirees. Identity and possible selves were positively related to physical activity cross-sectionally. Moreover, I found positive associations between possible selves focused on physical activity and physical activity identity. Through looking at and confirming relationships between self-perceptions and physical activity, the findings detailed in *Article 1* represented a first step toward understanding the associations between these self-perceptions and designing a relevant physical activity intervention for retirees.

Within the same sample, *Article 2* extended the examination of relationships between possible selves, identity, and physical activity through an examination over time. In particular, the aim of this study was to determine whether physical activity identity mediated the relationship between possible selves and physical activity; this mediational relationship was supported. These findings provided further insight into the relationship between these variables and supported the potential value of self-perceptions for designing a pertinent physical activity intervention for retirees.

Study 2. The results reported in *Article 3* pertain to a possible selves intervention aimed at increasing physical activity identity and physical activity behaviour in newly retired individuals. A total of 294 participants were randomized into one of three groups: (a) a repeated group with three possible selves image generation exposures, (b) a one-time group with one possible selves image

generation exposure, or (c) a control group. No significant differences were found between groups on identity and physical activity behaviour (i.e., no group effect) at follow-up time points. There was, however, a time effect by which all groups reported marginally higher levels of identity and physical activity, irrespective of group assignment. While the hypothesized outcomes did not materialize, the finding raise a number of future research directions which I hope will energize the design of future interventions intended for newly retired individuals.

Related to *Study 2*, supplemental analyses were conducted and presented in *Chapter V*. While exploratory, these analyses suggest that consideration of future consequences was not a moderator of the effect of the intervention on the outcomes of identity and physical activity. Further, mediation analyses were conducted to examine the interplay between identity and physical activity; results did not support the proposed mediational relationships. Finally, the intervention appeared acceptable to participants.

Strengths

The present dissertation boasts many strengths. From a theoretical perspective, this dissertation contributed to the literature by reiterating the importance of self in understanding health behaviour (Contrada & Ashmore, 1999). Self-perceptions like identity and possible selves are relevant to and associated with retirees' physical activity. I also extended previous findings relative to identity and possible selves as they relate to physical activity in retirees. My dissertation also represented an effort to examine both self-perceptions simultaneously. This led to finding support for a mediational model, which in turn influenced the development of an online-delivered possible selves intervention. This intervention was also unique in that it aimed at increasing identity,

Another strength of this research program was its focus on retirees, where the examination of self-perceptions related to their physical activity behaviour is appropriate on many fronts. First, retired individuals are known to be insufficiently active (Godfrey et al., 2014). Second, their retreat

from the workplace and thus their exit from the social role they occupied can represent a period when these individuals engage in identity exploration (e.g., Liechty, Yarnal, & Kerstetter, 2012; Liechty, Dahlstrom, Sveinson, Stafford Son, & Rossow-Kimball, 2014). Against this backdrop, retirement is a time where concerns about aging emerge; natural (and inevitable) aging may also intermingle with one's perceptions on aging. These opportunities and changes, characteristic of retirees, contribute to this life stage as being earmarked as a "critical window" for physical activity/lifestyle interventions (Barnett et al., 2012). Furthermore, my research allowed for the examination of physical activity and self-perceptions in retirees exclusively; previous studies have looked at groups that may have included retirees, but did not focus on retirees *per se*. Additionally, through the recruitment of individuals retired for three years or fewer, the experiences of recent retirees were probed (as opposed to seasoned retirees who may have already established set routines and lifestyle choices).

Through adapting and delivering an intervention online, I also attempted to innovate and improve on previous versions of possible selves-based interventions. This represented a logical and worthwhile endeavour. *Study 2* stands as one of a few known physical activity possible selves interventions, to my knowledge, to be delivered online. The reasons behind the decision to carry-out a possible selves intervention online, herein, were three-fold. First, this intervention approach seemed appropriate given the growing body of research showing that internet delivered interventions are acceptable and/or effective in increasing physical activity in older adults (Amman, Vandelanotte, de Vries, & Mummery, 2013; Irvine, Gelatt, Seeley, Macfarlane, & Gau, 2013; Mouton & Cloes, 2013; Reinwand, Schulz, Crutzen, Kremers, & de Vries, 2015; Wijsman et al., 2013; Vroege et al., 2014). Second, online delivery may have facilitated engagement and an enhanced imaginal experience relative to simply reading the intervention material on paper. For example, the imaginal experience may have been enhanced through participants' exposure to an

embedded video component as a part of the image generation task. Further, the video may have prevented participants from hastily reading through the intervention material appearing on the screen in what Liu (2005) describes as "keyword spotting", thereby increasing the likelihood that participants engaged with the intervention task. The video delivery, according to Hattar, Hagger, and Pal (2015), offered the advantage of delivering the intervention material in a consistent manner, for all participants. Finally, the online modality as a whole assured better reach of the intervention; participants were not required to come to campus for a lab session, which may have been inconvenient. While I acknowledge that physical activity interventions delivered through personal contact appear to net more favorable outcomes over other modes of delivery (Bock, Jarczok, & Litaker, 2014), I surmise that such interventions may not reach all intended recipients. While the intervention did not ultimately yield the hypothesized outcomes, it likely increased the reach of the intervention and minimized known barriers for in-person interventions (e.g., time commitment, parking, scheduling).

Finally, the intervention displayed methodological rigour worth noting. Quality assurance checks were performed with respect to the image generation tasks described in *Article 3*. Irrespective of the outcomes, the intervention heeded calls to look at the impact of imaging tasks in older segments of the population (Ouellette et al., 2005). Of note, contemporary mediation techniques were used in *Article 2* whereas mixed modeling techniques were favoured over the usual MANCOVA in *Article 3*.

Implications

In this section, I provide an overview of the theoretical, practical, and methodological implications arising from the research presented herein. I lead with the theoretical implications, which are discussed through considering theorizations from identity theory (Stets & Burke, 2009) and possible selves (Markus & Nurius, 1986).

On the relationship between identity and physical activity. For identity theory proponents, identities are associated with meanings which often pertain to behaviour. These meanings act like standards (or goals); it is through attempts to realize or pursue these standards – like partaking in physical activity when self-identifying with physically active – that individuals carry out and confirm their identity (Burke, 2006; Burke & Stets, 2009). The more strongly one endorses an identity, the more compelled they will feel to act in accordance with identity meanings (Ryan & Deci, 2003). In the physical activity/exercise purview, multiple studies document the link between identity and physical activity/exercise (Petosa, Suminski, & Hartz, 2003; Strachan, Brawley, Spink, & Jung, 2009; Strachan, Flora, Brawley, & Spink, 2011; Strachan & Brawley, 2008). The identity-physical activity association has also been observed in studies conducted in older adults (Hays, Damush, & Clark, 2005; Liechty, Dahlstrom, Sveinson, Stafford Son, & Rossow-Kimball, 2014; Strachan, Brawley, Spink, & Glazebrook, 2010).

For the most part, the present dissertation found support for the identity-physical activity association in a sample of new retirees. In *Article 1*, presented in *Chapter II*, physical activity identity was associated with physical activity cross-sectionally. This association was also supported prospectively, in *Article 2*. While this relationship has been demonstrated among older adults (e.g., Strachan et al., 2010), this is the first research, to my knowledge, to examine this association exclusively among retirees. An identity theory interpretation of these findings would suggest that retirees who identify as being physically active may engage in physical activity in an effort to confirm and uphold their identity (Burke & Stets, 2009); I can only offer this explanation as a possibility given the associative nature of the data that support it.

However, this line of reasoning is challenged in *Article 3*. Given that identity and physical activity are associated among retirees, I sought to explore whether an intervention that, theoretically speaking, should increase identity, should subsequently lead to increases in physical activity. The

supplemental analyses presented in *Chapter V* and conducted in relation to the intervention (*Chapter IV*) did not support this mediational sequence. This finding runs contrary to theory and the established association between identity and physical activity. These results, though, should be considered with caution as it may be premature to draw conclusions from just one study. Nonetheless, it can be reasonably assumed that identity is a construct associated with physical activity in retirees. What remains elusive is whether and how identities can be strengthened to positively impact physical activity.

On the relationship between possible selves and physical activity. Possible selves are future-oriented self-representations, which, according to Markus & Nurius (1986) tender the opportunity “to be, to think, to feel, or to experience” (p. 960). Possible selves are often understood to occupy a motivational function as well as to provide a context to evaluate one’s behaviour (Markus & Nurius, 1986). For these authors, possible selves allow individuals to consider what they can become in the future. Whether expressed in the form of a broad future self (like becoming physically active) or in the form of goals or steps, possible selves can energize behaviour. In the exercise/physical activity area purview, studies document the link between possible selves and physical activity (Harju & Reed, 2003; Whaley, 2003; Whaley & Schrider, 2005).

For the most part, the dissertation herein found support for the association between possible selves focused on physical activity and physical activity behaviour. This association was found cross-sectionally as documented in *Article 1*, and prospectively, in *Article 2*. Herein, results suggest that retirees holding a future view of themselves as physically active were found to engage in physical activity. This is consistent with the literature. Again here, though, the findings of the intervention (*Article 3*) were not consistent with proposed functions of possible selves or the literature. Specifically, when exposed to a possible selves intervention, retirees did not report more physical activity than those assigned to the control group. This was surprising as past experimental

studies were successful in leveraging possible selves to increase physical activity in undergraduate students (Murru & Martin Ginis, 2010; Ouellette et al., 2005) and adults aged 18-64 (Strachan, Marcotte, Giller, Brunet, & Schellenberg, in press). In the intervention detailed herein, a time but not a group effect was observed showing that increases in physical activity were not attributable to exposure to a possible selves intervention. My results align with those of Gunnell, Crocker, Mack, and Zumbo (2015); their possible selves intervention did not yield increases in physical activity. In summary, whereas these thesis findings pose questions about whether (or how) possible selves can be influenced to increase physical activity, they expand support and relevance for an association between possible selves and physical activity among retirees.

On the relationship between possible selves and identity. While possible selves and physical activity are often discussed in tandem, there is theorizing suggesting that possible selves can potentially serve as a determinant of identity (i.e., Dunkel, 2000; Dunkel, Kelts & Coon, 2006). As summarized in Strachan and Whaley (2013), contemplating possible selves may serve as a way through which identities are explored, which may help, in turn, yield changes in one's sense of self. The present dissertation allowed for the examination of this potentially worthwhile function of possible selves. In *Study 1*, cross-sectional positive relationships were observed between possible selves and identity (*Article 1*). This finding encouraged further prospective probing, which led to finding support for a mediational relationship between possible selves, identity, and physical activity (*Article 2*). Specifically, identity appeared to serve as the mediating link between possible selves and physical activity. This finding supports theorizing on the possible selves-identity relationship. These findings also lead me to tentatively suggest that retirees who entertain possible selves for a physically active lifestyle may find themselves identifying with the behaviour. This still remains speculative, and, once again, I am careful not to infer causality. The outcomes of the intervention discussed in *Article 3* fail to support the idea offered in *Articles 1* and *2*, that

contemplating a physical activity possible self leads to identification with physical activity.

Observed increases in identity were inconsequential to group assignment (i.e., the possible selves groups); they were attributable to a time effect. Once more, I remain confident in an association between identity and possible selves, yet unable to conclude that forming possible selves may serve as a vehicle to identity development.

When considering the theoretical implications of this dissertation, there are mixed findings. One study (*Study 1*) presented as *Articles 1 and 2* supported theorizing and previous findings in confirming associations between possible selves, identity, and physical activity. *Study 2 (Article 3)*, however, did not support the ability of these associations to carryover in the context of an experimental manipulation. By and large, though, my findings suggest that self-perceptions appear to be relevant in understanding retirees' physical activity.

Practical implications. Theorists have argued for both the stability (Burke, 1980; Markus, 1977) and malleability (Stein & Markus, 1996) of self. In the physical activity purview, several researchers have documented increases in identity over the course of a few weeks (Cardinal & Cardinal, 1997; Carraro & Gaudreau, 2010; Hardcastle & Taylor, 2005; Whaley & Schrider, 2005). With concern to the present dissertation, the intervention presented in *Article 3* yielded a significant time effect on identity for all three groups. Identity for physical activity increased; identity scores went up by roughly half a point (on a seven-point scale) across groups over the course of 12 weeks (period including both intervention and follow-up points). The significant increase in identity regardless of group assignment adds to a growing body of research suggesting that identity is amenable to change in short order, though to what this change is attributable remains unclear. Despite the significant change in identity across groups, the magnitude of the change was small, which calls into question the practical significance of this finding. Further, a theoretically-sound intervention effort did not account for the identity shift. These two points lend credence to the idea

that identities are relatively stable and difficult to change (Burke, 1980; Markus, 1977).

Nonetheless, given the positive impact identity can have on physical activity, I encourage researchers to persist at the worthwhile task of seeking successful ways to intervene to increase identity in the physical activity purview.

A second practical implication of this dissertation concerns self constructs in retirees. The self has long been associated with health behaviours (Contrada & Ashmore, 1999). Herein, self-perceptions were shown to coalesce with physical activity (*Article 1*). In addition, evidence for a mediational model was also found (*Article 2*). Together the findings from *Study 1* suggested that a possible selves intervention may lead to increases in identity and physical activity. Unfortunately, efforts to leverage possible selves in an intervention, as done in *Study 2*, did not materialize as expected. As a result, the practical challenge of designing effective interventions for retirees remains.

Methodological implications. My second study (detailed in *Article 3*) offered the opportunity to examine whether an online intervention was effective. The findings of this dissertation do not support the effectiveness of the online delivery of a possible selves intervention. These present findings are similar to those of Gunnell and colleagues (2015), who failed to demonstrate increases in physical activity through a possible selves intervention. However, these findings stand in contrast to a recent study by Strachan et al. (in press). These researchers conducted an online intervention in a community sample of adults where the two main conditions were informed by possible selves. Participants in these conditions reported significantly higher physical activity than their control counterparts at various follow-ups. The divergent findings from this study and the present thesis suggest that more research is needed to determine the appropriateness of this delivery mode with this particular intervention. It is important to note that the few online possible selves intervention studies to date (including mine) were not designed to *directly compare* online

and lab-based delivery modes of possible selves interventions. That is, identical intervention content was not directly compared to in-lab delivery within a common sample. This type of research design would allow for the effect of mode of delivery to be isolated so that the optimal delivery mode could be determined.

Research outside the physical activity domain allows me to speculate about the appropriateness of the online forum as a delivery modality. Through administering a positive psychology intervention (based on the concept of best possible selves) for undergraduate students via two modalities, online and in-person, Layous, Nelson, and Lyubomirsky (2013) found no differences in the outcomes of interest (i.e., positive affect, flow, and relatedness) across modalities. These findings lend support to the idea that interventions focused on future self-perceptions can be effective when delivered online. Findings from a physical activity intervention with older Belgian adults ($M_{\text{age}} = 65$; $SD = 6$) seem worthy of consideration relevant to the population similarity with my sample. Mouton and Cloes (2015) randomized participants to a web-based intervention (informational in nature), a center-based intervention (with physical activity programming), a mixed intervention, or a control group. The mixed and web-based intervention both appeared to have significantly impacted awareness for physical activity but only the mixed condition resulted in a significant change in physical activity level. Interestingly, these findings on awareness are consistent with some of the feedback I received relative to my intervention (presented in the *Supplemental Analyses* section). These studies are offered as pertinent examples of interventions that share similarities with the one in this dissertation, but where online versus more traditional modes of delivery were directly compared. The mixed findings speak to the current premature state of the literature relative to drawing conclusions about the effectiveness of online intervention delivery.

To review, through this dissertation, I offer contributions to the literature in terms of tests of theoretical tenets, as well as both practical and methodological implications. Next, I review the limitations. Finally, I offer ideas for future research.

Limitations

No research program is without limitations. In lieu of reiterating limitations germane to each article, which have been previously discussed, I will focus on broad limitations that permeated my program of research as a whole. Namely, issues relating to the measurement of identity, discrepancy and self-regulation, and social influences will be considered.

Identity measurement. My choice to use a quantitative measure of identity was associated with limitations. Identity theorists recognize that individuals draw on both shared social structure and idiosyncratic ideas when considering what it means to hold an identity (Burke & Stets, 2009; Stets & Burke, 2003). Lending support for this theoretical tenet, Strachan, Perras, Forneris, and Stadig (2015) found that while exercisers' identity meanings were informed by *common* categories of observations like exercise goals, behavioural targets (i.e., frequency, duration), and personal exercise routines, there was also great *variability* within these categories (e.g., variation in acceptable frequencies of exercise). Strachan et al. (2015) argue that quantitative identity measures - like the Exercise Identity Scale (Anderson & Cychosz, 1994) rely on *shared* exercise identity meanings, like having exercise-related goals or having others view oneself as an exerciser, and as such, may not capture those meanings unique to individuals. While these common criteria are undoubtedly valid criteria that exercisers use relative to identifying with exercise, they may fail to capture their alternative or idiosyncratic exercise meanings. Therefore, my choice to measure identity using a quantitative scale may have failed to capture idiosyncratic aspects of identity meanings.

Need for discrepancy. A limitation of this thesis is that I did not fully explore the issue of discrepancy between possible and present self related to physical activity. Self theorists recognize the motivational and self-regulatory properties inherent to individuals' perceptions of a discrepancy between their ideal/future and current self (e.g, Burke & Stets, 2009; Higgins, 1987). In the possible selves literature, discrepancy is pervasive as it is considered one of the elements needed for future self-representations to energize behaviour (e.g., van Dellen & Hoyle, 2008). Researchers may be able to improve the effect of possible selves interventions through paying close attention to the issue of discrepancy. A possible self that is too close to the present self may not yield any further energization of action (Hoyle & Sherrill, 2006). To this end, Oyserman and James (2009) have discussed the need for an "observable gap" between present and future self. In *Study 1*, the issue of discrepancy was not addressed. For *Study 2*, I attempted to recruit participants for whom a discrepancy between their current and possible self would exist through recruiting participants who were not overly active or who did not strongly view themselves as exercisers. Furthermore, I attempted to more explicitly probe whether there was a discrepancy between retirees' present and future view of themselves as physically active retirees (using the PSI instrument described in *Article 1* and *Article 2*; see Appendix A13 for exact questions). Retirees' score out of 7 for the present self was 3.59; their score for future self was 6.00. Thus, a differential of -2.41 was obtained. It is however difficult to ascertain whether this difference between present and future self is practically meaningful. Hence, it would be advisable for researchers, in subsequent inquiries, to probe - perhaps highlight - the discrepancy between present and future self in more detail through open-ended (qualitative) questions. For example, participants could be asked to describe their perceptions of discrepancy. More simply, discrepancy could be examined as a potential moderator/mediator of intervention effectiveness.

Self-regulation. Possible selves may help individuals shape plans to attain their future selves (Markus & Ruvo, 1989). Oyserman and James (2009) further note that possible selves are most likely to impact self-regulation of behaviour when they are accompanied by strategies for achievement. This is not surprising as results from *Study 1* herein showed how self-regulatory properties are tied to possible selves. In the intervention presented in *Study 2*, the image generation tasks were not followed up with self-regulatory content, in the form, for instance, of goal setting or planning prompts. However, recently Strachan et al. (in press) tested the tenets above by randomizing insufficiently-active adults (aged 18-64) to either a self-enhancing possible selves intervention (consistent with Murru & Martin-Ginis, 2010) or an enhanced self-regulatory possible selves intervention. The script for the latter group alluded to steps required to attain the physically active self as well as the potential challenges and need for coping solutions that could arise on one's journey to an active lifestyle. While participants in both conditions reported significantly higher physical activity than their control counterparts, the authors concluded that self-regulatory condition conferred "no apparent additional benefit". The authors also speculate that spontaneous strategizing may have naturally occurred in the self-enhanced group and/or that the instructions for the self-regulatory group did not sufficiently prompt the generation of self-regulatory strategies. Further examination of the impact of self-regulatory content in possible selves intervention is warranted as per Strachan and colleagues (in press). Doing so would align with recommendations from Hobbs et al. (2013) on how to foster longer term success in physical activity interventions for adults aged 55 to 70 years: personalized activity goals proved useful.

Social influences. Through a focus on physical activity and identity at the individual level, possible *social* influences were not examined in this dissertation. Identity theorists Burke and Stets (2009) remind us that "the individual exists within the context of the social structure" (p. 3) and as such "others" can inform our identity. A limitation of this thesis is that, I did not probe whether

retirees' relationships within their social circles facilitated or thwarted changes in identity or physical activity. For example, Kearney and O'Sullivan (2003), in a synthesis article on weight loss, smoking cessation, and alcohol/drug-abuse recovery, identified social pressures as a form of constraint that may arise when individuals attempt behaviour and identity change. The authors cite the "lack of associates congruent with the new identity" (e.g., difficulty in finding friends or family who will also eat low-calorie foods) or social pressures to preserve the *status quo* (i.e., fearing that a change in behaviour may expose others' problematic behaviours). Similar social pressure could extend to the physical activity domain. Similarly, Strachan et al. (2010) ponder whether exercising in community group settings can act as a catalyst to promote the development of a physical activity identity in older adults. Along these lines, a review by Heaven et al. (2013) concluded that interventions promoting meaningful social roles in retirement can be beneficial as they may lessen the social voids created by the exit from work and help "create meaningful and socially engaging activities" (p. 224). Social influence can also be manipulated albeit surreptitiously; Zell and Alicke (2009) surmise that having people believe that they did more physical activity than others (downward social comparison) may increase their identity for physical activity, which could yield greater physical activity intentions and actual behaviour. In many respects, Van Dyck, Cardon, Deforche, and De Bourdeaudhuij (2015) assert that both individual factors and interpersonal factors may have some bearing on retirees' physical activity (e.g., Beck, Gillison, & Standage, 2010; Barnett, Guell, & Ogilvie, 2012).

Turning to the "darker" side of social influences, White, Young, and Gillett (1995) discuss the ideology of 'healthism', the cultural trend where individuals are viewed as being responsible for their own health and avoidance of disease, through personal effort. An individual-focused intervention like mine may, without malice intention, reinforce the healthism agenda. Digitized (i.e., online) interventions can further reinforce the individual's onus for their health. Given the

ubiquitous presence of technology through smart phones, tablets, and activity trackers, monitoring one's behaviour should be an easily accomplished task (Lupton, 2014). However, online interventions may be more likely to cater to those individuals within a higher socioeconomic gradient who may have disproportionate access to health related resources (White et al., 1995). This group has been identified as likely to turn to the internet to seek health information (Diaz, Griffith, Ng, Reinert, Friedmann, & Moulton, 2002). The idea that online interventions may be disproportionately used by those of a higher socio-economic segment creates unequal accessibility which is further problematic given previous finding showing that socio-economic status moderated the retirement-physical activity relationship (Barnett, van Sluijs, & Ogilvie, 2012). In discussing cardiac rehabilitation in underprivileged men, for instance, Savage, Dumas, and Stuart (2013) mention that health initiatives must consider the "social and living conditions of particular groups of individuals" (p. 1223). Lupton (2014) also warns about furthering social inequalities in health promotion as digital interventions are inherently predicated on digital literacy. Furthermore, my program of research may inadvertently reinforce a singular "it" view of aging which brings to mind some of the prejudices advanced against the "successful aging" literature. This model of aging is heavily predicated on the assumption of low disease, adequate cognitive and physical functioning, and active engagement in life (Boudiny, 2013), and could possibly appear exclusionary to some retirees and older adults.

Future Research

While some future research ideas were broached while discussing the limitations of the present program of research, I will now present future research ideas geared towards optimizing possible selves interventions to increase identity and physical activity.

Qualitative exploration of identity. Circling back to my earlier discussion on identity measurement, my choice of a quantitative measure may have also had implications for the ability to

capture identity change in *Study 2*. The addition of a qualitative component to a future possible selves intervention may allow researchers to capture aspects of identity that may change and that are not captured by quantitative measures. Indeed, many qualitative researchers report the occurrence of identity construction or negotiation in their studies (e.g., Carless & Douglas, 2008; McGannon & Spence, 2010; Rossing & Jones, 2013; Rossing, Ronglan, & Scott, 2014). Further, a more qualitative exploration of identity change may allow for the creation of a space where participants could make sense of their experience and reflect on their journey or personal story (e.g., Hudson, Day, & Oliver, 2015).

Physical Activity Self-Definition Model. The Physical Activity Self-Definition Model (PASD; Kendzierski, Furr, & Schiavoni, 1998; Kendzierski & Morganstein, 2009) identifies five variables that contribute to one's self-definition as an exerciser; support for this model has been established (Kendzierski & Morganstein, 2009). Perceived commitment (i.e., dedication devoted to physical activity engagement) and perceived ability (i.e., skill, efficacy) make a direct contribution to self-definition whereas perceived trying (i.e., pushing one's self, planning/scheduling), perceived wanting (i.e., value), and enjoyment (i.e., fun, feeling absorbed in the activity) make an indirect contribution. Kendzierski and Morganstein (2009) recommend using this "working model" to develop theoretically sound, identity-based interventions. Given its focus on physical activity self-definition, this model could inform the content of a possible selves intervention that aims to increase exercise identity. Participants could be prompted to imagine themselves as a physically active retiree and this could include pondering questions about each of the five variables of the model (e.g., imagining yourself as a physically active retiree, describe what you would value or like about being physically active [perceived wanting]). By having participants imagine a possible self that focuses specifically on factors known to be important in physical activity self-definition, researchers may be more likely to see an increase in identity.

Perceptions of aging. For Osborne (2012), retirement coalesces with aging and becoming a senior. Herein, aging and retirees' *perceptions* of aging - "older individuals' beliefs about their own aging" (Levy, Slade, & Kasl, 2002, p. 409) were not examined. By developing negative perceptions¹⁴ of aging, older adults often attribute their health woes to normative beliefs about aging while discounting the impact of lifestyle (Levy, Ashman, & Slade, 2009; Stewart, Chipperfield, Perry, & Weiner, 2012). Thus, they engage in fewer health-protective behaviours thereby enabling a self-fulfilling prophecy (Levy, 2003; Levy, Slade, & Kasl, 2002; Wurm, Warner, Ziegelmann, Wolff, & Schüz, 2013). Conversely, older adults reporting positive perceptions of aging also report engaging in health behaviours (Levy & Myers, 2004). Practically, Wolff, Warner, Ziegelmann, and Wurm (2014) contend that negative perceptions of aging may thwart health behaviour interventions. Therefore, they conducted an intervention to increase physical activity with a 'views-on-ageing' component in adults aged 65+. Through changing older adults' views on aging, researchers observed increased physical activity at a later time point. As per this dissertation, it is difficult to tell whether perceptions of aging impacted the relationships between variables or the results of the intervention. Future research with retirees may, at minimum, consider the moderating effect of these perceptions. A subsequent step researchers could take is to focus on untangling retirees' perceptions of aging or embed positive self-perceptions of aging and physical activity with the possible selves image generation tasks. Beyond intervention efforts situated at the individual level, we cannot dismiss too the potential impact of *broader* initiatives. For instance, attempting to change societal norms about aging and participation in physical activity, while likely time- and resource-heavy, could benefit more people. Such proposition brings to mind successful smoking

¹⁴ Out of space consideration, the term "perceptions of aging" is used to denote findings related to aging (self) stereotypes. Worth noting, Chalabaev et al. (2013) extends the discussion of aging stereotypes to the physical activity domain. Also, Meisner and Baker (2013) discuss expectations regarding aging (ERAs) in their work.

cessation initiatives realized through changing broad social norms around smoking behaviour (e.g., smoking was recast as undesirable/unacceptable; Roeseler & Burns, 2010).

Conclusion

Researchers often observe retirees' physical activity to be lacking when juxtaposed against public health guidelines (Godfrey et al., 2014). This finding is somewhat paradoxical given how retirement likely affords retirees increased leisure time that could be dedicated to physical activity. Thus, the impetus for this dissertation was to understand retirees' physical activity through self-perceptions, namely possible selves and identity. The present focus on self variables seems appropriate given the changes to the self assumedly engendered by retirement (i.e., shift in social roles, change in routine, etc).

Taken together, the findings of the two studies I conducted indicate that self-perceptions relate to retirees' physical activity; a possible mediational model was even supported. The question remains, how can self-perceptions be leveraged successfully in interventions; the attempt tested herein did not produce the anticipated outcomes. A presumed takeaway to be gleaned for this dissertation is the idea that in future physical activity interventions or health promotion initiatives, researchers may want to consider a "self" perspective to entice identification with physical activity and, of course, engagement in physical activity itself. In all probability, discussing physical activity at a more personal level - tied with one's desired future views - may yield better outcomes in newly retired individuals than mere informational, run-of-the-mill health campaigns. It would be worthwhile to continue exploring these ideas in future enquiries.

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STATEMENT OF CONTRIBUTIONS

The present Ph.D dissertation centered on a program of research jointly conceptualized by the Ph.D candidate, Mélanie G.M. Perras, and her thesis co-supervisors, Drs. Shaelyn M. Strachan and Michelle S. Fortier. The research was independent from other research projects conducted in Drs. Strachan and Fortier's labs.

In this section, the contributions of Ms. Perras are outlined. Her involvement consisted of the following, but was not limited to: conceptualizing the project, selecting the measures, and coordinating French adaptations when needed. With her co-supervisors' assistance, she secured approval from the Research Ethics Board (REB), and corresponded with the board when needed (i.e., amendment, renewal, and file closure). Ms. Perras set-up an account with Fluid Surveys (online survey tool), rendered the surveys online, and prepared the video components for *Study 2*. Moreover, she, coordinated advertising strategies and prepared printed advertising materials for both studies, recruited participants, fielded all phone calls and e-mails from participants regarding the study (i.e., queries, troubleshooting), tracked participants' completion of questionnaires, sent relevant URL links for next online questionnaires, and sent reminder e-mails. Ms. Perras conducted draws for prizing, contacted winners, obtained winners' prize acceptance, and released prizes. The candidate also managed (cleaned) and analyzed data. She wrote drafts as well as revised the three articles featured in this dissertation as well as the introduction, supplemental analyses, and general discussion. Ms. Perras also audited two statistical courses – one on multivariate statistics and one on hierarchical linear modeling (HLM) – to further her knowledge of statistics. In sum, Ms. Perras was involved in all stages of the research program

Drs. Strachan and Fortier were also heavily involved in both studies. Both co-supervisors helped conceptualized the program of research with the candidate. The co-supervisors provided invaluable advice and suggestions; Dr. Strachan met with the candidate on almost a weekly basis

(and as needed) and corresponded almost daily via e-mail. Dr. Fortier also exchanged e-mail correspondence with the candidate (i.e., Faculty rules relative to theses, relevant articles, feedback) and through regular informal interactions, caught up with the candidate. Ms. Perras and Drs. Strachan and Fortier met periodically to discuss progress and project timelines. Both co-supervisors assisted with recruitment efforts by disseminating the studies in their social networks. Dr. Strachan was involved in the significant editing/commenting of all components of the present dissertation. Dr. Fortier also provided comments and edits for the thesis proposal, for each article, as well as for the general discussion outline, and the general discussion itself. Both co-supervisors appear as co-authors on all articles stemming from this dissertation.

While realizing her program of research, Ms. Perras received valuable assistance from individuals whose contributions are noted below. Drs. Tanya Forneris and Bradley W. Young provided helpful comments and suggestions in the early stages of the research, chiefly through the proposal stage. Ms. Perras enlisted the help of four bilingual volunteers (i.e., Ginette and Dennis Perras, Eva Guérin, Flora Nassrallah) to record vocal tracks for the videos used in Study 2 (though, ultimately, only three were used). The javascript code used to embed the videos within the Fluid Surveys online survey tool was forwarded (but not written) by a colleague. Regarding analytical matters, Laura Meade, a graduate student of Dr. Strachan, assisted with the coding of possible selves data (as presented in *Article 1* and *Article 2*). Ms. Perras also consulted with Dr. Jennifer Brunet, adjunct professor at uOttawa, on statistical matters, notably the mediation analyses presented in *Article 2*. Finally, Ms. Perras enlisted the help of Dr. Brenden Dufault, biostatistical consultant at the University of Manitoba, to assist with and help interpret the repeated measures analyses presented in *Article 3*. Of note, Ms. Perras still was involved in these analyses by organizing data sets (initial assemblage of all data points) and fielding queries about the variables of interest. Dr. Dufault also provided comments on Ms. Perras' initial write-up of the results, and made

edits where warranted (statistical content and manuscript, overall). Given his involvement in *Article* 3, Dr. Dufault appears as part of the authorship team (including for forthcoming submission for publication). With the exception of the abovementioned particulars, Ms. Perras was responsible for all the work presented in the present dissertation.

Appendix A: Measures

Note: The measures featured in this section have been divided into *Study 1* and *Study 2*. A few measures, though, were common to both studies. I point to the: Godin leisure time exercise questionnaire (and accompanying preamble), physical activity identity scale, participant identification questions, and the socio-demographic questions. Out of space considerations, these specific measures appear once with *Study 1* measures. Likewise, the French versions of the measures are not included. References to original measures are included in parentheses. Details as per changes/adaptations made to measures are discussed within each article. Please note that all measures were administered via the online survey platform Fluid Surveys. As such, the use of boldface, colour, and/or question designs (i.e., templates, backgrounds) provided a "neater" presentation of the measures than the one herein.

Study 1

Appendix A1: Eligibility questions for Study 1.

1. Are you currently in the labour force (i.e., you have not yet accessed a pension or superannuation)? Note: For the present study, you are NOT in the labour force if you hold some employment while PENSIONED.

Yes
No

2. Do you consider yourself “retired”?

Yes
No

3. Have you been retired for three (3) years or fewer?

Yes
No

Appendix A2: Participant identification questions (for pairing data across time points).

1. Please indicate your e-mail address. Note: Your e-mail address will only be used to match up your data across time points and to contact you during the study; please use the same e-mail address when completing all questionnaires.

[Text box provided]

2. What is your first name? Note: Your first name will only be used to match up your data across time points.

[Text box provided]

3. What is your month of birth? Note: Your month of birth will only be used to match up your data across time points.

[Scroll-down menu: January through December]

Appendix A3: Socio-demographic questions for Study 1.

1. What is your age?

Range from 40 to 85

2. Are you male or female?

- 1) Male
- 2) Female

3. What is your ethnic background?

- 1) White
- 2) Aboriginal/Native
- 3) South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
- 4) Chinese
- 5) Black
- 6) Filipino
- 7) Latin American
- 8) Arab
- 9) Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian, etc.)
- 10) West Asian (e.g., Iranian, Afghan, etc.)
- 11) Korean
- 12) Japanese
- 13) Multiracial
- 14) Other

4. What is your current weight?

Range from: 100 lbs (45.36 Kg) to 375 lbs (170.10 Kg)

5. What is your height?

Range from: 4'8" (142cm) to 6'3" (190.5 cm)

6. What is your marital status?

- 1) Married
- 2) Living common-law
- 3) Widowed
- 4) Separated
- 5) Divorced
- 6) Single, never married

7. What is the highest degree, certificate or diploma you have obtained?

- 1) No post-secondary degree, certificate or diploma
- 2) Trade certificate or diploma from a vocational school or apprenticeship training
- 3) Non-university certificate or diploma from a community college, CEGEP, school of nursing, etc.
- 4) University certificate below bachelor's level
- 5) Bachelor's degree
- 6) University degree or certificate above bachelor's degree

8. When did you retire?

Scroll-down menu: Month and year of retirement

Appendix A4: Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985).

1) Preamble

We would like to ask you a few questions about your level of physical activity. Please think back to the physical activity you engaged in during a typical/average week over the past four (4) weeks.

Like most people, it is likely that you are not as physically active as you would like to be. In fact, even the most disciplined people have difficulties doing as much physical activity as they would wish to because of family demands, fatigue at the end, unexpected situations, etc.

We need to understand how much physical activity you are really doing. Please tell us what you are actually doing. Don't worry if you have not done as much physical activity as you wish you had. We need to know what is really happening, not what you think we want to hear. The most difficult thing will no doubt be for you to remember when you engaged in physical activity, what type of physical activity you did, and how hard you did it. It is thus important for you to make an

effort to remember so that your answers are as precise as possible. Take the time you need to answer.

2) Questionnaire

During a typical 7-day period, how many times, on the average, do you do the following kinds of exercise for more than 15 minutes during your free time (select the appropriate number)?

Please note, for example, that a 45-minute walk counts as one (1) time and not three (3).

1. Strenuous exercise (heart beats rapidly) (Times Per Week)

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

When exercising at the STRENUOUS level, please specify the average duration (minutes) of your exercise session. (Minutes)

2. Moderate exercise (not exhausting) (Times Per Week)

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

When exercising at the MODERATE level, please specify the average duration (minutes) of your exercise session. (Minutes)

Appendix A5: Physical Activity Identity Scale (Anderson & Cychosz, 1994).

Use the scale provided to rate extent to which each item applies to you.

1. I consider myself a physically active person.

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

2. When I describe myself to others, I usually include my involvement in physical activity.

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

3. I have numerous goals related to physical activity.

Strongly disagree							Strongly agree
1	2	3	4	5	6	7	

4. Physical activity is a central factor to my self-concept.

Strongly disagree	1	2	3	4	5	6	Strongly agree	7
5. I need to be physically active to feel good about myself.								
Strongly disagree	1	2	3	4	5	6	Strongly agree	7
6. Others see me as someone who engages in physical activity regularly.								
Strongly disagree	1	2	3	4	5	6	Strongly agree	7
7. For me, being a physically active person means more than just engaging in physical activity.								
Strongly disagree	1	2	3	4	5	6	Strongly agree	7
8. I would feel a real loss if I were forced to give up physical activity.								
Strongly disagree	1	2	3	4	5	6	Strongly agree	7
9. Physical activity is something I think about often.								
Strongly disagree	1	2	3	4	5	6	Strongly agree	7

Appendix A6: The Possible Selves Instrument (Hooker, 1999).

This questionnaire addresses how you see yourself in the future. We all think about the future to some extent. When doing so, we usually think about the kinds of experiences that are in store for us and the kinds of people we might possibly become. Sometimes we think about what we hope we will be like – selves we hope to become in the future, or “hoped-for possible selves”.

Some hoped-for possible selves seem quite likely, like 'being a grandparent' or 'vacationing in Florida'. Other future selves seem quite far-fetched but are still possible – for example, winning the lottery. *Things that we do are not possible selves but are usually part of a possible self. For example, to write books is not a possible self; to be a writer is a possible self.*

1. In thinking about what you hope you will be like in the future, list up to seven (7) hoped-for possible selves (one per line), in the spaces provided below. Tip: A possible self is usually stated as: Be... /To become a. . .

Seven text boxes provided (i.e., list format)

2. Now, please take a few minutes and think about the following possible self: BE A PHYSICALLY ACTIVE RETIREE. As a physically active retiree, you incorporate physical

activity to your lifestyle on most days of the week at a moderate to vigorous intensity. You have the energy to carry out your daily tasks and all your personal goals for retirement.

NOTE: Whether or not the possible self depicted above is similar to the possible self you described previously, it is important that you answer the following questions.

i. How important is it to you to achieve this possible self?

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

ii. How capable do you feel of achieving this possible self?

1	2	3	4	5	6	7
Not at all capable			Somewhat capable		Very capable	

iii. How likely do you think it is that this possible self will be achieved?

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

Study 2

Appendix A7: Eligibility questions for Study 2. (For question 3: Boudreau & Godin, 2014; Gionet & Godin, 1989; Godin, Jobin, & Bouillon, 1986; for question 4: Aron, Aron, & Smollan, 1992).

1. Do you meet this study's definition of "newly retired"? You retired sometime in 2010 or after; You are collecting a pension and/or retirement income; you consider yourself "retired". Note: You may participate in this study if you are holding employment while collecting a pension or retirement income.

Yes
No

2. To your knowledge, does your current health status allow you to increase your level of moderate-to-vigorous physical activity? Generally speaking, moderate-intensity physical activities will cause people to sweat a little and to breathe harder; at this level, physical activity is not exhausting. Vigorous-intensity physical activities will cause people to sweat and be out of breath. At this level, the heart beats rapidly.

Yes
No
I don't know/I am not sure

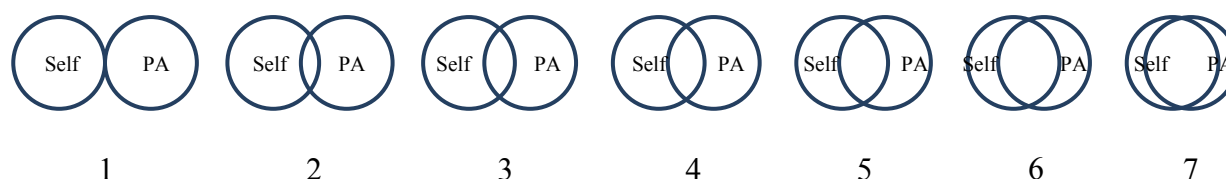
3. Leisure-time physical activity circumscribes what you do while engaging in leisurely activities, exercise, or sport for a minimum of 30 minutes in one day. How often have you participated in one or more moderate-to-vigorous physical activities for at least 30 minutes in one day during your free time in the last three months?

Generally speaking, moderate-intensity physical activities will cause people to sweat a little and to

breathe harder; this type of physical activity is not exhausting. Some examples of moderate physical activities include: fast walking, bicycling, swimming, golf (no cart), and aquaform. Vigorous-intensity physical activities will cause people to sweat and be out of breath at this level, the heart beats rapidly. Some examples of vigorous physical activities include: running, jogging, squash, and vigorous swimming.

- 1 = never
- 2 = about once per month
- 3 = about 2 or 3 times per month
- 4 = about once per week
- 5 = about 2 times per week
- 6 = about 3 times per week
- 7 = 4 times or more per week

4. Please use the scale below to select the number that corresponds to your relationship with physical activity (i.e., the extent to which you think physical activity is a part of who you are).



Appendix A8: Socio-demographic questions for Study 2.

Note: Aside from the socio-demographic questions outlined in Appendix A3, three additional questions, below, were asked to ascertain perceived health as per Conn (1998).

1. How would you rate your health?

- 1) poor
- 2) fair
- 3) good
- 4) excellent

2. When comparing your health to others your age, your health is:

- 1) worse than others
- 2) about the same as others
- 3) better than others

3. To what extent does your health interfere with desired activities?

- 1) not at all
- 2) somewhat
- 3) a great deal

Appendix A9: Imaging Ability Questionnaire (Kwekkeboom, 2000).

Those interested in obtaining the Imaging Ability Questionnaire may want to contact its author. Please refer to: Kwekkeboom, K. L. (2000). Measuring imaging ability: Psychometric testing of the imaging ability questionnaire. *Research in Nursing and Health*, 23, 301-309.

Appendix A10: Consideration of Future Consequences (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 uncharacteristic	somewhat uncharacteristic	uncertain	somewhat characteristic	extremely 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. ____

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. _____

Appendix A11: Possible selves intervention (i.e., image generation task; Murru & Martin Ginis, 2010).

1. Instructions

Important information: You are invited to watch and listen to the video below. Before clicking "play video" it is recommended that you TURN UP the volume of your computer or speakers (or wear headphones). Once the "play video" button is pressed, the clip cannot be paused, stopped, or played again. It is only a few minutes long.

The following video will refer to moderate-to-vigorous physical activity. Generally speaking, moderate-intensity physical activities will cause people to sweat a little and to breathe harder; this type of physical activity is not exhausting. Vigorous-intensity physical activities will cause people to sweat and be out of breath; at this level, the heart beats rapidly.

When you are ready to start, press "play video" once. A delay of a few seconds is normal.

2. Video script

Narrator: The following video is a very important component of the present study. We kindly ask you to watch and listen carefully. It is only a few minutes long. This video addresses how you see yourself in the future. We all think about the future to some extent. When doing so, we usually think about the kinds of experiences that are in store for us and the kinds of people we might possibly become.

Narrator + text on screen: We are interested in your impression of yourself five to ten years from now. // More specifically, we would like you to think about yourself in the future as a physically active retiree. // You incorporate physical activity into your lifestyle on most days of the week at a moderate to vigorous intensity. // Five to ten years from now you have the energy to carry out your daily tasks. // And all your personal goals for retirement. // When you think about yourself five to ten years from now as a retiree who is physically active on a regular basis. // What images come to mind? // Please take a few minutes to image and think about these images.

Narrator: This exercise is a very important part of this study. You will now be given a few minutes to imagine yourself as a physically active retiree. We ask you to stay on this page until the screen turns dark, after which point you can continue to the next page of the survey.

3. Elaboration questions

There is no time limit to complete this page. Write as little or as much as you like. Try to give as much detail as you can.

i. Write the first thing that comes to mind when you thought about this image of yourself.

[Text box provided]

ii. Describe the image's appearance (i.e., yourself, five to 10 years from now, as a physically active retiree).

[Text box provided]

iii. Give us a sense of the general health of the image (i.e., yourself, five to 10 years from now, as a physically active retiree).

[Text box provided]

iv. Describe the energy level of the image (i.e., yourself, five to 10 years from now, as a physically active retiree).

[Text box provided]

v. Describe the attitude toward life of the image (i.e., yourself, five to 10 years from now, as a physically active retiree).

[Text box provided]

vi. List some of the achievements carried out by the image (i.e., yourself, five to 10 years from now, as a physically active retiree).

[Text box provided]

vii. Tell us about the relationships formed and maintained by the image (i.e., yourself, five to 10 years from now, as a physically active retiree).

[Text box provided]

viii. Feel free to share anything else that comes to mind (i.e., yourself, five to 10 years from now, as a physically active retiree).

[Text box provided]

4. Compliance check questions¹⁵

i. In considering the video you just watched, identify the benefit of a physically active lifestyle that was mentioned in the video.

¹⁵ For questions i through iv, only two of the four questions were asked at one time (i.e., during one image generation task).

Energy
Strength
Flexibility
Memory

ii. In considering the video clip you just watched, what was the time frame for thinking about yourself in the future?

1-2 years
3-5 years
5-10 years
10-15 years

iii. In considering the video clip you just watched, what was the stated frequency for being physically active?

Most days
Once a week
Twice a week
Once a month

iv. In considering the video clip you just watched, which intensity of physical activity was mentioned?

Light
Intense
Moderate-to-vigorous
Extreme

v. Did you use the time provided to think about the image of yourself as a physically active retiree?

Yes
No

vi. To what extent did you imagine yourself as a physically active retiree?

Scale from: *Not at all* (1) to *Very much* (9)

Appendix A12: Process evaluation/acceptability (modeled after Ammann, Vandelanotte, de Vries, & Mummery, 2012).

Use the scale below to answer a few questions about your experience in this intervention.

1	2	3	4	5
Not acceptable				Very acceptable

1. How would you rate the **length of time** needed to complete online surveys or activities?
2. How would you rate the **format** of the intervention (self-paced online delivery)?
3. How would you rate the **content** of the intervention?
4. How would you rate the **usefulness** of this intervention?

Preference

5. Would you have preferred...

Fewer activities/surveys?

More activities/surveys?

The same amount I have received?

Repeat Participation

6. If given the opportunity, would you agree to participate in this research study again?

Definitely yes

Probably yes

I'm not sure

Probably no

Definitely no

Appendix A13: Additional items from the Possible Selves Instrument (Hooker, 1999).

Note: The complete description of the possible selves instrument appears in Appendix A6.

Now, please take a few minutes and think about the following possible self: "Be a physically active retiree".

iv. To what extent does this possible self describe you now?

1	2	3	4	5	6	7
Not at all			Somewhat		Very much	

v. To what extent would you like this possible self to describe you in the future?

1	2	3	4	5	6	7
Not at all			Somewhat		Very much	

Appendix B: Consent and Debrief Forms

Appendix B1: Consent Form for Study 1 (English)

LETTER OF INFORMATION AND CONSENT FORM¹⁶

Title of the study: An investigation of lifestyle habits in new retirees.

Name of researchers:

Principal investigator/Ph.D student:	Thesis co-supervisor:	Thesis co-supervisor:
Mélanie G.M. Perras, PhD (c) School of Human Kinetics University of Ottawa	Shaelyn Strachan, PhD Faculty of Kinesiology and Recreation Management University of Manitoba	Michelle Fortier, PhD School of Human Kinetics University of Ottawa

Invitation to Participate: I am invited to participate in the abovementioned research study conducted by Mélanie Perras, PhD candidate, and supervised by Drs. Shaelyn Strachan and Michelle Fortier.

Purpose of the Study: The purpose of the study is to explore health behaviours in newly-retired individuals. If I choose to participate in this study, I will complete questionnaires that will inquire about my habits, thoughts, and various behaviours like physical activity, etc.

I must keep in mind that there are no “good” or “bad” answers. The researchers want me to describe my real thoughts and experiences and not what I think they want to hear.

Participation: My participation will consist essentially of completing online questionnaires at three (3) time-points, spread one-month apart. Each time point will require approximately 30 to 40 minutes of my time. Thus, the study will require roughly 1.5 to 2 hours of my time in total. All of the activities/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 within a day or two of receiving the link in my e-mail. It is important that I complete the questionnaires promptly.

Risks: My participation in this study will entail that I share personal information (e.g., habits, thoughts), and this may cause me to experience mild and temporary emotional discomfort (e.g., guilt, uneasiness). On the whole, the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life.

I have the assurance from the researcher that every effort will be made to keep in strict confidence any information I share, and no one other than the researchers will be able to trace my answers back to me.

Benefits: My participation in this study may allow me to contribute to the line of research focused on understanding the factors associated with health behaviours in new retirees. This contribution is

¹⁶ The official uOttawa letterhead was not used as study was conducted online.

not guaranteed. Additionally, I will be entered into a draw (participant ID number will be entered – not my name) for one of 20 prizes of 100\$ (odds of winning depend upon the number of participants). Finally, I will be able to request a copy of the results of this study once data collection and analysis is over (in about 18 months; upon request only).

Confidentiality and anonymity: I have the assurance from the researcher that the information I will share will remain strictly confidential. I understand that the contents will be used only for the purposes stated in the present document (e.g., exploring health behaviours in newly-retired individuals) and that my confidentiality will be protected.

My data will remain confidential as the online Canadian server that will be used to collect the data is secure and password-protected.

Anonymity will be protected through several means. The principal researcher will merge my data with that of the other participants. Furthermore, 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. Finally, neither my name nor my contact information will appear in any publications stemming from this research.

Conservation of data: During Mélanie Perras' residency (PhD program), all electronic data will be retained on a password-protected computer in the principal investigator's office at the University of Ottawa. Furthermore, the electronic data will be stored in files whose access passwords will be known only to the researchers. Once the project is finished (e.g., data collection and analysis), the data will be kept for a storage period of five (5) years. For this period, the data will be stored on Dr. Michelle Fortier's computer, in her office, under the same conditions described above, after which it will be destroyed (deleted) securely. Data will be transferred from Mélanie's computer unto Dr. Fortier's computer via USB key. Contents of this USB key will be securely deleted once the transfer is completed. At all times, the data will not be made available to anyone other than the researchers and me, at my personal request.

Compensation: As described above, my participation in this study will give me a *chance* to win one of 20 cash prizes of 100\$ (random draw). For each time point I complete, I will receive an entry (up to three (3) entries) into the draw which will take place at the end of the study. If I choose to withdraw from the study, I will still be eligible for prizing (I will receive an entry or entries as per the last time point(s) I completed or partially completed). I will promptly be contacted by the principal investigator if I win a prize.

This study has received internal funding from the Research Development Program and the Research Management Services of the University of Ottawa.

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, all data gathered until the time of withdrawal will be deleted.

Acceptance:

☐ I agree to participate in the above research study conducted by Mélanie Perras of the School of Human Kinetic and supervised by Drs. Shaelyn Strachan and Michelle Fortier.

☐ I do not agree to participate in the above research study conducted by Mélanie Perras of the School of Human Kinetic and supervised by Drs. Shaelyn Strachan and Michelle Fortier.

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

If I have any questions regarding the ethical conduct of this study, I may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5. Tel.: (613) 562-5387. Email: ethics@uottawa.ca

Appendix B2: Consent Form for Study 1 (French)

LETTRE D'INFORMATION ET FORMULAIRE DE CONSENTEMENT¹⁷

Titre de l'étude: Étude sur les habitudes de vie des personnes nouvellement retraitées

Nom des chercheuses:

Chercheuse principale/candidate au doctorat:	Co-superviseuse de thèse:	Co-superviseuse de thèse:
Mélanie G.M. Perras, PhD (c) École des sciences de l'activité physique Université d'Ottawa	Shaelyn Strachan, PhD Faculty of Kinesiology and Recreation Management University of Manitoba	Michelle Fortier, PhD École des sciences de l'activité physique Université d'Ottawa

Invitation à participer: Je suis invité¹⁸ à participer à la recherche nommée ci-haut qui est menée par Mélanie Perras, candidate au doctorat et supervisée par les Drs. Shaelyn Strachan et Michelle Fortier.

But de l'étude: Le but de l'étude est d'explorer les habitudes de vie des personnes nouvellement retraitées. Si je choisis de participer à cette étude, je vais remplir des questionnaires qui incluront des questions relatives à mes habitudes de vie, mes pensées et à certains comportements (par exemple, l'activité physique).

Je dois noter qu'il n'y a pas de "bonnes" et de "mauvaises" réponses. Les chercheuses veulent explorer mes vraies pensées et mes vraies expériences; elles ne veulent pas que j'indique ce que je pense qu'elles veulent entendre.

Participation: Ma participation consistera essentiellement à remplir des questionnaires en ligne à trois (3) occasions, à un (1) mois d'intervalle. Chaque occasion devrait prendre environ 30 à 40 minutes de mon temps. L'étude au complet devrait prendre 1.5 à 2 heures. Tous les questionnaires seront disponibles en ligne. Ainsi, je peux les remplir là où j'ai accès à Internet.

On me demandera de compléter les questionnaires à ma prochaine convenance, idéalement dans les 24 à 48 heures suivant l'envoi du courriel contenant le lien Internet sécurisé à utiliser. Il est important de remplir les questionnaires dans les délais les plus courts.

Risques: Je comprends que puisque ma participation à cette recherche implique que je donne de l'information personnelle (habitudes, pensées), il est possible qu'elle crée des risques d'inconfort émotionnel léger et temporaire (gêne, embarras). Somme toute, la probabilité et l'importance des éventuels inconvénients associés à la participation à la recherche sont comparables à ceux auxquels toute personne s'expose dans les aspects de sa vie quotidienne.

J'ai reçu l'assurance des chercheuses que tout se fait en vue de minimiser ces risques. Ainsi, toutes les informations que je partage seront gardées en stricte confidentialité et que seules les chercheuses pourront identifier mes réponses.

¹⁷ Note: L'en-tête officiel de l'Université d'Ottawa n'est pas utilisé car l'étude se déroule en-ligne.

¹⁸ Le genre masculin a été utilisé afin d'alléger le texte et ce sans aucune discrimination.

Bienfaits: Ma participation à cette recherche pourra contribuer l'avancement du savoir relatif aux habitudes de vie des personnes nouvellement retraitées. Cette contribution n'est pas assurée. Par ailleurs, mon numéro de participant sera inclus dans un tirage où je pourrais gagner l'un des 20 prix de 100\$ en argent comptant. Finalement, une copie des résultats de l'étude pourra m'être envoyée (si j'en fais la demande) une fois la collecte et l'analyse des données complétées (veuillez accorder un délai d'environ 18 mois).

Confidentialité et anonymat: J'ai l'assurance des chercheuses que l'information que je partagerai restera strictement confidentielle. Je m'attends à ce que le contenu ne soit utilisé que pour les buts décrits dans le présent document (e.g., explorer les habitudes de vie des personnes nouvellement retraitées) et que ma confidentialité soit protégée. Mes données resteront confidentielles car le serveur sécurisé (conservé au Canada) utilisé pour la collecte de données en ligne est également muni d'un mot de passe.

L'anonymat est garanti par les façons suivantes: mes données seront jumelées à celle des autres participants. Également, mes coordonnées personnelles seront dissociées de mes réponses une fois les analyses et le projet complétés. Mes coordonnées personnelles et mes réponses seront sauvegardées sur l'ordinateur de la chercheuse principale; celui-ci est protégé par un mot de passe. L'ordinateur se trouve dans le bureau barré de la chercheuse principale. Finalement, ni mes coordonnées ni mon nom n'apparaîtront dans les publications découlant de ce projet.

Conservation des données: Durant la résidence de Mélanie Perras (études doctorales), toutes les données électroniques seront sauvegardées sur l'ordinateur de la chercheuse principale; celui-ci est protégé par un mot de passe. L'ordinateur se trouve dans le bureau barré de la chercheuse principale. De plus, toutes les données seront conservées dans des fichiers munis de mots de passe (connus des chercheuses ci-haut mentionnées seulement). Une fois le projet terminé (collecte de données et analyses), les données seront conservées pour une période de cinq (5) ans. Pour cette période de cinq (5) ans, les données seront conservées sur l'ordinateur de Michelle Fortier, dans son bureau, sous les mêmes conditions ci-haut mentionnées. Le transfert des données se fera au moyen d'une clé USB; celle-ci sera vidée de son contenu dès le transfert terminé. Après cette période de cinq (5) ans, les données seront effacées de façon sécurisée. En tout temps, mes données seront disponibles qu'aux chercheuses et qu'à moi (si j'en fais la demande).

Compensation: Tel que mentionné ci-haut, ma participation à cette étude me donnera la chance de gagner l'un des 20 prix de 100\$ en argent comptant. Pour chaque questionnaire rempli, je recevrai un billet (jusqu'à trois (3) billets) pour le tirage qui aura lieu une fois l'étude terminée. Si je décide de me retirer de l'étude, je peux quand même gagner un prix. Les billets que j'aurai obtenus jusqu'au et incluant le moment de mon retrait seront inclus dans le tirage. Je serai avisé par la chercheuse principale si je gagne un prix.

Ce projet a reçu le support financier du service de subventions de recherche et déontologie et des subventions du programme de financement pour le développement de la recherche de l'Université d'Ottawa.

Participation volontaire: Ma participation à la recherche est volontaire et je suis libre de me retirer en tout temps, et/ou refuser de répondre à certaines questions, sans subir de conséquences négatives. Si je choisis de me retirer de l'étude, les données recueillies jusqu'à ce moment seront supprimées.

Acceptation:

☐ J'accepte de participer à cette recherche menée par Mélanie Perras de l'École des sciences de l'activité physique, laquelle recherche est supervisée par les Drs. Shaelyn Strachan et Michelle Fortier.

☐ Je n'accepte pas de participer à cette recherche menée par Mélanie Perras de l'École des sciences de l'activité physique, laquelle recherche est supervisée par les Drs. Shaelyn Strachan et Michelle Fortier.

Pour tout renseignement additionnel concernant cette étude, je peux communiquer avec la chercheure principale ou ses superviseures.

Pour tout renseignement sur les aspects éthiques de cette recherche, je peux m'adresser au Responsable de l'éthique en recherche, Université d'Ottawa, Pavillon Tabaret, 550, rue Cumberland, pièce 154, (613) 562-5387 ou ethics@uottawa.ca.

Appendix B3: Consent Form for Study 2 (English)

LETTER OF INFORMATION AND CONSENT FORM¹⁹

Title of the study: Testing the effectiveness of physical activity interventions designed for newly-retired individuals.

Name of researchers:

Principal investigator/PhD student:	Thesis co-supervisor:	Thesis co-supervisor:
Mélanie G.M. Perras, PhD (c) School of Human Kinetics University of Ottawa	Shaelyn Strachan, PhD Faculty of Kinesiology and Recreation Management University of Manitoba	Michelle Fortier, PhD School of Human Kinetics University of Ottawa

Invitation to Participate: I am invited to participate in the abovementioned research study conducted by Mélanie Perras, PhD candidate, and supervised by Drs. Shaelyn Strachan and Michelle Fortier.

Purpose of the Study: The purpose of the study is to test the effectiveness of physical activity interventions designed for newly-retired individuals.

Participation: This study will test different interventions designed to increase physical activity. As a result, my participation will consist of completing various online activities/surveys at several time points (exact number will vary). On the whole, I am assured that my participation will be completed within a 12-week period and that the total time needed will vary between 1.5 to 4.5 hours.

All of the activities/questionnaires will be online so I can complete them wherever I have Internet access. I will be asked to complete the questionnaires/activities at my earliest convenience within a day or two of receiving the link in my e-mail. It is important that I complete the questionnaires promptly.

Risks: Participation in this study might compel me to engage in more physical activity. Consequently, temporary physical discomfort (e.g., stiffness, fatigue) may arise, especially if I am a new exerciser or a "returning" exerciser (becoming active after a period of inactivity).

Although exercise is safe for many people there are some exceptions. For example, if I have an underlying medical condition (e.g., heart disease, high blood pressure, and diabetes) I may not be able to exercise. **This is why consulting my doctor is an important first step.**

Finally, I may experience negative albeit mild and temporary feelings related to my engagement in physical activity (e.g., feeling out of shape, bored) or the disclosure of personal information about my exercise habits (or lack thereof).

On the whole, the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life.

¹⁹ Please note that this consent form will be administered online.

I have the assurance from the researcher that every effort will be made to keep in strict confidence any information I share, and no one other than the researchers will be able to trace my answers back to me.

Benefits: My participation in this study may allow me to contribute to the line of research focused on understanding physical activity in new retirees. This contribution is not guaranteed. Participating in this study might also compel me to engage in more physical activity. Additionally, I will be entered into a draw for one of 20 prizes of 100\$. Finally, I will be able to request a copy of the results of this study once data collection and analysis is over (in about 18 months; upon request only).

Confidentiality and anonymity: I have the assurance from the researcher that the information I will share will remain strictly confidential. I understand that the contents will be used only for the purposes stated in the present document (e.g., test effectiveness of physical activity interventions) in newly-retired individuals) and that my confidentiality will be protected.

My data will remain confidential as the online Canadian server that will be used to collect the data is secure and password-protected.

Anonymity will be protected through several means. The principal researcher will merge my data with that of the other participants. Furthermore, 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. Finally, neither my name nor my contact information will appear in any publications stemming from this research.

Conservation of data: During Mélanie Perras' residency (PhD program), all electronic data will be retained on a password-protected computer in the principal investigator's office at the University of Ottawa. Furthermore, the electronic data will be stored in files whose access passwords will be known only to the researchers. Once the project is finished (e.g., data collection and analysis), the data will be kept for a storage period of five (5) years. For this period, the data will be stored on Dr. Michelle Fortier's computer, in her office, under the same conditions described above, after which it will be destroyed (deleted) securely. Data will be transferred from Mélanie's computer unto Dr. Fortier's computer via USB key. Contents of this USB key will be securely deleted once the transfer is completed. At all times, the data will not be made available to anyone other than the researchers and me, at my personal request.

Compensation: As described above, my participation in this study will give me a *chance* to win one of 20 cash prizes of 100\$ (random draw). Regardless of the intervention I am testing, I will receive up to four (4) entries into a random draw which will take place at the end of the study. If I choose to withdraw from the study, I will still be eligible for prizing (I will receive an entry or entries as per the last activities I completed). I will promptly be contacted by the principal investigator if I win a prize.

This study has received internal funding from the Research Development Program and the Research Management Services of the University of Ottawa.

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, all data gathered until the time of withdrawal will be deleted.

Acceptance:

☐ I agree to participate in the above research study conducted by Mélanie Perras of the School of Human Kinetic and supervised by Drs. Shaelyn Strachan and Michelle Fortier.

☐ I do not agree to participate in the above research study conducted by Mélanie Perras of the School of Human Kinetic and supervised by Drs. Shaelyn Strachan and Michelle Fortier.

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

If I have any questions regarding the ethical conduct of this study, I may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5
Tel.: (613) 562-5387

Email: ethics@uottawa.ca

Appendix B4: Consent Form for Study 2 (French)

LETTRE D'INFORMATION ET FORMULAIRE DE CONSENTEMENT²⁰

Titre de l'étude: Évaluation de nouvelles interventions ayant pour but d'augmenter l'activité physique chez les personnes nouvellement retraitées.

Nom des chercheuses:

Chercheuse principale/candidate au doctorat:	Co-superviseuse de thèse:	Co-superviseuse de thèse:
Mélanie G.M. Perras, PhD (c) École des sciences de l'activité physique Université d'Ottawa	Shaelyn Strachan, PhD Faculty of Kinesiology and Recreation Management University of Manitoba	Michelle Fortier, PhD École des sciences de l'activité physique Université d'Ottawa

Invitation à participer: Je suis invité²¹ à participer à la recherche nommée ci-haut qui est menée par Mélanie Perras, candidate au doctorat et supervisée par les Drs. Shaelyn Strachan et Michelle Fortier.

But de l'étude: Le but de l'étude est d'évaluer l'efficacité de nouvelles interventions visant à augmenter l'activité physique chez les personnes nouvellement retraitées.

Participation: Cette étude testera *plusieurs* interventions. Dès lors, ma participation peut varier mais consistera essentiellement à remplir des questionnaires en ligne et/ou à compléter des activités (nombre variable). Somme toute, l'étude s'étalera sur douze (12) semaines. L'étude au complet devrait prendre entre 1.5 à 4.5 heures de mon temps.

Tous les questionnaires seront disponibles en ligne. Ainsi, je peux les remplir là où j'ai accès à Internet. On me demandera de compléter les questionnaires à ma prochaine convenance, idéalement dans les 24 à 48 heures suivant l'envoi du courriel contenant le lien Internet sécurisé à utiliser. Il est important de remplir les questionnaires dans les délais les plus courts.

Risques: Participer à cette étude pourrait m'inciter à faire plus d'activité physique. Ainsi, il y a des risques possibles d'inconfort physique léger et passager (e.g., raideurs, fatigue). Ces risques sont susceptibles de se produire si je suis un nouvel initié à l'activité physique ou si je redeviens actif après une période d'arrêt prolongée.

L'activité physique est recommandable pour la plupart des gens, mais pas nécessairement pour tous. Si, par exemple, j'ai une condition médicale sous-jacente (e.g., trouble cardiaque, pression artérielle élevée, diabète), je ne serez peut-être pas en mesure de faire de l'exercice. **Voilà pourquoi il est essentiel que je consulte le médecin avant d'entreprendre quoi que ce soit.**

²⁰ Note: Ce questionnaire de consentement sera administré en ligne.

²¹ Le genre masculin a été utilisé afin d'alléger le texte et ce sans aucune discrimination.

Finalement, il est possible que l'intervention crée des risques d'inconfort émotionnel léger et temporaire associés à l'activité physique comme telle (e.g., se sentir en mauvaise forme, ennui) ou à la révélation d'informations personnelles (habitudes, niveau d'activité physique).

Somme toute, la probabilité et l'importance des éventuels inconvénients associés à la participation à la recherche sont comparables à ceux auxquels toute personne s'expose dans les aspects de sa vie quotidienne.

J'ai reçu l'assurance des chercheuses que tout se fait en vue de minimiser ces risques. Ainsi, toutes les informations que je partage seront gardées en stricte confidentialité et que seules les chercheuses pourront identifier mes réponses.

Bienfaits: Ma participation à cette recherche pourra contribuer l'avancement du savoir relatif à l'activité physique chez les personnes nouvellement retraitées. Cette contribution n'est pas assurée. De ce fait, participer à cette étude pourrait m'inciter à faire plus d'activité physique. Je serai inclus dans un tirage où je pourrais gagner l'un des 20 prix de 100\$ en argent comptant. Finalement, une copie des résultats de l'étude pourra m'être envoyée (si j'en fais la demande) une fois la collecte et l'analyse des données complétées (veuillez accorder un délai d'environ 18 mois).

Confidentialité et anonymat: J'ai l'assurance des chercheuses que l'information que je partagerai restera strictement confidentielle. Je m'attends à ce que le contenu ne soit utilisé que pour les buts décrits dans le présent document (e.g., évaluer des interventions pour augmenter l'activité physique) et que ma confidentialité soit protégée. Mes données resteront confidentielles car le serveur sécurisé (conservé au Canada) utilisé pour la collecte de données en ligne est également muni d'un mot de passe.

L'anonymat est garanti par les façons suivantes: mes données seront jumelées à celle des autres participants. Également, mes coordonnées personnelles seront dissociées de mes réponses une fois les analyses et le projet complétés. Mes coordonnées personnelles et mes réponses seront sauvegardées sur l'ordinateur de la chercheuse principale; celui-ci est protégé par un mot de passe. L'ordinateur se trouve dans le bureau barré de la chercheuse principale. Finalement, ni mes coordonnées ni mon nom n'apparaîtront dans les publications découlant de ce projet.

Conservation des données: Durant la résidence de Mélanie Perras (études doctorales), toutes les données électroniques seront sauvegardées sur l'ordinateur de la chercheuse principale; celui-ci est protégé par un mot de passe. L'ordinateur se trouve dans le bureau barré de la chercheuse principale. De plus, toutes les données seront conservées dans des fichiers munis de mots de passe (connus des chercheuses ci-haut mentionnées seulement). Une fois le projet terminé (collecte de données et analyses), les données seront conservées pour une période de cinq (5) ans. Pour cette période de cinq (5) ans, les données seront conservées sur l'ordinateur de Michelle Fortier, dans son bureau, sous les mêmes conditions ci-haut mentionnées. Les données seront transférées d'un ordinateur à l'autre via une clé USB. Le contenu de celle-ci sera effacé de façon sécurisée dès le transfert terminé. Après cette période de cinq (5) ans, les données seront effacées de façon sécurisée. En tout temps, mes données seront disponibles qu'aux chercheuses et qu'à moi (si j'en fais la demande).

Compensation: Tel que mentionné ci-haut, ma participation à cette étude me donnera la chance de gagner l'un des 20 prix de 100\$ en argent comptant. Peu importe l'intervention que je testerai, je pourrai amasser jusqu'à quatre (4) billets pour le tirage au sort qui aura lieu une fois l'étude

terminée. Si je décide de me retirer de l'étude, je peux quand même gagner un prix. Les billets que j'aurai obtenus jusqu'au et incluant le moment de mon retrait (seront inclus dans le tirage. Les chances de gagner dépendent du nombre de participants. Je serai avisée par la chercheuse principale si je gagne un prix.

Ce projet a reçu le support financier du service de subventions de recherche et déontologie et des subventions du programme de financement pour le développement de la recherche de l'Université d'Ottawa.

Participation volontaire: Ma participation à la recherche est volontaire et je suis libre de me retirer en tout temps, et/ou refuser de répondre à certaines questions, sans subir de conséquences négatives. Si je choisis de me retirer de l'étude, les données recueillies jusqu'à ce moment seront supprimées.

Acceptation:

☐ J'accepte de participer à cette recherche menée par Mélanie Perras de l'École des sciences de l'activité physique, laquelle recherche est supervisée par les Drs. Shaelyn Strachan et Michelle Fortier.

☐ Je n'accepte pas de participer à cette recherche menée par Mélanie Perras de l'École des sciences de l'activité physique, laquelle recherche est supervisée par les Drs. Shaelyn Strachan et Michelle Fortier.

Pour tout renseignement additionnel concernant cette étude, je peux communiquer avec la chercheuse principale ou ses superviseuses.

Pour tout renseignement sur les aspects éthiques de cette recherche, je peux m'adresser au Responsable de l'éthique en recherche, Université d'Ottawa, Pavillon Tabaret, 550, rue Cumberland, pièce 154, (613) 562-5387 ou ethics@uottawa.ca.

Appendix B5: Debrief Form for Study 2 (English)

Thank you so much for participating in this study. Your participation was very valuable. I know you are very busy and very much appreciate the time you devoted to participating in this study.

There was some information about the study that I was not able to discuss with you prior to the study, because doing so probably would have impacted your actions and thus skewed the study results. I would like to explain these things to you now.

You were led to believe that the purpose of the study was to test various physical activity interventions for newly-retired individuals. This is semi-true. The real purpose was to test whether an intervention based on possible selves – how we think about ourselves in the future - would compel newly-retired individuals to a) engage in more physical activity and, b) see themselves as physically active retirees.

In the present study, some participants were invited to think about themselves as active retirees during one (1) single session while other participants did so during a total of three (3) sessions. As with any study, I did have a control group who only completed four standard questionnaires. Your assignment to one of three groups was completely random; no personal data was used to determine in which group you would be assigned to. It should be reiterated that your participation was very valuable to me.

I hope this clarifies the purpose of the research, and the reason why I could not tell you all of the details about the study prior to your participation.

Since you were deceived, it is my obligation to ask you whether or not you want me to retain and use your data in my analyses.

One last note: It is very important that you do not discuss this study with anyone else until the study is complete. Our efforts will be greatly compromised if participants come into this study knowing what is about and how the ideas are being tested. If you have any questions or concerns, you may contact Mélanie Perras at (xxx) xxx-xxxx ext xxxx or xxxxxxxxxxxx@xxxxxxxx.xx

Thank you again for your participation!

Mélanie

- ☐ Yes, please keep and use my data for the purposes of Mélanie's research.
- ☐ No, destroy my data immediately.

Appendix B6: Debrief Form for Study 2 (French)

Merci d'avoir participé à cette étude. Votre participation nous a été très utile. Nous savons que vous êtes très occupé, si bien que nous apprécions le temps que vous avez consacré à cette étude.

Nous n'avons pas abordé avec vous certains aspects de cette étude avant votre participation, parce que cela aurait probablement changé vos actions et faussé les résultats de l'étude. Mais nous souhaitons vous les exposer maintenant.

On vous a poussé à croire que cette étude avait pour but de tester diverses interventions d'activité physique chez les récents retraités. Ce n'est vrai qu'en partie. En fait, le but réel consistait à tester si une intervention basée sur les «sois» possibles (comment nous nous voyons dans l'avenir) pousserait des récents retraités à: a) faire davantage d'activité physique et b) se voir comme des retraités actifs physiquement.

Dans le cadre de cette étude, on a invité certains participants à s'imaginer comme des retraités actifs physiquement pendant une (1) séance, tandis que les autres participants le faisaient pendant trois (3) séances. Comme dans toutes les études, nous avons un groupe de contrôle dont les membres n'ont répondu qu'à quatre (4) questionnaires. Votre affectation à l'un de ces trois groupes a été faite complètement au hasard. Aucune donnée personnelle n'a servi à déterminer à quel groupe ont allait vous affecter. Nous vous répétons que votre participation nous a été très utile.

Nous espérons que ceci a clarifié le but de notre recherche et les motifs pour lesquels nous ne pouvions pas vous communiquer tous les détails relatifs à l'étude avant votre participation.

Étant donné que nous vous avons induit en erreur, nous sommes obligés de vous demander si vous voulez que nous conservions et utilisions vos données dans nos analyses.

Dernière remarque: Il est très important pour nous que vous ne parliez pas de cette étude tant qu'elle n'est pas terminée. Nos efforts seront en effet très compromis si les participants font cette étude en sachant de quoi il s'agit et comment les idées sont testées.

Si vous avez des questions ou commentaires à propos de l'étude, n'hésitez pas à communiquer avec Mélanie Perras au (xxx) xxx-xxxx poste xxxx ou xxxxxxxxxxxx@xxxxxxxx.xx

Merci encore pour votre participation.

Mélanie

- ☐ Oui, Mélanie peut conserver et utiliser mes données dans ses analyses et sa recherche.
- ☐ Non, détruisez mes données immédiatement.

Appendix C: Ethics Certificates

File Number: H 02-12-03		Date (mm/dd/yyyy): 04/17/2012	
Université d'Ottawa Bureau d'éthique et d'intégrité de la recherche	University of Ottawa Office of Research Ethics and Integrity		
Ethics Approval Notice Health Sciences and Science REB			
Principal Investigator / Supervisor / Co-investigator(s) / Student(s)			
<u>First Name</u>	<u>Last Name</u>	<u>Affiliation</u>	<u>Role</u>
Shaelyn	Strachan	Health Sciences / Human Kinetics	Supervisor
Michelle	Fortier	Health Sciences / Human Kinetics	Co-Supervisor
Mélanie	Perras	Health Sciences / Human Kinetics	Student Researcher
File Number: H 02-12-03			
Type of Project: PhD Thesis			
Title: Back to the Future: The Role of Possible Selves in Developing a Physical Activity Identity in Newly Retired Individuals			
Approval Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type	
04/17/2012	04/16/2013	Ia	
(Ia: Approval, Ib: Approval for initial stage only)			
Special Conditions / Comments: This certificate is valid for research <u>not conducted</u> in organisations.			
1 550, rue Cumberland 550 Cumberland Street Ottawa (Ontario) K1N 6N5 Canada Ottawa, Ontario K1N 6N5 Canada (613) 562-5841 • Téléc./Fax (613) 562-5338 http://www.research.uottawa.ca/ethics/index.html http://www.recherche.uottawa.ca/deontologie/index.html			



Université d'Ottawa
Bureau d'éthique et d'intégrité de la recherche

University of Ottawa
Office of Research Ethics and Integrity

This is to confirm that the University of Ottawa Research Ethics Board identified above, which operates in accordance with the Tri-Council Policy Statement and other applicable laws and regulations in Ontario, has examined and approved the application for ethical approval for the above named research project as of the Ethics Approval Date indicated for the period above and subject to the conditions listed the section above entitled "Special Conditions / Comments".

During the course of the study the protocol may not be modified without prior written approval from the REB except when necessary to remove subjects from immediate endangerment or when the modification(s) pertain to only administrative or logistical components of the study (e.g. change of telephone number). Investigators must also promptly alert the REB of any changes which increase the risk to participant(s), any changes which considerably affect the conduct of the project, all unanticipated and harmful events that occur, and new information that may negatively affect the conduct of the project and safety of the participant(s). Modifications to the project, information/consent documentation, and/or recruitment documentation, should be submitted to this office for approval using the "Modification to research project" form available at:

http://www.rges.uottawa.ca/ethics/application_dwn.asp

Please submit an annual status report to the Protocol Officer 4 weeks before the above-referenced expiry date to either close the file or request a renewal of ethics approval. This document can be found at:

http://www.rges.uottawa.ca/ethics/application_dwn.asp

If you have any questions, please do not hesitate to contact the Ethics Office at extension 5841 or by e-mail at: ethics@uOttawa.ca.

Germain Zongo
Protocol Officer for Ethics in Research
For Dr. Daniel Lagarec, Chair of the Health Sciences and Sciences REB



Université d'Ottawa University of Ottawa

Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Health Sciences and Science Research Ethics Board

APPROVAL OF MODIFICATIONS

March 20, 2013

Shaelyn M. Strachan
Faculty of Kinesiology and Recreation
Management
University of Manitoba

Michelle Fortier
School of Human Kinetics
Faculty of Health Sciences
University of Ottawa

Mélanie G. M. Perras

**RE: Back to the Future: The Role of Possible Selves in Developing a Physical Activity Identity in
Newly Retired Individuals (H 02-12-03)**

Dear Professors Strachan, Fortier and Ms. Perras,

The Health Sciences and Science Research Ethics Board has examined your request for ethics approval of the following modifications to your research project:

- For phase 2 the researchers will add a few extra questionnaires to assess constructs which may prove valuable.
- The researchers have modified the consent form to provide more information about the draw for 20 prizes of \$100.

Your request has been accepted. The certification of ethical approval granted on April 17, 2012 and valid until April 16, 2013 covers these modifications.

During the course of the study, any further modifications to the protocol or forms may not be initiated without prior written approval from the REB. You must also promptly notify the REB of any adverse events that may occur.

If you have any questions, please do not hesitate to contact me at extension 5387.

Sincerely yours,

Germain Zongo
Protocol Officer for Research Ethics
For Daniel Lagarec, Chair of the Health

550, rue Cumberland 550 Cumberland Street
Ottawa (Ontario) K1N 6N5 Canada Ottawa, Ontario K1N 6N5 Canada

(613) 562-5387 • Téléc./Fax (613) 562-5338
<http://www.research.uottawa.ca/ethics/index.html>

File Number: H02-12-03

Date (mm/dd/yyyy): 03/22/2013



Université d'Ottawa
Bureau d'éthique et d'intégrité de la recherche

University of Ottawa
Office of Research Ethics and Integrity

Ethics Approval Notice

Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

<u>First Name</u>	<u>Last Name</u>	<u>Affiliation</u>	<u>Role</u>
Shaelyn	Strachan	Health Sciences / Human Kinetics	Supervisor
Michelle	Fortier	Health Sciences / Human Kinetics	Co-Supervisor
Mélanie	Perras	Health Sciences / Human Kinetics	Student Researcher

File Number: H02-12-03

Type of Project: PhD Thesis

Title: Back to the Future: The Role of Possible Selves in Developing a Physical Activity Identity in Newly Retired Individuals

Renewal Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
04/17/2013	04/16/2014	Ia

(Ia: Approval, Ib: Approval for initial stage only)

Special Conditions / Comments:

N/A

File Number: H02-12-03

Date (mm/dd/yyyy): 03/22/2013



Université d'Ottawa University of Ottawa
 Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

This is to confirm that the University of Ottawa Research Ethics Board identified above, which operates in accordance with the Tri-Council Policy Statement and other applicable laws and regulations in Ontario, has examined and approved the application for ethical approval for the above named research project as of the Ethics Approval Date indicated for the period above and subject to the conditions listed the section above entitled "Special Conditions / Comments".

During the course of the study the protocol may not be modified without prior written approval from the REB except when necessary to remove subjects from immediate endangerment or when the modification(s) pertain to only administrative or logistical components of the study (e.g. change of telephone number). Investigators must also promptly alert the REB of any changes which increase the risk to participant(s), any changes which considerably affect the conduct of the project, all unanticipated and harmful events that occur, and new information that may negatively affect the conduct of the project and safety of the participant(s). Modifications to the project, information/consent documentation, and/or recruitment documentation, should be submitted to this office for approval using the "Modification to research project" form available at:

<http://www.research.uottawa.ca/ethics/forms.html>

Please submit an annual status report to the Protocol Officer four weeks before the above-referenced expiry date to either close the file or request a renewal of ethics approval. This document can be found at:

<http://www.research.uottawa.ca/ethics/forms.html>

If you have any questions, please do not hesitate to contact the Ethics Office at extension 5387 or by e-mail at: ethics@uOttawa.ca.

Signature:

Protocol Officer for Ethics in Research
 For Daniel Lagarec, Chair of the Sciences and Health Sciences REB