

Electronic Thesis and Dissertation Repository

12-16-2015 12:00 AM

Exercise Identity: Origins, Applications, and Future Utility

Vincent L. Liardi, *The University of Western Ontario*

Supervisor: Dr. Craig Hall, *The University of Western Ontario*

A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Kinesiology

© Vincent L. Liardi 2015

Follow this and additional works at: <https://ir.lib.uwo.ca/etd>



Part of the [Sports Sciences Commons](#)

Recommended Citation

Liardi, Vincent L., "Exercise Identity: Origins, Applications, and Future Utility" (2015). *Electronic Thesis and Dissertation Repository*. 3451.

<https://ir.lib.uwo.ca/etd/3451>

This Dissertation/Thesis is brought to you for free and open access by Scholarship@Western. It has been accepted for inclusion in Electronic Thesis and Dissertation Repository by an authorized administrator of Scholarship@Western. For more information, please contact wlsadmin@uwo.ca.

EXERCISE IDENTITY: ORIGINS, APPLICATIONS, AND FUTURE UTILITY

by

Vincent L. Liardi

Graduate Program

in

Kinesiology

A thesis submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

The School of Graduate and Postdoctoral Studies
The University of Western Ontario
London, Ontario, Canada
December 2015

© Vincent L. Liardi 2015

ABSTRACT

It has been determined that exercise identity (EI) is a key component of the self-concept and is a strong determinant of exercise behaviours. The primary purpose of study 1 was to examine EI's relationship with three key self-presentational variables: self-presentational efficacy (SPE), social physique anxiety (SPA), and impression motivation (IM). Specifically, we looked at how EI contributed uniquely to predicting exercise behaviour over and above these self-presentational concerns. The analyses demonstrated that EI is positively correlated with SPE and unrelated to SPA in both genders. Further analyses revealed that EI contributes a significant amount of variance towards exercise behaviour over and above what is accounted for by SPE, SPA, and IM. Lastly, EI did not moderate the SPA-exercise relationship in either gender. In study 2 an implicit measure of exercise identity was developed and tested using the Implicit Association Test (IAT) procedure on 60 individuals (60% males, 40% females) ranging from 18 to 61 years of age. Findings showed that (explicit) exercise identity (EI) and implicit identity (II) were distinct concepts, yet each was moderately correlated with vigorous forms of exercise. Individuals who ranked EI among their top three identities (high-salient group) scored significantly higher in both EI and II measures than those who ranked exercise identity among their top bottom three identities (low-salient group). Implications are discussed for the future utility of this objective measure of II. The aim of study 3 was to determine if two distinct imagery foci would differentially impact the following six outcomes: exercise identity (EI), self-presentational efficacy (SPE), social physique anxiety (SPA), upper body endurance, core endurance, and cardiorespiratory fitness (CRF). Follow-up exercise data were also collected. The two different forms of imagery implemented were exercise identity imagery (EII) and self-presentational efficacy imagery (SPEI). 19 females and 5 males completed the intervention. Results indicated that both EII and SPEI groups significantly improved in all but one outcome (SPA), relative to

baseline assessment. Yet, no significant differences were discovered between imagery conditions EII and SPEI. Follow-up exercise data indicated that both groups exercised at statistically similar rates post-intervention.

KEY WORDS: Identity theory, exercise identity, self-presentation, social physique anxiety, implicit attitudes, imagery, physical activity intervention

CO-AUTHORSHIP

The research material included in this dissertation represents my original work. However, I would like to recognize the contributions of others who were vital in the completion of each of these three studies. First, I would like to acknowledge Dr. Kimberly Gammage's contributions throughout Study 1 and Study 3. Her content expertise and editorial skills were central to the development and execution of much of this dissertation. Second, I would like to thank Dr. David Markland for acting as an alternate advisor and mentor while I was a visiting scholar in the UK. Dave played an invaluable role in overseeing the rollout, as well as some of the editing, in Study 2. Finally, I would like to acknowledge Dr. Craig Hall who, as my thesis advisor, played a significant role in the genesis of many of the ideas, concepts, and analyses contained herein. His proficiency in a variety of subject matters, foresight, and patience is second to none.

ACKNOWLEDGEMENTS

“Cultivate the habit of being grateful for every good thing that comes to you, and to give thanks continuously. And because all things have contributed to your advancement, you should include all things in your gratitude.”

— Ralph Waldo Emerson

TABLE OF CONTENTS

ABSTRACT	ii
CO-AUTHORSHIP	iv
ACKNOWLEDGEMENTS	v
TABLE OF CONTENTS	vi
LIST OF TABLES	xi
LIST OF FIGURES	xiii
LIST OF APPENDICES	xv
INTRODUCTION	1
Identity Theory	1
Exercise Identity	2
Self-Presentation	3
Social Physique Anxiety	4
Implicit Cognitions	4
Imagery	6
Overview Of Present Research	7
References	10
STUDY 1: EXERCISE IDENTITY AND ITS RELATION TO SELF-PRESENTATION	
CONCERNS IN MALES AND FEMALES	15
Introduction	15
Exercise Identity	15
Self-Presentation	17
Method	24

Female Participants	24
Male Participants	24
Measures	25
Exercise Identity	25
Self-Presentational Efficacy	25
Social Physique Anxiety	25
Impression Motivation	26
Demographic Questionnaire	26
Procedure	26
Results	27
Treatment of Data	27
Bivariate Correlations	27
Hierarchical Multiple Regression Analyses	28
Moderation Analyses	29
Discussion	30
References	41
STUDY 2: IMPLICIT AND EXPLICIT EXERCISE IDENTITY, IDENTITY SALIENCE, AND THE RELATIONSHIP TO EXERCISE BEHAVIOUR	46
Introduction	46
Exercise Identity	46
Identity Salience	48
Implicit Identity & Measurement.....	50
Method	54

Participants	54
Measures	54
Exercise Identity	54
Identity Salience.....	54
Implicit Identity	55
Exercise Behaviour Follow-Up	56
Demographic Questionnaire	57
Procedure	57
Results	58
Bivariate Correlations	58
Identity Salience	58
Hierarchical Multiple Regression Analysis	59
Discussion	60
Implications, Limitations, and Future Directions	61
References	71
STUDY 3: EXERCISE IDENTITY AND SELF-PRESENTATIONAL RESPONSES TO A 6-WEEK PHYSICAL ACTIVITY PLUS IMAGERY INTERVENTION	78
Introduction	78
Imagery	78
Self-Presentation.....	83
Exercise Identity	85
Method	88
Participants	88

Measure.....	89
Exercise Identity (EI)	89
Self-Presentational Efficacy (SPE).....	89
Social Physique Anxiety (SPA).....	90
Cardiorespiratory Fitness.....	90
Upper-Body Strength.....	91
Core-Endurance	91
Exercise Behaviour Follow-Up	91
Demographic Questionnaire	92
Procedures	92
Recruitment.....	93
Randomization	93
Pre-test	94
Imagery	94
Exercise Program	96
Post-test and Follow-up	97
Results.....	97
Treatment of Data	97
Missing Data and Outliers	97
Preliminary Analyses	98
Group Differences in Psychosocial Outcomes	98
Group Differences in Physical Outcomes.....	99
Follow-up Physical Activity	101

Discussion	101
References	116
GENERAL DISCUSSION	124
References	129
APPENDICES	131
VITA	172

LIST OF TABLES

Table(Study)		
1(1)	Descriptive statistics for demographic information of males and females	34
2(1)	Correlations, means, and standard deviations of key variables in females	35
3(1)	Correlations, means, and standard deviations of key variables in males	36
4(1)	Hierarchical regression model of physical activity in females	37
5(1)	Hierarchical regression model of physical activity in males	38
1(2)	Descriptive statistics for demographic information	66
2(2)	Bivariate correlations, means, and standard deviations of key variables	67
3(2)	EI and II differences between high-salient and low-salient exercise identities	68
4(2)	Summary of hierarchical regression analysis for variables predicting all-form physical activity	69
5(2)	Summary of hierarchical regression analysis for variables predicting vigorous physical activity	70

1(3)	Physical and psychological outcomes variables: Study compliers versus dropouts at baselines.....	107
2(3)	Physical and psychological outcomes variables at baseline: Between groups.....	108

LIST OF FIGURES

Figure(Study)

1(1)	Plot of the interaction effect of social physique anxiety (SPA) and exercise identity (EI) on total weekly physical activity behaviour (METS) among female participants only.....	39
2(1)	Plot of the interaction effect of social physique anxiety (SPA) and exercise identity (EI) on total weekly physical activity behaviour (METS) among male participants only.....	40
1(3)	Comprehensive participant flow through the physical activity plus imagery intervention	109
2(3)	Plot of exercise identity scores (min = 9, max = 63) between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up)	110
3(3)	Plot of self-presentational efficacy scores (min = 0, max = 100) between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up)	111
4(3)	Plot of social physique anxiety scores (min = 9, max = 45) between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points	

	of the intervention (commencement of intervention, cessation of intervention, and follow-up)	112
5(3)	Plot of aerobic capacity (estimated VO2max) scores between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up)	113
6(3)	Plot of upper body strength (push-ups) between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up)	114
7(3)	Plot of core strength (sit ups) between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up)	115

LIST OF APPENDICES

APPENDIX A	Research Ethics Approval Notices	131
APPENDIX B	Exercise Identity Scale – Studies 1 to 3	135
APPENDIX C	Self-Presentational Efficacy Scale – Studies 1 & 3	137
APPENDIX D	Social Physique Anxiety Scale – Studies 1 & 3	139
APPENDIX E	Impression Motivation Subscale - Study 1	141
APPENDIX F	Letter(s) of Information – Study 1	143
APPENDIX G	Godin Leisure Time Exercise Questionnaire (GLTEQ) – Study 1 ...	147
APPENDIX H	Identity Salience Hierarchy Measure – Study 2	149
APPENDIX I	International Physical Activity Questionnaire – Study 2	151
APPENDIX J	Letter of Information – Study 2	155
APPENDIX K	Letter of Information – Study 3	158
APPENDIX L	Follow-Up Exercise Email – Study 3.....	162
APPENDIX M	Physical Activity Readiness Questionnaire (PAR-Q) – Study 3	164
APPENDIX N	Sample EII script – Study 3	166
APPENDIX O	Sample SPEI script – Study 3	169

INTRODUCTION

Identity Theory

As Amin Maalouf (2001, pg. 26) so eloquently states, “A person’s identity ... is like a pattern drawn on a tightly stretched parchment. Touch just one part of it, just one allegiance, and the whole person will react, the whole drum will sound.” The term *identity* carries with it many meanings. However, for the scope of the forthcoming paper, we will use it to signify the many parts of the self in which individuals attach meaning to particular roles that are occupied within contemporary society (Stryker & Burke, 2000). Identity Theory seeks to explain the foundations of behaviour. Central to this effort is the adage that society shapes the self, which in turn, shapes behaviour (Mead, 1934). When individuals occupy a certain role (e.g., teacher) within society, there are meanings and expectations tied to that role. These meanings and expectations set the standards that guide future behaviour (Burke & Tully, 1977; Burke, 1991). Identities are thus internalized self-labels that both tie individuals together, and set them apart, by defining unique responses to stimuli within society. Chief to these identity standards is the concept of *identity salience*, which is defined as the likelihood that an identity will be activated across a variety of circumstances. It is understood that people occupy numerous identities that are theoretically organized in a hierarchical manner. The stronger the relative position of an identity along this hierarchy, the greater the odds that particular identity will be invoked cross-situationally (Markus, 1977; Serpe, 1987). Although identities are relatively stable manifestations of role-occupancy, theorists acknowledge interpersonal relationships, and society-at-large, is a dynamic system that tolerates changes within the self over time (Serpe & Stryker, 2011). However, the greater the commitment (i.e., meaningful relationship) one has to a particular role-identity the less fluid one’s identity becomes. Similarly, the greater the commitment to an identity, the more

likely it is that one's internal mechanisms will resist variability in behaviour as it pertains to the identity standard. That is, the greater our perceived discrepancy to an identity standard, the deeper the internal drive will be to neutralize this disturbance and render the discrepancy void (Burke, 1991). It is in this way that identities are both changeable by the nature of a shifting society, but also staunchly resistant to change cross-situationally, thus acting as strong barometers for many forms of common behaviours.

Exercise Identity

In the realm of physical activity, the theoretical foundations of identity theory are surely applicable to the role of an exerciser. Hence, exercise identity would not only affect the processing of exercise-related stimuli, but would also provide direction for future exercise behaviour(s). Identity theory would hold that the likelihood of activating your exercise identity as a basis for performing behaviours in a related role (e.g., going for a hike on a sunny day) is a reflection of exercise identity's standing within your identity salience hierarchy. Thus, the more you identify with exercise as an important part of who you are, particularly relative to other potential roles, the greater the probability it will occupy a superior position along your identity hierarchy. This enhances the odds you will engage in exercise behaviours which act to reaffirm this identity.

The Exercise Identity Scale (EIS; Anderson & Cychosz, 1994) is the main questionnaire designed to measure the degree that one internalizes exercise as a central part of self-identity. Additional research has demonstrated further construct validity for EIS analyses within community-dwelling populations, thus substantiating the relationship between enhanced perceptions of an exercise identity and physical activity outcomes (Anderson, Cychosz, & Franke, 1998; 2001). In a noteworthy study conducted by Cardinal and Cardinal (1997), female

college students joined either a one-hour exercise class, twice a week for fourteen weeks (experimental group), or a non-exercise health education class (control group). This resulted in steady, significant increases in exercise identity throughout the study for only the exercise group. Furthermore, the experimental group's mean exercise identity scores at week one and week seven significantly predicted persistent exercise involvement throughout the entire fourteen weeks. The control group, however, showed no change in exercise identity. The authors contended that exercise behaviour alone could not account for the significant increase in exercise identity displayed by the experimental group (Markus, 1977). These studies point to the importance that developing and upholding a salient exercise identity has on health and fitness practices.

Self-Presentation

Self-presentation is the manner in which individuals attempt to regulate and self-monitor the impressions others form of them (Leary & Kowalski, 1990). We dedicate ample resources to assess how others are feeling about us, and subsequently, we behave in ways that endeavor to control how we are treated in various situations. Society often dictates that those who appear more favorable are advantaged. Naturally, we highlight features of ourselves that emphasize positive attributes as to increase the prospect of constructing favourable impressions upon others. Conversely, we generally attempt to downplay characteristics of ourselves that may result in unwelcome impressions. Self-presentation has been shown to impact an assortment of behaviours in situations pertaining to physical activity, motivation, confidence, exercise choice, and level of exertion (Gammage, Hall, & Martin Ginis, 2004). It was proposed that both self-efficacy and self-presentational theories could be fused into the resultant construct of self-presentational efficacy (SPE; Leary, 1983). It is the subjective conviction in one's own ability to exhibit a

sought after impression or perform a preferred behavior thus leading to a desired outcome (Maddux, Norton, & Leary, 1988). SPE is a compelling predictor of high-frequency exercise (Gammage et al.).

Social Physique Anxiety

In many social contexts, when people don't believe they possess the requisite abilities to meet the situational demands they may experience social anxiety (Leary, 1992). This is especially heightened when the desire to convey a particular impression is strong (e.g., talking to your grade nine crush). Social physique anxiety (SPA) is a variant of social anxiety about the body that stems from apprehensions one's physique may be judged by others (Hart, Leary, & Rejeski, 1989). In physical activity contexts it has largely been recognized as a latent barrier to exercise participation and fulfilment (Carron & Prapavessis, 1997). However, in some instances SPA may actually spur exercise behaviour, as individuals attempt to alleviate their personal anxieties over body image concerns (Frederick & Morrison, 1996). Research has demonstrated that self-presentational reasons for exercise (appearing physically attractive, controlling weight, and toning the body) are positively connected with SPA even when controlling for body composition effects (Eklund & Crawford, 1994). Women typically score higher on SPA, likely due to disparities in body image and body dissatisfaction between genders (Miller, Linke, & Linke, 1980). Gammage and colleagues claimed that SPA is the "most widely studied aspect of self-presentation in exercise psychology research" (Gammage, Hall, & Martin Ginis, 2004, p. 1639).

Implicit Cognitions

It is frequently expected that measures of the self-concept should be entertained within the framework of our conscious thoughts and perceptions (Baumeister, 1988). At first glance it

makes sense, since we meander through our days considering what to do and how to do it. Sometimes we reflectively weigh the pros and cons of a decision, with a mindful consideration of what goals we wish to pursue and the actions necessary to accomplish them. Yet, a separate line of investigation questions these assumptions – instead advancing that many of our daily manners emerge without deliberate introspection, but rather through implicit, subconscious operative modes (Devos & Banaji, 2003). The term “implicit” explains mental processes that transpire outside of our conscious awareness and/or without conscious control.

Advances in social cognition-based evaluative tools have led to the rise of dual systems theory (DST; Greenwald & Banaji, 1995). DST posits that both conscious considerations, and inversely, automated subliminal conclusions operate in parallel to effect behaviour. As stated by Markland, Hall, Duncan, and Simatovic (2015, pg. 24) “Explicit processes are those that are rational and deliberative, effortfully initiated, accessible to awareness, and can be assessed by self-report measures. Implicit processes are automatically activated in response to contextual stimuli and are not deliberately initiated or controlled by the individual.” It is gathered that implicit and explicit cognitions are drawn from the same knowledge system but maintain unique properties since implicit cognitions are indirectly measured (Buhrmester, Blanton, & Swann Jr., 2011). In recent years implicit measures have been widely deployed in social psychology trials (for review, see Fazio & Olson, 2003). The most prominent tool that assesses these implicit cognitions is the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The IAT uses a response-latency paradigm that measures the associations between two constructs of interest (e.g., attitudes towards Black and White persons). Subconscious, latent appraisal is helpful in ascertaining social cognitions because it restrains the conscious alteration responses.

As such, outcomes on the IAT are more liable to secure unfiltered, valid aspects of social cognition (Olson, Fazio, & Hermann, 2007).

Imagery

Imagery, also referred to as visualization or cognitive rehearsal, is akin to playing a movie in your mind. It is a mental skill that all individuals are capable of, and thus can be improved with training (Feltz & Landers, 1983; Hall, 2001). The way individuals typically acquire and process information is considered bottom-up processing; an environmental stimulus is transduced to a cell of the nervous system and afterwards the signal is transmitted from the nerve ending to the brain, via an axon. However, imagery is unique in that it is considered a top-down cognitive process; the cerebrum generates images that can neurologically impact the rest of the body's senses (Kosslyn, 1996). This is analogous to executing perception backwards (Moran, Guillot, MacIntyre, & Collet, 2012), and the generally agreed upon rationale is that imagery is closely linked to perception, thus the images are largely congruent to the actual object being formed mentally. This proposal that imagery relies on the same neural network employed in actual perception and motor control has since been referred to as the functional equivalence theory (Kosslyn, Ganis, & Thompson, 2001). Imagery tends to be most effective when the visualization is both highly vivid and under great degrees of control (Corbin, 1972).

Imagery is a key determinant of cognition and exercise behavior. An early model of imagery use for motor performance proposed that it is utilized by athletes for both cognitive and motivational purposes (Paivio, 1985). Hall (1995) later exhibited that those in the exercise domain can reap the benefits of imagery similar to those in the sport domain. Ensuing research by Hall, Mack, Paivio, and Hausenblas (1998) updated previous models in order to put forward imagery's five principal functions: (1) the mental practice of specific skills or techniques; (2) the

mental practice of strategies or routines; (3) visualizing specific outcome goals; (4) regulating affect (typically used for anxiety reduction); and (5) augmenting confidence and preserving focus.

Overview Of Present Research

In light of these previous concepts, this dissertation endeavoured to build out the current knowledge base relating to exercise identity and its utility within the research landscape. Phase 1 of this project was aimed at examining the relationship EI has with various aspects of self-presentation. Given SPA's equivocal relationship with exercise behaviour (Hausenblas & Symons Downs, 2002), it would be prudent to explore whether a strong, internalized exercise identity is meaningfully related in some way with SPA, or not. This may offer insight into the nature of SPA's relationship with exercise – if it is caused by a fundamental belief that exercise is part of the self-concept, or not. Moreover, individuals tend to self-present in a manner that is congruent with their self-concept (Leary & Kowalski, 1990). The self-concept supplies a guide to the credibility and plausibility of trying to create these varied impressions. It would similarly be useful to better understand the relationship between SPE and EI. This may better inform our insight into SPE as, in part, a reflection of deep-rooted views of the self. It has been suggested that identity progression and self-efficacy advancement are affiliated, perhaps in a reciprocal manner, with intense forms of physical activity resulting in greater identification with exercise (Miller, Ogletree, & Welshimer, 2002). To this end, it's of merit to explore this relationship deeper, while also testing if EI alone might significantly predict exercise behaviour over and above that already spoken for by self-presentational variables.

For phase 2 of this project, the goal was to better understand exercise identity's placement on the identity salience hierarchy relative to other prominent identities. Of consequence,

answering the question: does a more salient exercise identity actually translate to greater exercise behaviour? By gathering this information, practitioners may better design interventions aimed at bolstering identity salience. Adjacent to this goal, we also aimed to better understand exercise identity's role in cognition processes; principally the role an exercise identity has in informing exercise behaviour. Do the devices of exercise identity operate at a more sub-attentive, implicit level? Does exercise identity operate more so at a level of explicit, conscious awareness? Or perhaps, do both cognitive tracks play an influential role? Again, a more refined grasp of how both types of cognition works may better inform intervention design and implementation strategy. If we are able to capture aspects of an exercise identity at both the explicit and implicit operative levels, this could potentially alter the way we approach the measurement of EI from a validity standpoint.

Phase 3 of this project ventured to introduce an exercise identity-based intervention in an applied setting. We chose imagery as the vehicle in which to package the underlying exercise identity properties. Further, since an abundance of research has established that imagery interventions are effective (see Kossert & Munroe-Chandler, 2007 for a review) and that imagery combined with physical practice is better than physical practice alone (Munroe, Giacobbi, Hall, & Weinberg, 2000) we elected to devise a protocol that compared exercise identity imagery with self-presentational efficacy imagery (SPEI) rather than with a control group. This was done in such a manner as to answer the primary question: can distinct forms of imagery content differentially impact both psychosocial and physical outcomes, and if so, which approach is more effective? Much emphasis during this phase was placed on external validity, as there is a pressing need in health-related research to structure investigations with a real-world perspective in mind

(Glasgow, Bull, Gillette, Klesges & Dzewaltowski, 2002). This allowed our participants to maintain a proper level of autonomy within the confines of study framework.

Overall, a deeper examination of the self will allow us to better understand the deep-rooted mechanisms that inform our behaviours. With exercise rates trending downward and sedentary rates trending upward (Brownson, Boehmer & Luke, 2005) it is imperative that researchers learn more about why individuals choose to partake in inactive, as opposed to more physically active, choices. By unearthing more knowledge about how the exercise identity operates, this may offer an added piece of the puzzle that holds value in shaping a healthier global community.

References

- Anderson, D. F., & Cychosz, C. M. (1994). Development of an exercise identity scale. *Perceptual and Motor Skills, 78*(3), 747-751.
- Anderson, D. F., Cychosz, C. M., & Franke, W. D. (1998). Association of exercise identity with measures of exercise commitment. *Journal of Sport Behavior, 21*(3), 233-241.
- Anderson, D. F., Cychosz, C. M., & Franke, W. D. (2001). Preliminary exercise identity scale (EIS) norms for three adult samples. *Journal of Sport Behavior, 24*, 1431-9.
- Baumeister, R. F. (1988). Masochism as escape from self. *Journal of Sex Research, 25*(1), 28-59.
- Brownson, R. C., Boehmer, T. K., & Luke, D. A. (2005). Declining rates of physical activity in the United States: what are the contributors?. *Annu. Rev. Public Health, 26*, 421-443.
- Buhrmester, M. D., Blanton, H., & Swann Jr, W. B. (2011). Implicit self-esteem: nature, measurement, and a new way forward. *Journal of personality and social psychology, 100*(2), 365.
- Burke, P. J., & Tully, J. C. (1977). The measurement of role identity. *Social Forces, 55*(4), 881-897.
- Burke, P. J. (1991). Identity processes and social stress. *American Sociological Review, 836-849*.
- Cardinal, B. J., & Cardinal, M. K. (1997). Changes in exercise behavior and exercise identity associated with a 14-week aerobic exercise class. *Journal of Sport Behavior, 20*(4), 377.
- Carron, A. V., & Prapavessis, H. (1997). Self-presentation and group influence. *Small Group Research, 28*(4), 500-516.

- Corbin, C. B. (1972). Mental practice. *Ergogenic aids and muscular performance*, 93-118.
- Devos, T., & Banaji, M. R. (2003). Implicit self and identity. *Annals of the New York Academy of Sciences*, 1001(1), 177-211.
- Eklund, R. C., & Crawford, S. (1994). Active women, social physique anxiety, and exercise. *Journal of Sport & Exercise Psychology*, 16(4), 431-448.
- Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual review of psychology*, 54(1), 297-327.
- Feltz, D. L., & Landers, D. M. (1983). The effects of mental practice on motor skill learning and performance: A meta-analysis. *Journal of sport psychology*.
- Frederick, C. M., & Morrison, C. S. (1996). Social physique anxiety: Personality constructs, motivations, exercise attitudes, and behaviors. *Perceptual and motor skills*, 82(3), 963-972.
- Gammage, K. L., Hall, C. R., & Martin Ginis, K. A. (2004). Self-presentation in exercise contexts: Differences between high and low frequency exercisers. *Journal of Applied Social Psychology*, 34(8), 1638-1651.
- Glasgow, R. E., Bull, S. S., Gillette, C., Klesges, L. M., & Dzewaltowski, D. A. (2002). Behavior change intervention research in healthcare settings: a review of recent reports with emphasis on external validity. *American journal of preventive medicine*, 23(1), 62-69.
- Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: attitudes, self-esteem, and stereotypes. *Psychological review*, 102(1), 4.

- Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: the implicit association test. *Journal of personality and social psychology, 74*(6), 1464.
- Hall, C. R. (1995). The motivational function of mental imagery for participation in sport and exercise. *Exercise addiction: Motivation for participation in sport and exercise*, 15-21.
- Hall, C. R. (2001). Imagery in sport and exercise. *Handbook of sport psychology, 2*, 529-549.
- Hall, C. R., Mack, D. E., Paivio, A., & Hausenblas, H. A. (1998). Imagery use by athletes: development of the Sport Imagery Questionnaire. *International Journal of Sport Psychology, 29*(1), 73-89.
- Hart, E. A., Leary, M. R., & Rejeski, W. J. (1989). The measurement of social physique anxiety. *Journal of Sport and exercise Psychology, 11*(1), 94-104.
- Hausenblas, H. A., & Fallon, E. A. (2002). Relationship among body image, exercise behavior, and exercise dependence symptoms. *International Journal of Eating Disorders, 32*(2), 179-185.
- Kossert, A. L., & Munroe-Chandler, K. (2007). Exercise imagery: A systematic review of the empirical literature. *Journal of Imagery Research in Sport and Physical Activity, 2*(1).
- Kosslyn, S. M. (1996). *Image and brain: The resolution of the imagery debate*. MIT press.
- Kosslyn, S. M., Ganis, G., & Thompson, W. L. (2001). Neural foundations of imagery. *Nature Reviews Neuroscience, 2*(9), 635-642.

- Leary, M. R. (1983). Social anxiousness: The construct and its measurement. *Journal of personality assessment, 47*(1), 66-75.
- Leary, M. R. (1992). Self-presentational processes in exercise and sport. *Journal of Sport and Exercise Psychology, 14*, 339-339.
- Leary, M. R., & Kowalski, R. M. (1990). Impression management: A literature review and two-component model. *Psychological bulletin, 107*(1), 34.
- Maalouf, A. (2001). *In the name of identity: Violence and the need to belong*. Arcade Publishing.
- Maddux, J. E., Norton, L. W., & Leary, M. R. (1988). Cognitive components of social anxiety: An investigation of the integration of self-presentation theory and self-efficacy theory. *Journal of Social and Clinical Psychology, 6*(2), 180-190.
- Markland, D., Hall, C. R., Duncan, L. R., & Simatovic, J. (2015). The effects of an imagery intervention on implicit and explicit exercise attitudes. *Psychology of Sport and Exercise, 17*, 24-31.
- Markus, H. (1977). Self-schemata and processing information about the self. *Journal of personality and social psychology, 35*(2), 63.
- Mead, G. H. (1934). *Mind, self, and society: From the standpoint of a social behaviorist* (Works of George Herbert Mead, Vol. 1).
- Miller, T. M., Coffman, J. G., & Linke, R. A. (1980). Survey on body image, weight, and diet of college students. *Journal of the American Dietetic Association, 77*(5), 561-566.

- Moran, A., Guillot, A., MacIntyre, T., & Collet, C. (2012). Re-imagining motor imagery: Building bridges between cognitive neuroscience and sport psychology. *British Journal of Psychology*, *103*(2), 224-247.
- Munroe, K. J., Giacobbi Jr, P. R., Hall, C., & Weinberg, R. (2000). The four Ws of imagery use: where, when, why, and what. *The Sport Psychologist*.
- Olson, M. A., Fazio, R. H., & Hermann, A. D. (2007). Reporting tendencies underlie discrepancies between implicit and explicit measures of self-esteem. *Psychological Science*, *18*(4), 287-291.
- Paivio, A. (1985). Cognitive and motivational functions of imagery in human performance. *Canadian journal of applied sport sciences. Journal canadien des sciences appliquées au sport*, *10*(4), 22S-28S.
- Serpe, R. T. (1987). Stability and change in self: A structural symbolic interactionist explanation. *Social Psychology Quarterly*, 44-55.
- Serpe, R. T., & Stryker, S. (2011). The symbolic interactionist perspective and identity theory. In *Handbook of identity theory and research* (pp. 225-248). Springer New York.
- Stryker, S., & Burke, P. J. (2000). The past, present, and future of an identity theory. *Social psychology quarterly*, 284-297.

STUDY 1

EXERCISE IDENTITY AND ITS RELATION TO SELF-PRESENTATION

CONCERNS IN MALES AND FEMALES

Physical inactivity is currently the fourth leading cause of death worldwide (WHO, 2009), causing an estimated 3.3 million premature deaths globally. Given the publically funded nature of many health-care systems and the undesirable health consequences of a sedentary lifestyle, steps must be taken to counteract this troubling trend. Recognizing why people engage in exercise vs. sedentary behaviours contributes to evidence-based planning of public health interventions, allowing programs to carefully target factors known to cause inactivity. Continued research into the psychological bases of physical activity, health, and fitness are part of a robust solution. Additional research into the roles played by variables such as self-presentational concerns and exercise identity is warranted and consequently explored below.

Exercise identity

One such factor that continues to gain traction among researchers studying the determinants of physical activity is exercise identity. As unique individuals, we possess a multitude of possible identities. For example, if you attend or work in an academic institution, and value learning, it is likely that you possess a relatively high academic identity. The self is often based on these multiple identities and is said to be reflexive, in that it makes decisions based on interactions with others in a social surrounding (Mead, 1934). This is referred to as the interactionist perspective. Stryker's identity theory (1968) built upon this interactionist concept and postulated that the roles we maintain are embedded positions within the larger social structure. That is, it is through interaction with others that individuals develop these distinct roles, in turn creating internalized expectations for our own behaviour. Thus, in a variety of

settings, our sense of identity is either reaffirmed or contradicted based on the actions we take. The multifaceted self reflects the wider social structure, and its identities exist insofar as they are role participants in social relationships. The strength of one particular identity has a direct (but not exclusive) effect on behaviour choice. Termed identity salience, it measures the probability of an identity being invoked in an interactional situation. Returning to our previous example, if one's academic identity is highly salient (i.e., more important, relative to other identities, on the identity hierarchy) it would be likely that one would stay in and study the night before an exam, rather than go out to a social gathering.

Identity theory's close theoretical tie with role-related behaviour justifies its promising foundation for examining physical activity. Exercise identity (EI; Anderson & Cychosz, 1994) measures the centrality and value of exercise within one's self-concept. This concept has helped identify persons least likely to maintain an exercise program and has assisted in the development of effective intervention strategies. For instance, exercise behaviour indices have demonstrated a robust relationship to exercise identity. Measurements of frequency and duration of exercise account for approximately one-third of the variance in one's identity (Anderson & Cychosz, 1995; Miller, Ogletree & Welshimer, 2002). This substantiates the mutually reinforcing relationship between the 'role' of exerciser and one's behaviour. Moreover, EI and exercise behaviour have been measured together in a prospective design (Cardinal & Cardinal, 1997). Participants who enrolled in an aerobics class, when compared to a control group who received a basic health-education class, exhibited significantly greater increases in both exercise participation and EI over a four-month span. EI scores at week one and week seven were significant predictors of exercise involvement through week fourteen of the study. Further, with respect to specific physiological indicators, research has also shown that EI is correlated to

decreases in body fat percentage, increases in muscular endurance, and heightened maximal oxygen uptake (Anderson, Cychosz, & Franke, 1998).

Qualitative research has explored the cognitions associated with EI. Hardcastle and Taylor (2005) conducted a series of semi-structured interviews to probe how a physical activity intervention for inactive, older individuals influences physical self-cognitions over time. It was apparent that the participants began to view exercise as central to their weekly routines and as an important part of who they are. They alluded to feelings of achievement, a greater sense of control, a sense of belonging, and social interaction as critical factors in fostering the identity of an exerciser. Over the course of ten weeks, many remarked how their priorities were changing and how they were now engaging in “guilt-free” exercise. The enhanced identity as an exerciser was coupled with feelings of empowerment and well-being.

EI’s established links with both fitness and psychological contentment render it notable in the effort to improve health and wellness. However, little research has been conducted examining how one’s EI might be related to the important psychological components associated with one’s self-presentational concerns.

Self-presentation

Naturally, as human beings we have an interest in how others view us; typically we would prefer to be viewed in a positive light. Generally, making a “good” impression on others is desirable, while making a “bad” impression is unwanted. People dedicate significant resources in gauging how other people perceive them, and often operate in a manner that creates impressions that lead others to treat them in desired ways (Leary & Allan, 2011). When individuals engage in these self-presentational strategies (which are also similarly referred to as impression management strategies) they are attempting to manage the impressions they are giving to others

in their surroundings (Schneider, 1981; Leary & Kowalski, 1990). By nature, self-presentation has the capacity to impact one's cognitions, attitudes, and behaviours (Schlenker, 1980). Social psychologists have known for decades that, in reality, people are not interacting with a counterpart but rather their own *impression* of that person (Leary & Allan).

Prudent efforts to manage social impressions require people to be self-aware and to think about how they are being perceived through the eyes of others. Indeed, Humphrey (2003) opined that humans may have evolved an innate capacity for self-awareness for the purpose of reflecting on what others might be thinking about them. It has been theorized that there are two components of impression management. The first process involves impression motivation, while the second involves impression construction (Leary & Kowalski, 1990). Impression motivation is the level of desire to form and control how one is seen by others, but may not always result in observable impression-driven behaviours. In certain cases people may have a high desire to create or maintain a desired image but not engage in behaviours that carry out this function. Routinely, people are often motivated to cultivate a desired impression for the purposes of maximizing their cost-benefit ratio during interactions (Schlenker, 1980), maintaining or enhancing a personal sense of self-esteem (Schneider, 1969), and developing a particular self-relevant identity (Mead, 1934). The apparent actions that result, in the form of impression construction, are reasonably in line with one's self-concept and identity (Leary & Allen, 2011), but also heed various situational factors such as the values of the target audience and other diverse role constraints (e.g., behavioural codes of conduct).

One's self-confidence in their ability to form and maintain a favourable impression has been conceptualized as self-presentational efficacy (SPE) -- classically defined as the subjective probability of portraying a desired impression or image to others (Maddux, Norton, & Leary,

1988). When people subjectively believe they will be unable to convey a desired impression upon others, they may experience varying degrees of anxiety. Particularly, social anxiety can manifest as a psychophysiological outcome due to a perceived failure in reaching the desired impression. To that extent, social anxiety is thought to arise from people's worries about how they are being perceived by others (Leary & Atherton, 1986). More precisely, it has been argued that anxiety arises when our IM is high but our SPE is low – that is, we want to make a specific impression but are not sure we will be successful in doing so (Leary & Kowalski, 1990). Thus, self-presentational concerns lead directly to social anxiety partly due to a failure in believing we can create, manage, and maintain certain desirable impressions.

Since varying degrees of self-presentational concerns are ubiquitous in people's daily lives, it is not surprising that they play a key role in their willingness to undertake and adhere to an exercise regime. Individuals have many reasons for engaging in exercise, but a consistent determinant of exercise participation is perceived physical appearance (Furnham, Badmin, & Sneade, 2002). Meta-analyses have established that people who are seen as attractive are more persuasive, are treated better in social interactions, and achieve greater success across the occupational spectrum (Langois et al., 2000). Exercise can generally enhance physical attractiveness by reducing body fat and increasing muscle tone. Leary (1992) suggested that one's concerns over the impressions formulated by others might influence exercise behaviour in two possible ways. First, it may provide an impetus to exercise more, as exercising can create a more "ideal" appearance, bringing with it more positive impressions from those others. Alternatively, self-presentational concerns can act as a deterrent to exercise, as individuals may avoid settings in which others may evaluate them, especially as it pertains to physical appearance or competence. For the most part, those who are less active have greater self-presentational

concerns overall (Culos-Reed, Brawley, Martin, & Leary, 2002).

One form of social anxiety related to appearance that is relevant in exercise settings is social physique anxiety (SPA), may manifest (Hart, Leary, & Rejeski, 1989). SPA has been linked to a myriad of negative exercise outcomes (e.g., non-adherence, low motivation, decreased enjoyment and satisfaction (see Hausenblas et al., 2004 for a review). However, these negative effects of SPA can be mitigated by a durable self-presentational efficacy in exercise (SPE) -- defined as one's confidence in his or her ability to be seen as an exerciser by others (e.g., coordinated, fit). SPE, it has an especially strong association with exercise participation (Gammage, Martin & Hall, 2004).

Given that self-presentational concerns, particular SPA, have the potential to act as either a catalyst or a deterrent in physical activity participation, it was previously hypothesized that SPE could play a key role as a moderating variable in this relationship. In a study of older women, analyses revealed that higher levels of SPA were inversely related to SPE (Woodgate, Martin Ginis, & Sinden, 2003). The authors suggested that even with low social physique anxiety levels, if one lacks the confidence to make a favorable physical impression, it is significantly less likely they initiate or maintain a lifestyle involving daily physical activity. In a separate study, research with a younger population ($M_{age} = 14.5$) has further highlighted the importance of SPE among female adolescents. In this study, the authors found a negative relationship between SPA and exercise levels when SPE was higher, and a positive relationship between SPA and exercise levels when SPE was lower among participants (Cumming & Thogersen-Ntoumani, 2011). This again reiterates the notion that individuals may be able to overcome high levels of SPA when they see themselves to possess the ability to self-present in a confident manner. In contrast, when low SPE is present they may instead rely on their SPA as a motivator for exercise. Considering

that extrinsic and physical appearance-based motives (like SPA) often leads to poor exercise adherence rates (Ryan, Frederick, Leps, Rubio, & Sheldon, 1997) it is important to promote self-presentational efficacy and other more intrinsic, internalized motives that more closely align exercise with a greater sense of the self and personal, internalized values.

More recently, Gammage, Lamarche, & Drouin (2014) examined the relationship between SPA and physical activity. More specifically, the authors posed the question: does SPE moderate the relationship between SPA and physical activity behaviour in a sample of male and female university students? Hierarchical moderated regression analysis failed to indicate any evidence of moderation in either gender. These results were not in line with previous findings (Woodgate et al., 2003; Cumming & Thogersen-Ntoumani, 2011), however, taken together may suggest that the relationship between SPE, SPA, and physical activity may shift over the lifespan. These findings suggest that investigation of other moderators of the SPA-physical activity relationship in a college sample is warranted, to further clarify the exact nature of such relationships.

Given the importance held between self-presentational concerns and exercise, it would be advisable to explore how these variables relate to characteristics of one's identity. Leary and Allen (2011) offer a compelling justification as to why self-presentation is associated with the concept of an identity (or self-concept). They argue that certainly there are various state-based circumstances that can influence the impressions one is attempting to make (e.g., the characteristics of the target or the prevailing situational norms). However, regardless of situational idiosyncrasies, there are enduring intrapersonal or personality characteristics that influence self-presentation. One of these is the *self-concept*, and the authors maintain that typically people's private perception of how they see themselves correlates favourably with how

they tend to self-present. That is, how we think we are is generally congruent with how we try to convey ourselves to others. Further, people forgo presenting themselves in a manner inconsistent with their private self-view in order to avoid cognitive dissonance (Aronson, 1969). Humans are generally concerned that if they appear duplicitous by way of appearing inconsistent with their actual role-related behaviours, they will be judged harshly (Goffman, 1959). This line of thinking draws a direct parallel between self-presentation and identity: we self-present in a manner that harmonizes with our self-concept.

Schlenker and Leary (1982) rationalized that when individuals experience social anxiety they are acknowledging awareness that others' reactions have an impact on their valued identities. These concerns about the lack of reinforcement, or identity-threat, may be self-presentational in nature. Worry about real or imagined critiques to one's identity can create an environment where the threat to one's identity outweighs their perceived efficacy to portray an appealing self-identity. In this instance, arousal can exacerbate self-perceived deficiencies and feelings of low competence. This anxiety may surface in such a way that causes the individual to disengage, either psychologically or physically, from the situation. In a cyclical manner this can be detrimental by further restricting opportunities to cultivate self-efficacy.

The threat to one's identity is more prominent when individuals direct conscious attention inward rather than away from the self (Fenigstein, Scheier, & Buss, 1975). Self-consciousness can be high enough that it induces a sort of social paralysis (Schlenker & Leary, 1985). Insofar as it can be ascertained, identities have a consistent and applicable influence on self-presentation and anxiety. Related to physical appearance, research merging identities with aspects of self-presentation has been scarce.

Given exercise's link with improvements in physical appearance, and the emphasis

placed on exercising as a source of comprehensive health improvements, it is valuable to understand how one's EI is associated with issues of self-presentation. We must better recognize the nature of identity as it relates to self-presentation. In doing so, exercise identity can potentially emerge as a valuable psychological structure in the mission to improve fitness and general health by successfully improving on exercise-related confidence and anxiety characteristics.

Based on the tenets of the aforementioned theories, this study sought to examine the intercorrelations between EI, SPE, SPA, and IM. It was expected that EI would display a positive association with SPE and IM, and, based on past findings, an ambivalent relationship with SPA. Further, we sought to test the unique contribution of EI towards exercise behaviours after accounting for the SPE, SPA, and impression motivation variables. It was anticipated that EI would still maintain a significant effect on physical activity over and above what is contributed by those three variables. A secondary aim of this project was to test the moderating effect of EI on the relationship between SPA and exercise. We hypothesized that in persons with low exercise identities, the SPA-exercise relationship would be significantly stronger than in persons with a low exercise identity.

The bulk of research to date on self-presentational concerns has concentrated on females. The reason behind this focus is the reproducible finding that SPA tends to be significantly higher among women, and thus has more of an impact in the deterrence of exercise behaviour in this population (Hagger & Stevenson, 2010). However, exercising for appearance and/or weight management reasons are two self-presentational motives also related to higher levels of SPA among men (Strong, Martin Ginis, Mack, & Wilson, 2007). Given the need to obtain a more complete understanding of male self-presentational issues, and continue on the path to gender

equivalency among research related to these concerns, we have chosen to analyze our male and female samples separately.

Method

Female Participants

Participants in this cross-sectional design were 234 females who volunteered to complete the survey package, recruited around the areas of London, Ontario, Canada and Bangor, Gwynedd, Wales. Ages ranged from 18 to 68 years ($M = 24.91$, $SD = 8.85$). 76.1% of respondents self-identified as students, and 89.7% self-identified as Caucasian. 80.3% of participants indicated that they exercise three or more times per week for a minimum of 20 minutes per session, at a level that increases their breathing rate and causes sweating (see Table 1 for a more detailed demographic breakdown). Mean exercise behaviours were at a level of 26.47 METS per week. No significant differences on key variables were apparent between our Canadian and Welsh female samples.

Male Participants

Participants in this cross-sectional design were 140 males who volunteered to complete the survey package, recruited around the areas of London, Ontario, Canada and Bangor, Gwynedd, Wales. Ages ranged from 18 to 67 ($M = 24.73$, $SD = 8.17$). 77.9% of respondents self-identified as students, and 79.3% self-identified as Caucasian. 85.7% of participants indicated that they exercise three or more times per week for a minimum of 20 minutes per session, at a level that increases their breathing rate and causes sweating (see Table 1 for a more detailed demographic breakdown). Mean exercise behaviours were at a level of 28.69 METS per week. No significant differences on key variables were apparent between our Canadian and Welsh male samples.

Measures

Exercise Identity. The Exercise Identity Scale (Anderson & Cychosz, 1994) measures how integral being an exerciser is to the self. Items were assessed on a 7-point Likert scale with anchors ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). There were a total of 9-items, two of which were “if I were forced to give up exercise I would feel a real loss” and “physical exercise is a central factor to my-self concept.” A score of 63 represents the maximum exercise identity; that exercise is a deeply internalized behaviour and fundamentally important to one’s being. This scale has demonstrated strong convergent validity, internal consistency, and test-retest reliability in previous studies (Anderson & Cychosz, 1995). Internal reliability for this measure in the present study was high ($\alpha_{\text{male}} = 0.95$; $\alpha_{\text{female}} = 0.94$).

Self-Presentational Efficacy. SPE was assessed using a 5-item Self-Presentational Efficacy Scale developed by Gammage, Hall, and Martin Ginis (2004). This scale was designed to measure participants’ confidence in their ability to present themselves favourably in the following five dimensions: physical coordination, tone & fitness, stamina, exercising habitually, and being in good shape. Anchors ranged from 0% (not at all confident) to 100% (completely confident). An example of one such item was, “these other people will think that (I) have good stamina.” This scale has demonstrated sufficient validity and reliability (Strong & Martin Ginis, 2007). Internal reliability for this measure in the present study was high ($\alpha_{\text{male}} = 0.92$; $\alpha_{\text{female}} = 0.92$).

Social Physique Anxiety. SPA was assessed using the 9-item Social Physique Anxiety Scale developed by Martin, Rejeski, Leary, McAuley, and Bane (1997). This questionnaire appraised the anxiety experienced by individuals when they perceive their physique to be evaluated by others. Each item was rated on a 5-point Likert scale ranging from 1 (not at all

characteristic of me) to 5 (extremely characteristic of me). An example of one such item was, “It would make me uncomfortable to know others were evaluating my physique/figure.” In the present study, internal reliability was satisfactory ($\alpha_{\text{male}} = 0.87$; $\alpha_{\text{female}} = 0.91$).

Impression Motivation (IM). IM was rated using the 4-item subscale developed by Gammage et al. (2004; adapted from Conroy, Motl, & Hall, 2000). This measured the level of individual desire to be seen as toned and fit by others. Each item (e.g., “I value the attention and praise offered by others in regard to appearing physically fit”) was rated on a 6-point Likert scale anchored by 1 (strongly disagree) to 6 (strongly agree). In the present study, internal reliability for this measure was high ($\alpha_{\text{male}} = 0.92$; $\alpha_{\text{female}} = 0.90$).

Demographic Questionnaire. Individual demographic information was also collected to gain a better understanding of our sample. Age, profession, height, weight, ethnicity, and exercise status were all collected at the outset of the questionnaire. Participants completed a modified version of the Godin Leisure Time Exercise Questionnaire (GLTEQ) as an index of physical activity participation over the previous week (Godin & Shephard, 1985). The instrument assesses the frequency of mild, moderate, and strenuous exercise completed for a minimum of 20 minutes per session. A total exercise score (GLTEQ-METs) was calculated on a ratio-level scale by averaging the weighted responses to each question, $\Sigma [(mild \times 3) + (moderate \times 5) + (strenuous \times 9)]$, that range, theoretically, from 0 to ∞ .

Procedure

After obtaining approval from the University Research Ethics Board, participants were recruited through campus advertisements and email. An opportunity to be entered into a draw to win a \$100 Lululemon gift card for completion of the survey was offered. The questionnaires were uploaded to a secure web-based survey domain (Survey Monkey) and took approximately

20 minutes to complete. Informed consent was obtained and participant confidentiality was assured. Participants were informed that the purpose of the current investigation is to determine how exercise identity, exercise motivational factors, and physical activity anxiety variables are related among women and men. It was emphasized that participation was completely voluntary and participants could refuse to answer any questions or exit the survey at any time.

Results

Treatment of Data

All data were screened in order to ensure the assumptions of main analyses were met (Tabachnick & Fidell, 2007). These assumptions included normality, linearity, multicollinearity, homogeneity of variance, and homoscedasticity. Missing data were replaced with the mean item score from participants of the same gender. This occurred in less than 1% of cases. If a participant failed to complete an entire measure, no values were entered and the participant was excluded from the analyses, as this was deemed to be the most conservative method (Tabachnick & Fidell, 2006). Accordingly, only two participants (one male, one female) were excluded from the analyses completely. Univariate outliers were identified if the standardized score (z score) for the reported value was in excess of ± 3.29 . Using this method, 4 outliers were found, and these cases were deleted prior to completing any further analyses. Multivariate outliers were screened using the Mahalanbois distance statistic. No residual outliers were identified.

Bivariate Correlations

Pearson Bivariate correlations were conducted to examine relationships between six key demographic and outcome variables for female participants (weekly physical activity (METS), EI, SPE, SPA, IM). Pearson r values are presented in Table 2. Correlational analyses were conducted between six key variables for male participants (weekly physical activity (METS), EI,

SPE, SPA, IM). Pearson r values are presented in Table 3.

For females, weekly physical activity behaviour (METs) was positively associated with EI, SPE, and IM, but there were no relation to SPA. Notable among the psychosocial variables, EI was positively associated with both SPE and IM, and unrelated to SPA. For males, weekly physical activity behaviour (METs) was positively associated with EI and SPE. There was no association with either SPA or IM variables. Notable among the psychosocial variables, EI was positively associated with both SPE and IM. EI was unrelated SPA.

Hierarchical multiple regression analyses

Two separate hierarchical multiple regressions (one for each gender) were performed to investigate the ability of exercise identity to predict physical activity behaviour (METs), after controlling for SPE, SPA, and IM. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. Additionally, tolerance and variance inflation statistics (VIF) were examined to rule out the possibility of multicollinearity. General sample size criteria were met, as the total N was greater than $50 + 8m$, where m represents the number of independent variables used in the model (Tabachnick & Fidell, 2008).

For females, in the first step of hierarchical multiple regression, three predictors were entered: SPE, SPA, and IM. This model was statistically significant $F(3, 208) = 11.61, p < .001$ and explained 14% of variance in METs. After entry of EI at Step 2 the total variance explained by the model as a whole was 37% ($F(4, 207) = 31.33, p < .001$). The introduction of EI explained an additional 23% of variance in METs, after controlling SPE, SPA, and IM (R^2 Change = .23, $F(1, 207) = 77.67, p < .001$). In the final adjusted model only EI contributed a significant Beta value ($\beta = .57, p < .001$). See Table 4 for detailed results.

For males, in the initial step of hierarchical multiple regression, the same three predictors

were entered: SPE, SPA, and IM. This model was statistically significant $F(3, 117) = 9.77, p < .001$ and explained 20% of variance in METS. After entry of EI at Step 2 the total variance explained by the model as a whole was 40% ($F(4, 116) = 19.36, p < .001$). The introduction of EI explained additional 20% of variance in METS, after controlling SPE, SPA, and IM ($R^2 \text{ Change} = .20, F(1, 116) = 38.69, p < .001$). In the final adjusted model only EI ($\beta = .56, p < .001$) and SPA ($\beta = .24, p < .01$) contributed a significant Beta value. See Table 5 for detailed results.

Moderation analyses

A hierarchical multiple regression analysis was used to test the hypothesis that EI may moderate the relationship between SPA and physical activity. Prior to commencing the analysis, the variables were zero-centered to help avoid the potentially problematic issue of high multicollinearity. In the first step, both EI and SPA were entered into the regression to test for a main effect (model 1). Next, an interaction term between SPA and EI was created (model 2) to determine if it accounted for a significantly higher proportion of the variance than model 1 alone.

For females, hierarchical multiple regression results demonstrated a significant model 1 contribution towards physical activity, $R^2 = .344, F(2, 209) = 54.85, p < .001$. However, the model 2 SPA x EI interaction failed to account for a significant increase in the amount of variance explained $R^2 \text{ Change} = .002, F(1, 208) = .58, p > .05$. In other words, EI did not moderate the relationship between SPA and physical activity among females (Figure 1). Similarly for males, the hierarchical multiple regression results demonstrated a significant model 1 contribution towards physical activity, $R^2 = .368, F(2, 118) = 34.43, p < .001$. Again, the model 2 SPA x EI interaction failed to account for a significant increase in the amount of variance explained $R^2 \text{ Change} = .002, F(1, 117) = .33, p > .05$. That is to say, EI did not moderate the

relationship between SPA and physical activity among men (Figure 2).

Discussion

The purpose of this present study was to provide an in-depth consideration of EI's relationship to exercise and various body-related psychosocial variables. The findings provide general support for most of the hypotheses forwarded. A discussion of the results with corresponding implications follows.

Firstly, EI was significantly and positively related to SPE for both men and women. That is, individuals with a stronger exercise identity were more confident that others would also see them as an exerciser. This result was anticipated since self-presentation management strategies have been previously thought of as founded, in part, in one's public identity (Baumeister, 1982). The concern over the public identity is a decisive factor in conformity and social inhibitions. Further, levels of self-efficacy and self-esteem have been rooted in the level of clarity of one's self-concept (Campbell, 1990). It is for these reasons that fostering and reaffirming the exercise identity ties in closely with the ability to present in a confident manner in an exercise setting. It is likely, since identities are validated in a reciprocal manner, that further enhancements in SPE serve to bolster the sense that exercising is a deep-rooted part of the self.

In addition, for both males and females there was no discernible relationship between EI and SPA. This lack of a relationship was partly expected since SPA has often demonstrated an inconsistent relationship with physical activity (Woodgate, et al., 2003; Gammage et al., 2014). In certain instances, SPA may be negatively related to EI since those with strong identities are often more self-assured and have a greater sense that exercise will remain an important part of who they are despite whatever obstacles may face them. On the other hand, it is possible that there are certain individuals who exercise to maintain an active identity, but that the exercise

behaviours stem from anxieties over how he or she feels in a public setting. That is to say, the internalized sense of anxiety over one's body may regulate one's exercise behaviours. In turn, this may act as a driving mechanism for exercise commitments, which ultimately act in part to cultivate the exercise identity. Therefore, it is quite possible that our lack of a significant finding is the result of the two distinct manifestations of SPA simply cancelling one another out.

Secondly, we tested the hypothesis that exercise identity would be able to account for a significant amount of the variation in exercise behaviour, even after controlling for various other psychosocial variables (i.e., SPE, SPA, IM). This proved to be the case for both genders. This finding is significant because many other studies - correlational (Anderson & Cychosz, 1995), prospective (Cardinal & Cardinal, 1997) and qualitative (Hardcastle & Taylor, 2005) - have clearly established that a strong EI is a key indicator of exercise behaviour. Yet, to demonstrate that EI maintained critical leverage on behaviour over and above what was accounted for by other key variables positions the identity as an evermore-vital construct in our field. Although it has been demonstrated that identity has a discernable link with self-presentation (Leary & Allan, 2011), we see that even after accounting for these key self-presentation variable identity still is able to account for exercise behaviour.

Efforts should be made to enhance the exerciser identity over time. One promising, practical avenue is integrating positive self-affirmations into our daily routines (e.g., saying to oneself (self-talk) or writing down: "Being an exerciser reflects my true self. It is who I am"). This has been shown to foster a heightened sense of a global, intrinsic self and is effective in dealing with threats to self-worth and self-integrity (Schimel, Arndt, Banko, & Cook, 2004). Daily writing of these intrinsically self-reinforcing phrases could prove to be a straightforward technique aimed at bolstering identity strength. Another possible identity strengthening technique

involves surrounding one's environment with pro-exercise reminders. Some suggestions may include: affixing a participation ribbon from an organized run to a commonly seen household item (i.e., the refrigerator), setting up a picture of oneself in an exercise setting (e.g., hiking) as the background image to a laptop or cell phone, or purchasing a new exercise item (e.g., running shoes) on a semi-regular basis, and setting them near the front door. These serve as reminders that exercise is a wholly integrated part of one's day-to-day surroundings.

Next, we aimed to determine if EI had a moderating effect on the SPA-exercise relationship. As previously mentioned, SPA maintains a somewhat inconsistent pattern of results with respect to its relationship with exercise. Previous research has indicated that SPE, a situation-specific social cognition, played a significant role as a moderator (Woodgate, et al., 2003). It was thought that exercise identity, a more global construct, could potentially play a similar moderating role, however this was not the case. The equivocal relationship between SPA and exercise appears to operate independent of one's internalized sense of self as an exerciser. It should be noted that our sample comprised mainly university-aged participants, whereas Woodgate and colleagues assessed a group of women whose mean age was above 70. Future research would do well to explore the extent to which age differences affect the potential moderating variables of the SPA and physical activity relationship.

The present study possesses several limitations that warrant discussion. As this sample was relatively homogeneous in nature – chiefly Caucasian students who exercise on a regular basis – the generalizability of these results should be approached with caution. Future research should seek a more ethnically diverse sample with a broader range of ages and exercise habits. Second, the present study was carried out as a cross-sectional design, thus limiting our ability to provide causal implications. Since there is enough evidence providing support for the value of a

strong exercise identity, scientists would do well to engage various populations in intervention-based designs. Research of a longitudinal nature would add to our current state of knowledge. In a similar vein, more research is required to discern what specific exercise identity intervention strategies yield the most optimal improvements in health and wellness. Thirdly, a minor drawback involves the acute reliance on self-report measures. Responses to questionnaires can conceivably be regarded as self-presentations aimed at target (i.e., the researcher; Baumeister, Tice, & Hutton, 1989). These self-presentations may reflect the true self, however, they may not. In order to control for interpersonal motives that can with or without conscience bias affect measurement accuracy, the development of an intrinsic, objective identity belief tool would be prudent.

Collectively, these findings advance our knowledge of exercise identity and its relationship with various important constructs examined throughout the contemporary literature. Despite the aforementioned limitations, this study was benefited by its holistic scope by way of including a variety of psychosocial variables, along with its large sample size. Indeed, exercise identity offers a compelling reason for why many succeed (or fail) in the pursuit of a physically active lifestyle.

Table 1

Descriptive Statistics for Demographic Information of Males and Females

Variable	Men	Women
	<i>n</i> = 140	<i>n</i> = 234
Profession		
Student	109	178
Employed	26	38
Retired	2	3
Other	3	14
Ethnicity		
Caucasian	111	210
Black	5	2
Asian	10	10
Latino	4	0
Indian	3	4
Other	7	8
Exercise Status		
Exerciser	120	188
Non- Exerciser	20	46

Table 2.

Correlations, means, and standard deviations of key variables in females

Measure	mean	sd	1.	2.	3.	4.	5.
1. Weekly Exercise	26.474	16.413	1				
2. Exercise Identity	45.576	13.202	.611*	1			
3. Self-Presentational Efficacy	68.485	17.925	.331*	.456*	1		
4. Social Physique Anxiety	27.486	7.578	-.022	-.016	-.343*	1	
5. Impression Motivation	4.450	1.152	.285*	.405*	.350*	.183*	1

*p < .05 (2-tailed)

Table 3.

Correlations, means, and standard deviations of key variables in males

Measure	mean	sd	1.	2.	3.	4.	5.
1. Weekly Exercise	28.689	16.831	1				
2. Exercise Identity	46.514	11.434	.583*	1			
3. Self-Presentational Efficacy	69.700	16.704	.377*	.575*	1		
4. Social Physique Anxiety	24.074	7.621	.077	-.152	-.381*	1	
5. Impression Motivation	4.341	1.128	.075	.300*	.199*	.064	1

*p < .05 (2-tailed)

Table 4.

Hierarchical Regression Model of Physical Activity in Females

	<i>R</i>	<i>R</i> ²	<i>R</i> ²	<i>B</i>	<i>SE</i>	β	<i>t</i>
	<i>Change</i>						
Step 1	.38	.14*					
SPE				.26	.06	.28	3.70
SPA				.00	.14	.04	.57
IM				.48	.03	.18	2.46
Step 2	.61	.38*	.23*				
SPE				.05	.06	.06	.85
SPA				.00	.14	.00	.01
IM				.48	.92	.03	.52
EI				.71	.08	.57	8.80

* $p < .05$

Note. SPE = self-presentational efficacy. SPA = social physique anxiety. IM = impression management. EI = exercise identity.

Table 5.

Hierarchical Regression Model of Physical Activity in Males

	<i>R</i>	<i>R</i> ²	<i>R</i> ²	<i>B</i>	<i>SE</i>	β	<i>t</i>
	<i>Change</i>						
Step 1	.45	.20*					
SPE				.49	.09	.49	5.27
SPA				.58	.20	.26	2.92
IM				-.58	1.27	-.04	-.45
Step 2	.63	.40*	.20*				
SPE				.17	.10	.17	3.01
SPA				.52	.17	.24	1.82
IM				-2.14	1.14	-.14	-1.88
EI				.83	.13	.56	6.22

**p* < .05

Note. SPE = self-presentational efficacy. SPA = social physique anxiety. IM = impression management. EI = exercise identity.

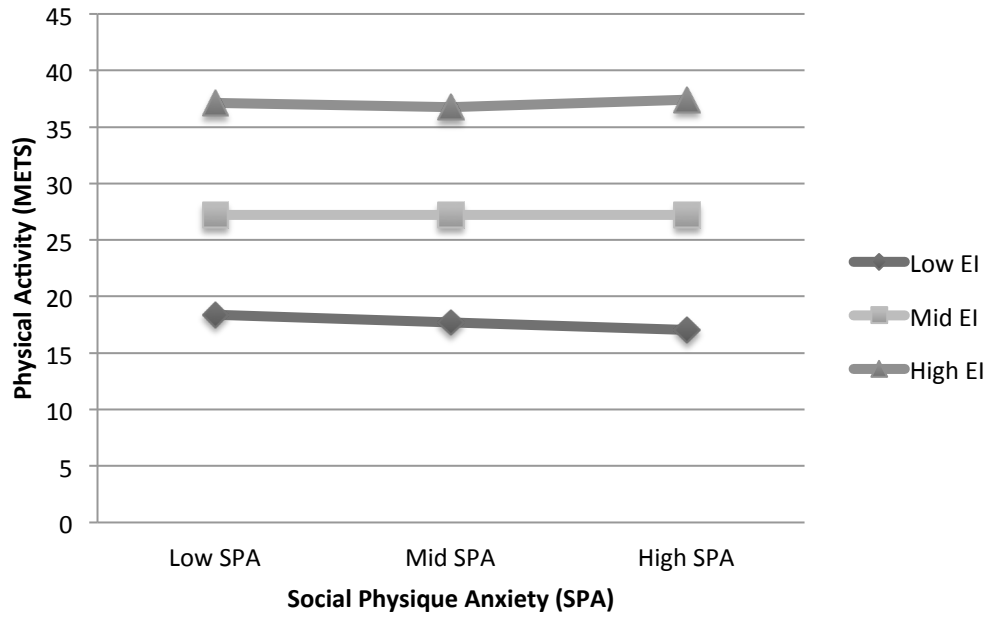


Figure 1. Plot of the interaction effect of social physique anxiety (SPA) and exercise identity (EI) on total weekly physical activity behaviour (METS) among female participants only

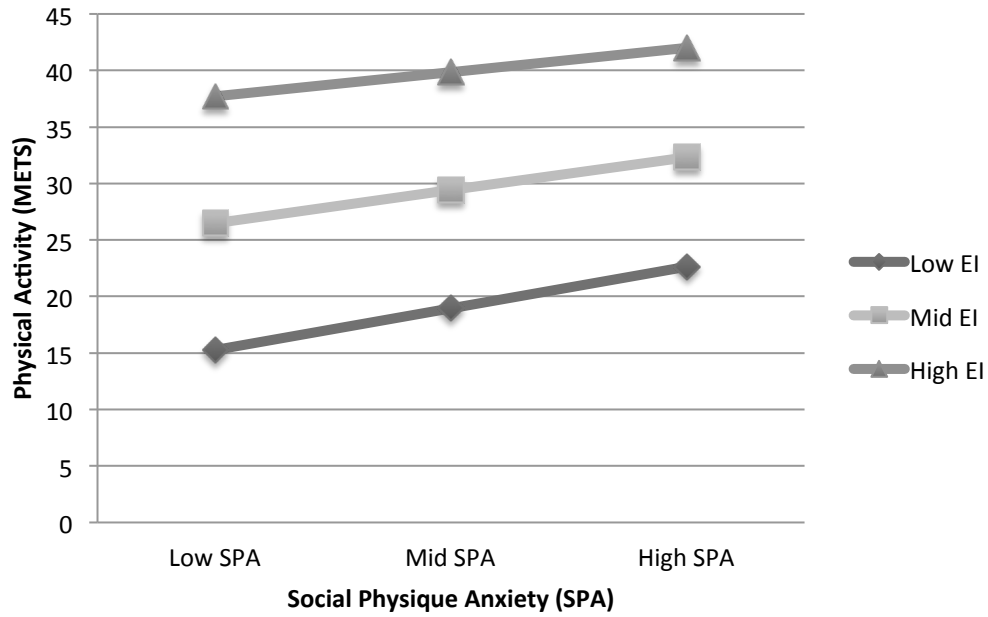


Figure 2. Plot of the interaction effect of social physique anxiety (SPA) and exercise identity (EI) on total weekly physical activity behaviour (METS) among male participants only

References

- Anderson, D. F., & Cychosz, C. M. (1994). Development of an exercise identity scale. *Perceptual and Motor Skills, 78*, 747-751.
- Anderson, D. F., & Cychosz, C. M. (1995). Exploration of the relationship between exercise behavior and exercise identity. *Journal of Sport Behavior, 18*(3), 159-166.
- Anderson, D. F., Cychosz, C. M., & Franke, W. D. (1998). Association of exercise identity with measures of exercise commitment and physiological indicators of fitness in a law enforcement cohort. *Journal of Sport Behavior, 21*, 233-241.
- Aronson, E. (1969). The theory of cognitive dissonance: A current perspective. *Advances in experimental social psychology, 4*, 1-34.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review, 84*, 191-215.
- Baumeister, R. F. (1982). A self-presentational view of social phenomena. *Psychological Bulletin, 91*, 3-26.
- Baumeister, R. F., Tice, D. M., & Hutton, D. G. (1989). Self-presentational motivations and personality differences in self-esteem. *Journal of Personality, 57*(3), 547-579.
- Burke, P. J. (1980). The self: Measurement requirements from an interactionist perspective. *Social Psychology Quarterly, 43*, 18-29.
- Campbell, J. D. (1990). Self-esteem and clarity of the self-concept. *Journal of Personality and Social Psychology, 59*(3), 538-549.
- Cardinal, B. J., & Cardinal, M. K. (1997). Changes in exercise behaviour and exercise identity

associated with a 14-week aerobic exercise class. *Journal of Sport Behaviour*, 20, 377-386.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Conroy, D. E., Motl, R. W., & Hall, E. G. (2000). Progress towards construct validation of the self-presentation in exercise questionnaire. *Journal of Sport and Exercise Psychology*, 22, 21-38.

Corcoran, K., & Fischer, J. (1987). *Measures for clinical practice: a sourcebook*. New York: The Free Press.

Culos-Reed, S. N., Brawley, L. R., Martin, K. A., & Leary, M. R. (2002). Self-presentation concerns and health behaviors among cosmetic surgery patients. *Journal of Applied Social Psychology*, 32, 560-569.

Cumming, J. & Thogersen-Ntoumani, C. (2011). Self-presentational cognitions for exercise in female adolescents. *Journal of Applied Social Psychology*, 41, 429-441.

Fenigstein, A., Scheier, M. F., & Buss, A. H. (1975). Public and private self-consciousness: Assessment and theory. *Journal of Consulting and Clinical Psychology*, 43, 522-527.

Gammage, K., Hall, C., & Martin Ginis, K. (2004). Self-presentation in exercise contexts: Differences between high and low frequency exercisers. *Journal of Applied Social Psychology*, 34, 1638-1651.

Gammage, K., Martin Ginis, K., & Hall, C. (2004). Self-presentational efficacy: It's influence on social anxiety in an exercise context. *Journal of Sport and Exercise Psychology*, 26, 179-190.

Goffman, E. (1959). *The presentation of self in everyday life*.

- Hagger, M. & Stevenson, A. (2010). Social physique anxiety and physical self-esteem: Gender and age effects. *Psychology & Health, 25(1)*, 89-110.
- Hardcastle, S. & Taylor, A. (2005). Making space for a new exercise identity in an older body: A longitudinal qualitative study of a primary care intervention. *Psychology of Sport and Exercise, 6(2)*, 173-188.
- Janssen, I., Lam, M., & Katzmarzyk, P. T. (2009). Influence of overweight and obesity on physician costs in adolescents and adults in Ontario, Canada. *Obesity Reviews, 10(1)*, 51-47.
- Kendzierski, D. (1990). Exercise self-schemata: Cognitive and behavioral correlates. *Health Psychology, 9*, 69-82.
- Langois, J., Kalakanis, L., Rubenstein, A., Larson, A., Hallam, M., & Smoot, M. (2000). Maxims or myths of beauty? A meta-analytic and theoretical review. *Psychological Bulletin, (126)* 390-423.
- Leary, M. R. (1992). Self-presentational processes in exercise and sport. *Journal of Sport and Exercise Psychology, 14*, 339-339.
- Leary, M. R., & Allen, A. B. (2011). Self-presentational persona: Simultaneous management of multiple impressions. *Journal of Personality and Social Psychology, 101(5)*, 1033.
- Leary, M. R., & Atherton, S. C. (1986). Self-efficacy, social anxiety, and inhibition in interpersonal encounters. *Journal of Social and Clinical Psychology, 4*, 256-267.
- Leary, M. R., & Kowalski, R. M. (1990). Impression management: A literature review and two-component model, *Psychological Bulletin, 107*, 34-47.
- Leary, M. R., & Kowalski, R. M. (1995). *Social anxiety*. New York: Guilford.
- Martin, K. A., Rejeski, W. J., Leary, M. R., McAuley, E., & Bane, S. (1997). Is the social

physique anxiety scale really multidimensional? Conceptual and statistical arguments for a unidimensional model. *Journal of Sport & Exercise Psychology*, 19, 359–367.

Mead, G. H. 1934. *Mind, self and society: From the standpoint of a social behaviorist* (Ed. with intro by C. W. Morris.). Chicago: University of Chicago Press. Miller.

Organisation for Economic Co-operation and Development (OECD). Health Data, 2012.

www.oecd.org

Rich, E. (2006). Anorexic dis(connection): Managing anorexia as an illness and identity.

Sociology of Health and Illness, 28(3), 284-305.

Schlenker, B. R. (1980). Impression management: The self-concept, social identity, and interpersonal relations. Monterey, CA: Brooks/Cole.

Schlenker, B. R., & Leary, M. R. (1982). Social anxiety and self-presentation: A conceptualization and model. *Psychological Bulletin*, 92, 641-669.

Schlenker, B. R., & Leary, M. R. (1985). Social anxiety and communication about the self. *Journal of Language and Social Psychology*, 4, 171-192.

Schimmel, J., Arndt, J., Banko, M. K., & Cook, A. (2004). Not all self-affirmations were created equal: The cognitive and social benefits of affirming the intrinsic (vs. extrinsic) self. *Social Cognition*, 22, 87-116.

Schneider, D. J. (1981). Tactical self-impressions: Towards a broader conception. In J. T. Tedeschi (Ed.), *Impression management theory and social psychological research* (pp. 23-40). New York, NY: Academic Press.

Stryker, S. 1968). Identity salience and role performance. *Journal of Marriage and the Family*, 4, 558– 564.

Stryker, S. (1980). *Social interactionism: A social structural version*. Menlo Park, CA: The

Benjamin/Cummings Publishing Company.

- Stets, J. E., & Burke, P. J. (2003). A sociological approach to self and identity. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity*: 128-152. New York: Guilford.
- Strong, H. A. & Martin Ginis, K. A. (2007). Factorial and construct validity of the Self-Presentation Efficacy in Exercise Scale. *Journal of Sport and Exercise Psychology*, 29, 206.
- Strong, H. A., Martin Ginis, K. A., Mack, D. E., & Wilson, P. M. (2007). *Journal of Applied Biobehavioral Research*, 11, 209-225.
- Stryker, S. & Burke, P. J. (2000). The past, present and future of identity theory. *Social Psychology Quarterly*, 63, 284-297.
- Stryker, S. & Serpe, R. T. (1994). Identity salience and psychological centrality: Equivalent, overlapping, or complementary concepts? *Social Psychology Quarterly*, 57, 16-35.
- World Health Organization, & World Health Organization. (2009). Mortality and burden of disease attributable to selected major risks. *Geneva: WHO*.
- Woodgate, J., Martin Ginis, K. A., & Sinden, A. R. (2003). Physical activity and social physique anxiety in older women: The moderating effects of self- presentation efficacy. *Journal of Applied Biobehavioral Research*, 8, 116–127.

STUDY 2

IMPLICIT AND EXPLICIT EXERCISE IDENTITY, IDENTITY SALIENCE, AND THE RELATIONSHIP WITH EXERCISE BEHAVIOUR

Stryker's identity theory (1968) has provided a leading perspective in which to base research on the self and identity. The self is organized into multiple identities, which are self-relevant meanings that define who one is (Burke, 2006). Pursuant to identity theory's framework, behaviour is acutely affected by one's identity. One way to understand basic human behaviour is by examining structural symbolic interactionism, which states that society affects the self and, in turn, the self affects one's social behaviour (Stryker, 2008). That is, the society and the self *interact* with one another in a reciprocal manner. The self, and accordingly identity, is generated by individualized experiences. Mead (1934) proposed that what makes humans distinct is their ability to develop a "self". Moreover, this self is reflexive and arises from ongoing communication with its surroundings. This communication facilitates the formation of role-identities that ultimately have a direct impact on behaviour. Roles have meanings, and these meanings are assimilated within the self to influence the actions one undertakes. Identities are not situation specific, rather they can be sustained or invoked in a variety of situations, and maintain the ability to influence behaviours in those situations (Stryker, 2008).

Exercise Identity

Inasmuch as identities are associated with role expectations, they are thought to provide standards for behaviour. Research has demonstrated that these ubiquitous and multidimensional identities hold sway over exercise behaviour. Particularly, the examination of exercise identity is viewed as an important perspective in the pursuit to better understand the relationship between the self and exercise participation. Exercise identity is defined as the level to which one's

previous exercise behaviour is ingrained in the sense of self, and the extent to which this exercise-related self-concept directs future exercise behaviour (Anderson & Cychosz, 1994). The strength of exercise identity varies amongst individuals (Anderson, Cychosz, & Franke, 2001). Those with stronger exercise identities are thought to more closely align the meanings of what it is to be an exerciser with behaviours that confirm the identity (e.g., “working out”). Individuals who possess an exercise identity that is highly central to their self-concept are most likely to engage in a level of exercise commensurate with their self-perceived exercise standards (Strachan, Brawley, Spink, & Jung, 2009). In prospective designs, a stronger exercise identity has been able to significantly predict continued involvement in an exercise class (Cardinal & Cardinal, 1997), as well as frequency and duration of running (Strachan, Woodgate, Brawley, & Tse, 2005). Furthermore, those with stronger exercise identities experience more pronounced negative affect when failing to meet those self-relevant exercise standards (Strachan, Flora, Brawley, & Spink, 2011) and, in objective measures, have exhibited greater muscular endurance, greater maximal oxygen uptake (VO_2 max) scores, and lower levels of percent body fat (Anderson, Cychosz, & Franke, 1998).

The underpinnings of identity theory provide support for the view that the behavioural standard associated with an exercise identity provides direction, motivation, and self-regulation towards achievement of certain physical activity standards (Stets & Burke, 2003). Indeed, Burke’s identity control theory (2006) provides support for the notion that individuals use mediating responses towards stimuli in order to support an identity. That is, should a discrepancy exist between one’s self-perceived identity standard and their role performance, the individual will behave in such a way as to alter their actions; this execution brings their behaviour once

again more in line with their identity. Thus, what it means to be an exerciser (i.e., an identity standard) is seen as a key antecedent of consistent behaviour.

Identity Salience

Identities encompass two related dimensions: commitment and salience (Stryker, 1980). Scholars have recurrently identified two distinctive types of commitment: *affective* commitment refers to the loss of relationships high on positive affect, whereas *interactional* commitment refers to the loss of relationships meaningful by virtue of their ubiquity in an individual's life. In Stryker's study examining the salience and commitment of a 'student identity' among 320 college freshmen over multiple time points, a clear pattern was established. The greater the commitment ascribed to the identity, the more instrumental it was in the expectations and desires of the individual, and thus was more salient. That is, identity commitment shapes identity salience, which in turn shapes the decisions (i.e., behaviours) one carries out.

To further elaborate on identity salience, we must first acknowledge that the multifaceted self is composed of an assembly of diverse identities that are theoretically organized along a hierarchy. Identity salience is defined as the relative positioning of a particular identity amid this identity hierarchy. It is hypothesized that behaviour is a direct result of this hierarchical identity salience ranking. Therefore, the higher an identity is ranked upon the salience hierarchy, the more likely its associated behaviour will be enacted. Since salience measures the probability of the identity being invoked in a given situation, it follows that a key feature of the theory is that identities are relational (Burke, 1980). An actor is involved in a reciprocal relationship within an identifiably different group (e.g., exerciser vs. non-exerciser), and one role is given meaning by the counter-role (Mead, 1934). This facilitates the internalization process of ordering numerous identities along the salience hierarchy. Additionally, identity salience is involved in a diverse

collection of situations (Stryker & Serpe, 1994). In our daily life these encountered situations can vary enormously throughout the day, and there is empirical evidence that salience plays a critical role in activating role-related identities. As a hypothetical example within the same individual, if the 'law student' identity has a higher relative positioning along the individual's identity salience hierarchy than their 'hockey player' identity, an individual would be more inclined to discuss her law studies, rather than her hockey activities, when first introduced to a mutual acquaintance. Because salience is a product of commitment, there is the ensuing recognition that identity configurations reflect the rootedness that identities maintain within social relationships.

Research has provided evidence that the salience hierarchy predicts time spent in religious activities (Stryker & Serpe, 1982) and the frequency of blood donations (Callero, 1985), among other behaviours. Only one study has examined identity salience in an exercise context (Strachan & Brawley, 2008). Subjects were asked to read a vignette, which had them imagine a scenario in which (due to work or school commitments) they had become far busier than normal over the past three weeks. Additionally, the busy schedule would continue for an additional three weeks in the future, resulting in physical activity levels that were much lower than those the subjects were typically accustomed to. Results indicated that those who ranked exercise identity higher along the identity hierarchy reported significantly more negative affect after reading the vignette, reported engaging in more strenuous exercise per week over the previous year, and generally possessed greater self-regulatory efficacy. The authors also noted that in line with identity control theory (Burke, 2006) the negative affect experienced from the challenge vignette may have prompted high-exercise identity participants to report greater *future* exercise intentions in order to reduce an identity-behaviour discrepancy. While this study made a significant

contribution to the literature, and offered a sound look into an affective corollary of exercise identity, there was a lack of follow-up in assessing if those participants actually carried through with intended exercise behaviours. It was noted that future studies examining exercise salience would do well to delve deeper into the applied behavioural outcomes of exercise identity salience.

Implicit Identity & Measurement

Implicit, or nonconscious, attitudes may play a central role in determining exercise behaviour. In the past, research has largely explored value-expectancy models, such as the Theory of Planned Behaviour (Ajzen, 1985), when addressing behavioural processes. Yet, as the tools afforded to researchers have evolved, findings further reinforce the notion that there are both conscious and non-conscious processes that play a role in engendering behaviour (e.g., Hofmann, Friese, & Wiers, 2008; Wilson, Lindsey, & Schooler, 2000). Termed dual-process models (of health behaviour), these proposals theorize that, on one hand, attitudes and subsequent actions are determined by reflective, deliberate rules of logic. These associations are accessed intentionally and carefully consider the cost-benefit relationship in a reasoned manner. They require a meaningful amount of cognitive effort and are made accessible to our present state awareness. On the other hand, we maintain automatically activated, less controllable stores of associations that have been built up over time. The implicit, otherwise known as automatic, modes are processed rapidly and principally occur outside of our awareness. Dual-process research holds promise for appreciating how implicitly driven decisions can aid as well as hinder health-promoting behaviours (Evans, 2008).

Typically, these implicit processes are evaluated indirectly using response latency paradigms, such as the Implicit Association Test (IAT) developed by Greenwald, McGhee, and

Schwartz (1998). The IAT measures the strength of associations between two concepts. Essentially, the strength of association is understood as the capability for one concept to trigger another. For example, within a social knowledge structure the ‘*me*’ or ‘*I*’ concept can be considered by its relationship with a variety of other concepts (e.g., professor, caring, intelligent). A social knowledge structure includes all of the concepts and their associations located within the self. During an IAT, a participant is asked to sort the concept stimuli into two concept target categories. The performance on the congruent stimuli is compared with the performance on the incongruent stimuli to provide a measure of overall IAT effect, which represents the strength of association (see Measures section for more detail).

Although identity is formed on the basis of a reflexive and conscious self, aspects of one’s identity are deeply rooted in unconscious expressions of thought and feeling (Devos & Banaji, 2003). This conceptualization is in line with Mead’s (1967) postulation that the ‘*me*’ is what is learned within an environment through social interaction and is internalized and organized within the self. Implicit identity acknowledges that self-evaluations are influenced by the opinions and actions of others, notwithstanding the potential to be unaware of such processes. Further, one’s identity may affect certain actions implicitly. Research on implicit self-esteem offers a parallel rationalization. Whereas explicit self-esteem was thought to be rooted in rational, conscious self- assessments, implicit self-esteem was presumed to be “preconscious, automatic, nonverbal, associative, rapid, effortless, concrete, holistic, and intimately associated with affect” (Epstein, 2006, p. 69). Although both implicit and explicit measures of self-esteem stem from the same knowledge structure, unique properties emerge during measurement because people are either unwilling or unable to unveil certain aspects of self-knowledge. Hence, assessments of implicit self-esteem are better positioned to detect true, unfiltered aspects of the self (Olson,

Fazio, & Hermann, 2007). Exploration into the temporal stability of implicit measures of self-esteem reveals more state-like and transient properties than that of explicit measures (Koole, Dijksterhuis, & van Knippenberg, 2001). Likely, when compelled to respond swiftly, participants ostensibly respond on the basis of whatever information happens to be readily available to them, “such as their non-conscious mood states, conditioned responses, working self- concepts, or idiosyncratic associations to the particular stimulus words they have been asked to consider” (Buhrmester et al., 2011, p. 375). This indicates that implicitly aimed trials might be gathering data on transitory states rather than on enduring dispositions.

The issue of how implicit and explicit measures of self relate to one another has been briefly examined in the literature. Because implicit measures are adept at revealing aspects of self-knowledge that are not captured by explicit measures, relations between the two types of measures ought to be faint or nonexistent (Buhrmester et al., 2011). Systematic correlations between varied assessments of implicit and explicit self-esteem have been screened, and consequently, only some of the measures were significantly related to one another. Of those that were, the correlations were small (all r values < 0.27). Thus, it has been affirmed that measures of implicit and explicit self-esteem are distinct constructs (Bosson, Swamm, & Pennebaker, 2000). Earlier studies have even provided some evidence that an implicit measure of the self holds greater predictive ability than an explicit measure (Rosenberg, 1965). How a person actively self-regulates his or her behaviour may be best understood by understanding the explicit ideas of the self. Conversely, Banting and colleagues (2009) postulated that ideas of the self could have their utmost influence on unplanned, impulsive behaviour. Indeed when conscious effort is modest, implicit self-evaluative measures are the preferred psychological tool (Devos & Banaji, 2005).

The self-concept has been conceptualized as a multidimensional construct housing all one's self-related thoughts and feelings (Rosenburg, 1979). Given that explicit identity representations are likely different from implicit representations, measures that focus solely on explicit measures fail to tap into all relevant self-knowledge. This is problematic if we are intent on delivering comprehensive interventions aimed at increasing exercise behaviour - most interventions (mistakenly) assume that our actions are wholly the result of conscious, deliberate thoughts. Currently, there is a scarcity of research examining the impact implicit cognitive processes have on exercise. However, what is available does indicate that exercise behaviour is related to implicit cognitions in a meaningful way, as positive implicit attitudes to exercise are related to higher levels of physical activity (Calitri, Lowe, Eves, & Bennett, 2009). Moreover, research has indicated that implicit exercise attitudes are linked to the significance of being an exerciser and avoiding becoming a sedentary non-exerciser (Harju & Reed, 2003). More recently, Berry and Strachan (2012) failed to show that stereotype priming affects implicit identity, however they did note that the correlation between their explicit and implicit identity measures was low ($r = .15, p > .05$) thus demonstrating the uniqueness of each measure.

These are meaningful first steps into the implicit exercise identity construct. Yet, if we aim to more fully understand the bedrocks of identity it is critical to intently examine identity salience's role in shaping exercise behaviour. Along a hierarchy, if exercise identity can maintain a more superior position relative to other identities, it would seemingly have considerable implications for exercise actions. In fact, following identity theory, salience profoundly impacts participation in relevant activities (Merolla, Serpe, Stryker, & Schultz, 2012). To this end, this study sought to substantiate three assumptions. First, reaffirming that the measurement of explicit identity is differentiated from the measurement of implicit identity (H_1). Second, those

individuals with more salient exercise identities, relative to other commonly held identities, score higher in both explicit and implicit measure of identity than those whose exercise identities are not as salient (H_2). Third, that a measure of implicit identity will predict variance in exercise levels over and above a measure of explicit identity (H_3).

Method

Participants

Participants were 60 volunteers in the United Kingdom. They ranged from 18 to 61 years of age ($M = 27.23$, $SD = 11.06$) and were composed of more males ($n = 36$) than females ($n = 24$). Of the participants, 75% indicated that they were full-time students. Caucasian was the predominant ethnicity (91.7%), and the majority (73.3%) reported that they exercised a minimum of three times per week, twenty minutes per session, regularly.

Measures

Exercise Identity (EI). The Exercise Identity Scale (Anderson & Cychosz, 1994) measures how important being ‘an exerciser’ is to one’s sense of self. EI was assessed on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). The scale consisted of 9-items (e.g., “exercising is something I think about often”). 63 is the maximum score, and represents exercise as a thoroughly internalized behaviour that is fundamentally important to one’s self-concept. This scale has demonstrated strong convergent validity, internal consistency, and test-retest reliability in previous studies (Anderson & Cychosz, 1995). Internal reliability for this measure in the present study was satisfactorily high ($\alpha = 0.94$).

Identity Salience. Adhering to past theoretical considerations regarding identity salience hierarchies (Stryker, 1980; Callero, 1985) participants were asked to carefully rank seven

potentially self-relevant identities in order of importance. A ranked score of #1 was considered to be the most personally important identity, whereas #7 was the least important. Identities listed shared much similarity to those used in previous research (Stryker & Serpe, 1982; Strachan & Brawley, 2008) and consisted of the following: political/civic identity, ethnic/cultural identity, exercise/physical activity identity, family/friends identity, organizations/groups identity, religious/spiritual identity, and academic/intellectual identity.

Implicit Identity. Individual's implicit exercise identity was measured using an adapted version of the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The IAT, which was hosted by the Inquisit 3.0 software suite (Millisecond Software, 2008), is a computerized test that assesses implicit cognitions by determining response latencies to stimuli associated with the object of interest. The logic behind the IAT is that the stronger a participants' implicit identity toward an object of interest (e.g., exercise vs. sedentary behaviour), the stronger the association between the target exemplars (e.g., images of people exercising vs. engaging in sedentary activities) and target categories (e.g., self vs. not-self). In this case, target exemplars (images) appeared in the middle of the computer screen, and participants were tasked with sorting the images into target categories appearing at the top left and top right of the screen. There were six different images and six different words for each target. Images and words can be made available upon request to the first author.

The IAT was presented on a laptop computer in seven blocks (20 trials each), with the first three blocks acting as practice to allow users a chance to acquaint themselves with the test parameters. The presentation order of target images and words was counterbalanced across subjects. Participants were directed to sort the images quickly but with consideration given to accuracy as well. The keys 'E' and 'I' were used to sort the words to the left (E) and right (I),

respectively with each index finger. In the present study, the target exemplar images, which appeared in the middle of the screen, consisted of ‘exercise’ (e.g., running on a treadmill) vs. ‘sedentary’ (e.g., watching television) colour images. The images employed both male and female models equally. The target categories, which appeared in the top corners of the screen, were composed of ‘self’ vs. ‘not-self’. The response latencies were relayed to a data editor and subsequently assessed using a *D-score* algorithm (Greenwald, Nosek, & Banaji, 2003). The central, resultant comparison is the difference in reaction time between trials in which self and exercise are paired (along with not-self and sedentary) versus trials in which self and sedentary are paired (along with not-self and exercise). Subjects are determined to bear high implicit exercise identities insofar as they are speedier to associate self with exercise images and not-self with sedentary images than to associate self with sedentary images and not-self with exercise images. Higher *D-scores* indicate a greater internalized affinity for exercise. Assuming typical IAT procedures, trials with latencies greater than 10,000ms (seven cases) or less than 300ms (three cases) were excluded from data analysis.

Exercise Behaviour Follow-Up. Participant’s exercise rates for the two weeks following completion of the initial measures were collected using the International Physical Activity Questionnaire (IPAQ; Craig et al., 2003). The purpose of the questionnaire was to obtain internationally comparable data on health-related physical activity at two time points (day 7, day 14) after initiation of the study. Our version was equivalent to the short-form, telephone version of the IPAQ, and requested participants to provide the frequencies and durations of all vigorous, moderate, and walking physical activity undertaken within the previous 7 days. The following scoring protocol is used to calculate a composite MET score: $[(3.3 \text{ METs} \times \text{walking days} \times \text{walking minutes}) + (4.0 \text{ METs} \times \text{moderate days} \times \text{moderate-intensity activity minutes}) + (8.0$

METs X vigorous days X vigorous-intensity activity minutes)]. The IPAQ has demonstrated reasonable levels of test-retest reliability and inner-method validity in extensive testing across 12 countries.

Demographic Questionnaire. Individual information was also collected to ascertain a clear demographic breakdown of our sample. Age, gender, occupation (student, full-time employed, or other), self-identified racial-ethnicity, marital status, childcare responsibility, and exercise status were all collected at the outset of the questionnaire. Exercise status was determined (*Yes/No*) after participants considered the following narrative: “*Regular exercise is any planned physical activity (e.g., brisk walking, jogging, bicycling, swimming, sports, etc.) performed to increase physical fitness. Such activity should be performed 3 or more times per week for 20+ minutes per session, at a level that causes perspiration and increases breathing rate.*” This definition is based on ACSM’s minimum exercise recommendations (American College of Sport Medicine, 2013). Demographic results are presented in Table 1.

Procedure

After obtaining approval from a University ethics board, participants were recruited both on campus and in the community at-large in an attempt to forge a diverse sample. They were told that the aim of this study was simply to examine relationships between reaction times, exercise, and self-relevant identities. All participants read the letter of information, which noted that they could refuse to participate in the study at any time, and proceeded to sign a consent form. The questionnaire package and IAT stages, each of which took approximately 6-8 minutes to complete, were counterbalanced in an attempt to negate any order effects. Participants were seated on a chair in front of a laptop computer in a quiet office in order to minimize distractions. Instructions for the IAT were clearly presented on the computer screen before commencement of

the task. The researcher made sure to present an opportunity for questions or clarification. Participants were informed that if they committed a trial error, a red 'X' would appear, and pressing the opposite (correct) key would promptly advance them to the next word. After completing both phases, participants either provided a phone number or email address (at their discretion) that they could be reached at in order to complete the follow-up IPAQ.

Results

Bivariate Correlations

Bivariate Pearson correlational analyses were conducted to examine relationships between five key outcome and demographic variables for all participants (EI, II, vigorous activity, moderate activity, and mild activity). Pearson r values are presented in Table 2. Results demonstrated a moderate, significant relationship between moderate and vigorous physical activity. More essential to the scope of this study, both EI and II independently exhibited a moderate, significant correlation with vigorous physical activity. Further, EI and II did not correlate with each other ($p > .05$).

Identity Salience

Two independent samples t-tests were carried out to examine potential differences between our high exercise identity salience group and our low exercise identity salience group. The participant was categorized as 'high-salient' if his/her exercise identity ranked within the top three of (seven) possible identities. Conversely, the participant was categorized as 'low-salient' if his/her exercise identity ranked within the top bottom three of (seven) possible identities. Results indicated significant differences for both the EI and II outcome variables ($p < .05$). In

each case, the high-salient group registered significantly greater identity scores (both EI and II) than did the low-salient group. See Table 3 for detailed results.

Hierarchical Multiple Regression Analysis

A two stage hierarchical multiple regression was performed to investigate the ability of II to predict physical activity behaviour (METS) at follow-up, after controlling for identity as measured by the exercise identity scale. Preliminary analyses were conducted to ensure there were no violations of the assumptions of normality, linearity, and homoscedasticity. Additionally, tolerance and variance inflation statistics (VIF) were examined to rule out the possibility of multicollinearity. Modification of extreme univariate outliers upon initial data screening was not necessary. General sample size criteria were met, as the minimum recommended number of participants is 15 per predictor variable (Stevens, 1996)

In the first step of hierarchical multiple regression, one predictor was entered: exercise identity (EI). This model was not statistically significant $F(1, 51) = 1.49, p > .05$. After entry of implicit identity (II) at Step 2 the total variance explained by the model as a whole was 14% ($F(2, 50) = 4.04, p < .05$). The introduction of II explained additional 11% of variance in reported physical activity behaviour, after controlling for EI ($R^2 \text{ Change} = .11, F(1, 50) = 6.44, p < .05$). In the final adjusted model only II contributed a significant Beta value ($\beta = .34, p < .05$). See Table 4 for detailed results.

A second hierarchical regression was conducted assessing the contribution of EI and II solely towards vigorous forms of exercise. In the first step of hierarchical multiple regression, one predictor was entered: exercise identity (EI). This model was statistically significant $F(1, 51) = 6.16, p < .05$ and explained 11% of the variance in vigorous physical activity. After entry of implicit identity (II) at Step 2 the total variance explained by the model as a whole was 16% (F

(2, 50) = 4.69, $p < .05$). The introduction of II explained additional 5% of variance in reported physical activity behaviour, after controlling for EI (R^2 Change = .05, $F(1, 50) = 2.98, p < .05$). In the final adjusted model both EI ($\beta = .29, p < .05$) and II ($\beta = .23, p < .05$) contributed a significant Beta value. See Table 5 for detailed results.

Discussion

We ventured that the measures of explicit identity (EI) and implicit identity (II) would be principally distinct from one another (H_1). Results verified this primary assumption, as EI and II were not related in a significant manner. Past research offers corroborative support in the form of meta-analytical data (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). Explicit exercise identity may be pertinent in understanding when individuals engage in the dynamic process of mindful self-regulation. Conversely, in line with previous findings, unconsciously embedded self-regulations may factor more forthrightly into unplanned types of physical activity (Devos & Banaji, 2003; Banting, Dimmock, & Lay, 2009; Berry & Strachan, 2012). This underscores the merit and distinctiveness of an implicit identity measure to evaluate characteristics of the self that are problematic to gauge effectively. From these data, we advance the subsequent germane definition of implicit identity: *the magnitude of integration exercise maintains within the self that people are either unable or unwilling to inform*.

Secondly, we speculated that those individuals with exercise identities that ranked higher on the salience hierarchy would score significantly higher on EI and II measures than those whose exercise identities were not as salient (H_2). This prediction was firmly substantiated. With respect to EI, this finding was wholly expected because of the explicit nature of both measures: salience ranking and EI. In both instances, subjects had to deliberately indicate how much exercise meant to their sense of self (more so in a relative sense for the salience rankings rather

than objectively for EI) and mark their responses, explicitly, on a questionnaire. Yet for II, although we expected this result, the level of distinction was especially reassuring. This begs the questions: What are the internal cognitive dynamics operating that bring this result to bear? In terms of neurological models of response selection, the ‘horse-race analogy’ offers a capable justification (Gurney, Prescott, & Redgrave, 2001). The fastest ‘horse’ (i.e., mental representation with the strongest salience) will command one’s role-related identity and thusly regulate behaviour. Accordingly, the immediacy of the implicit association will dictate the reaction times, used to infer one’s automated, instinctive feelings about the target behaviour in question, exercise.

Thirdly, we hypothesized that implicit identity, even after controlling for the effects of explicit identity, would significantly predict exercise behaviour (H_3). This hypothesis was also supported, for both total exercise and vigorous-only exercise. Previous research has demonstrated that medium-to-large changes in explicit cognitions (e.g., intention) yield only small-to-medium changes in absolute behaviour change (Webb & Sheeran, 2006). This further provides support for dual process models of behaviour, as mechanisms beyond conscious considerations are indeed actively enacting decision patterns. These implicit attitudes are not responsive to systematic reflection. In fact, emerging research infers that even after controlling for explicit motivational beliefs (e.g., efficacy beliefs, perceived behavioural control, etc.) implicit attitudes are able to positively predict physical activity (Conroy, Hyde, Doerkson, & Ribeiro, 2010). Similarly, the predictive power of models in forecasting healthy behaviours (i.e., dental flossing) is significantly bolstered with the inclusion of implicit responses (Millar, 2011). Our research findings substantiate this emerging line of evidence.

Implications, Limitations, and Future Directions

This study was one of the first to measure exercise identity implicitly (via II) while also positioning itself as the first to relate salience rankings directly to measures of exercise identity (both explicitly and implicitly). In doing so, these results further highlighted the integral nature of identity and its relationship to role-related exercise behaviour. The utility of implicit measures becomes clearer with each passing year. Implicit measures are straightforward assessments of the internalized cognitive mechanisms that sway our behavioral choices. Moreover, these implicit measures are quite resistant to social-desirability biases thus exhibiting not only favorable predictive validity, but also robust ratings of internal validity as well.

With respect to potentially altering identity and associated attitudes, two methods will be discussed: evaluative conditioning (EC) and implementation intentions, also known as if-then plans. Firstly, EC refers to “a change in the valence of a stimulus (the effect) that is due to the pairing of that stimulus with another positive or negative stimulus (the procedure)” (Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010, p. 390). Recently, researchers used an EC procedure to expose participants to the pairing of snacks with unpleasant pictures of heart disease or obesity (Hollands, Prestwich, & Marteau, 2011). Then, the implicit preference for the unhealthy snack was compared to that of a piece of healthy fruit. Both options, the snack and the fruit, were “offered” as a reward for completing the study. EC reduced both the implicit favorability of the snack and the likelihood that the participants ended up choosing the snack in lieu of the fruit. These results indicate that EC offers a promising avenue of exploration to determine if implicit preferences for sedentary behaviour (vs. physical activity) can be altered.

The second possible method to induce a change in one’s identity involves implementation intentions (Sheeran, Gollwitzer, & Bargh, 2013). Implementation intentions are if-then plans that link important situational cues towards goal-oriented behaviours in the format of *if(cue)–*

then(response). When people initially set goals for themselves, they can subsequently map out a mental action plan for how these goals will be achieved. This planning step will automatize the controlled action phase in such a way that, despite the goal having been set consciously, subsequent actionable attempts to meet said goal will materialize in a more subliminal, automatic manner. For example, if individuals themselves set conscious goals (e.g., “I will take the stairs instead of an elevator when both options are present.”) and bolster these goals with if-then plans indicating how to act upon this goal at critical moments (e.g., “And if I see an elevator I will focus my vision towards the nearest stairwell and briskly walk towards it!”), goal seeking becomes less and less counteracted by the initial default behaviour (i.e., taking the elevator because it requires less effort or is faster). Rather, it becomes increasingly intuitive (i.e., automatic) to locate the nearest set of stairs and induce a previously lacking active form of transportation. As such, both EC and implementation intentions offer promising forms of redirecting awards towards actionable, healthful behaviour. EC in particular could be a means of enhancing one’s exercise salience while implementation intentions may be a fruitful way of retraining one’s unconscious behavioural tendencies towards more exercise-inclined alternatives. Both pathways, as they pertain to exercise identity, warrant future research.

In searching for limitations within this study, we felt that a more objective measure of physical activity would have been applicable. With activity trackers (e.g., Apple Watch, Fitbit, etc.) becoming more refined and commonplace, distancing ourselves from the reliance on two-week recall via questionnaire may have been appropriate. This is especially crucial given our advocacy for the integration of more objective forms of identity measurement (i.e., II) in future research projects. Objective activity trackers, if of sufficient reliability, would go a long way to curtail self-report errors and biases. In a similar vein, it would be reasonable to parse out the

various forms of exercise; more particularly, the planned, intentional exercise versus unplanned, unintentional exercise. Previous evidence has suggested that parallel explicit and implicit motivational systems exist for intentional and unintentional components of physical activity, respectively (Conroy, Hyde, Doerkson, & Ribeiro, 2010). This study may have been more robust had it accurately determined if unintentional forms of activity were differentially affected by EI and II. This is important in light of more recent evidence concluding that NEAT (non-exercise activity thermogenesis; e.g., cooking, cleaning) plays a key role in weight loss (Hunter, Fisher, Neumeier, Carter, & Plaisance, 2015). Activity trackers may also play a pivotal role in appraising divergences between prearranged, deliberate exercise and the ebb and flow of unplanned movement. Lastly, our sample was quite diverse. Although a wide age-range can be an advantage, we aren't able to entirely rule out heterogeneity as a potentially restrictive influence on the evaluation of identity salience (i.e., an academic identity or a political identity might bear a different connotation to a 22 year old person than a 52 year old person).

In future research, we might want to better comprehend the temporal nature of implicit identity. For example, does implicit identity emerge developmentally prior to explicit identity? It would be prudent to answer that question. More generally, it would be advisable to build comprehensive models that better predict total physical activity throughout one's day. This will help researchers to generate improved interventions aimed at addressing both the conscious and subconscious processes essential in diminishing sedentary behaviour and increasing exercise behaviour. Accordingly, more extensive conceptual analyses of moderator effects are required to more effectively administer interventions geared at remodeling implicit attitudes. Investigations in our field must continue the trend beyond correlational-type studies that preclude causal implications.

Future researchers may want to explore if other tests besides the IAT may better assess aspects of implicit identity. For example, Thematic Apperception Test (TAT; Murray, 1943) is one tool that has been since modernized to measure various constructs (i.e., implicit motivation) that hold predictive validity in a variety of applications, including achievement and persistence (McClelland, 1999; Winter, 1999). Lastly, we must also conduct more forms of applied research that benefit knowledge translation to the practitioner level. Research on how to design legitimate implicit attitude modification sessions are warranted. Hence, although steady progress is being made in the fields of exercise identity and implicit attitudes, there are opportunities abound that hold promise towards shaping a healthier society.

Table 1.
Descriptive Statistics for Demographic Information

Outcome Variable	Mean	SD	Range Possible	Range Reported
Exercise	39.33	14.04	0 - 63	18-63
Identity (EI)				
Implicit	.45	.61	- INF - INF	-1.44 – 1.61
Identity (II)				
Vigorous	134.48	149.65	0 - INF	0 – 720.00
Follow-Up				
Moderate	134.41	116.07	0 - INF	0 – 455.00
Follow-Up				
Mild Follow-Up	316.08	243.65	0 - INF	0 – 840.00

Note. INF represents the concept of infinity. Follow-up exercise data is reported in METS, which is a metabolic equivalent. Scores were derived by using a multiple for each of mild (3.3 METs X walking days X walking minutes), moderate (4.0 METs X moderate days X moderate-intensity activity minutes), and vigorous (8.0 METs X vigorous days X vigorous-intensity activity minutes) activity.

Table 2.

Bivariate correlations, means, and standard deviations of key variables

Outcome Variable	1.	2.	3.	4.	5.
1. Exercise Identity (EI)	-				
2. Implicit Identity (II)	.19	-			
3. Vigorous Follow-Up	.33*	.28*	-		
4. Moderate Follow-Up	-.02	.19	.31*	-	
5. Mild Follow-Up	-.14	.19	-.09	.23	-

*Correlation is significant at the 0.05 level (2-tailed)

Table 3.

EI and II differences between High-Salient and Low-Salient Exercise Identities

Group	Saliency	Mean (SD)	t	df	Sig. (2-tailed)
Implicit Identity (II)	High-salient identity (N = 33)	.54 (.57)	3.00	44	< 0.01
	Low-salient identity (N = 13)	-.05 (.69)			
Explicit Identity (EI)	High-salient identity (N = 33)	47.47 (10.24)	6.01	44	< 0.01
	Low-salient identity (N = 13)	26.77 (11.54)			

Note. The participant was categorized as ‘high-salient’ if his/her exercise identity ranked within the top three of (seven) possible identities. Conversely, the participant was categorized as ‘low-salient’ if his/her exercise identity ranked within the top bottom three of (seven) possible identities. Mean scores for II are represented as effect sizes. Mean scores for EI are represented as the reported means from the Exercise Identity Scale.

Table 4.

Summary of Hierarchical Regression Analysis for Variables Predicting All-Form Physical Activity

	<i>R</i>	<i>R</i> ²	<i>R</i> ² <i>Change</i>	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1	.17	.03					
EI				19.48	15.95	.17	.23
Step 2	.37	.14*	.11*				
EI				12.02	15.45	.10	.78
II				903.33	356.07	.34*	2.54

Note. *N* = 53; **p* < .05

Table 5.

Summary of Hierarchical Regression Analysis for Variables Predicting Vigorous Physical Activity

	<i>R</i>	<i>R</i> ²	<i>R</i> ² <i>Change</i>	<i>B</i>	<i>SE</i>	β	<i>t</i>
Step 1	.33	.11*					
EI				3.50	1.41	.33*	2.48
Step 2	.40	.16*	.05*				
EI				3.04	1.41	.29*	2.15
II				56.09	32.49	.23*	1.73

Note. *N* = 53; **p* < .05

References

- American College of Sports Medicine. (2013). *ACSM's guidelines for exercise testing and prescription*. Lippincott Williams & Wilkins.
- Anderson, D. F., & Cychoz, C. M. (1994). Development of an exercise identity scale. *Perceptual and Motor Skills, 78*, 747-751.
- Anderson, D. F., & Cychoz, C. M. (1995). Exploration of the relationship between exercise behavior and exercise identity. *Journal of Sport Behavior, 18*(3), 159-166.
- Anderson, D. F., Cychoz, C. M., & Franke, W. D. (1998). Association of exercise identity with measures of exercise commitment and physiological indicators of fitness in a law enforcement cohort. *Journal of Sport Behavior, 21*, 233-241.
- Anderson, D. F., Cychoz, C. M., & Franke, W. D. (2001). Preliminary exercise identity scale (EIS) norms for three adult samples. *Journal of Sport Behavior, 24*, 1-9.
- Banting, L. K., Dimmock, J. A., & Lay, B. S. (2009). The role of implicit and explicit components of exerciser self-schema in the prediction of exercise behaviour. *Psychology of Sport and exercise, 10*(1), 80-86.
- Berry, T. & Strachan, S. (2012). Implicit and explicit exercise and sedentary identity. *Research Quarterly for Exercise and Sport, 83*(3), 479-484.
- Bosson, J., Swann, W. B., Jr., & Pennebaker, J. (2000). Stalking the perfect measure of implicit self-esteem: The blind men and the elephant revisited? *Journal of Personality and Social Psychology, 79*, 631-643.

- Buhrmester, M. D., Blanton, H., & Swann Jr, W. B. (2011). Implicit self-esteem: nature, measurement, and a new way forward. *Journal of personality and social psychology*, *100*(2), 365.
- Burke, P. J. (1980). The self: Measurement requirements from an interactionist perspective. *Social Psychology Quarterly*, *43*, 18-29.
- Burke, P. J. (2006). Identity change. *Social Psychology Quarterly*, *69*, 81-96.
- Calitri, R., Lowe, R., Eves, F. F., & Bennett, P. (2009). Associations between visual attention, implicit and explicit attitude and behaviour for physical activity. *Psychology & Health*, *24*, 1105-1123.
- Callero, P. (1985). Role identity salience. *Social Psychology Quarterly*, *48*(3), 203-215.
- Cardinal, B.J., & Cardinal, M.K. (1997). Changes in exercise behaviour and exercise identity associated with a 14-week aerobic exercise class. *Journal of Sport Behaviour*, *20*, 377-386.
- Conroy, D. E., Hyde, A. L., Doerkson, S. E., & Ribeiro, N. F. (2010). Implicit attitudes and explicit motivation prospectively predict physical activity. *Annals of Behavioral Medicine*, *39*, 112-118.
- Craig, C. L., Marshall, A. L., Sjostrom, M., Bauman, A.E., Booth, M. L., Ainsworth, B.E., Pratt, M., Ekelund, U., Yngve, A., Sallis, J. F., & Oja, P. (2003). International physical activity questionnaire (IPAQ): 12-country reliability and validity. *Medicine and Science in Sport and Exercise*, *35*, 1381-1395.

- Devos, T., & Banaji, M. R. (2003). Implicit self and identity. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 153–175). New York, NY: Guilford Press.
- Devos, T., & Banaji, M. R. (2005). American = White? *Journal of Personality and Social Psychology*, *88*, 447–466.
- Epstein, S. (2006). Conscious and unconscious self-esteem from the perspective of cognitive-experiential self-theory. In M. H. Kernis (Ed.), *Self-esteem issues and answers: A sourcebook of current perspectives* (pp. 69–76). New York, NY: Psychology Press.
- Evans, J. S. B. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology*, *59*, 255-278.
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, *74*, 1464-1480.
- Greenwald, A. G., Banaji, M. R., Rudman, L. A., Farnham, S. D., Nosek, B. A., & Mellot, D. S. (2002). A unified theory of implicit attitudes, stereotypes, self-esteem, and self-concept. *Psychological Review*, *109*, 3–25.
- Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the implicit association test: I. An improved scoring algorithm. *Journal of personality and social psychology*, *85*(2), 197.
- Greenwald, A. G., Poehlman, T. A., Uhlmann, E. L., & Banaji, M. R. (2009). Understanding and using the implicit association test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology*, *97*, 17-41.

- Gurney, K., Prescott, T. J., & Redgrave, P. (2001). A computational model of action selection in the basal ganglia: I. A new functional anatomy. *Biological Cybernetics*, *84*, 401-410.
- Harju, B. L., & Reed, J. M. (2003). Potential clinical implications of implicit and explicit attitudes within possible exercise selves schemata: A pilot study. *Journal of Clinical Psychology in Medical Settings*, *10*(3), 201-208.
- Hofmann, W., De Houwer, J., Perugini, M., Baeyens, F., & Crombez, G. (2010). Evaluative conditioning in humans: A meta-analysis. *Psychological Bulletin*, *136*, 390-421.
- Hofmann, W., Friese, M., & Wiers, R. W. (2008). Impulsive versus reflective influences on health behavior: A theoretical framework and empirical review. *Health Psychology Review*, *2*, 111–137.
- Hollands, G. J., Prestwich, A., & Marteau, T. M. (2011). Using aversive images to enhance healthy food choices and implicit attitudes: A experimental test of evaluative conditioning. *Health Psychology*, *30*, 195–203.
- Hunter, G. R., Fisher, G., Neumeier, W. H., Carter, S. J., & Plaisance, E. P. (2015). Exercise training and energy expenditure following weight loss. *Medicine and Science in Sport and Exercise*.
- Koole, S. L., Dijksterhuis, A., & van Knippenberg, A. (2001). What's in a name: implicit self-esteem and the automatic self. *Journal of personality and social psychology*, *80*(4), 669.
- McClelland, D. C. (1999). How the test lives on: Extensions of the Thematic Apperception Test approach. In L. Gieser & M. I. Stein (Eds.), *Evocative images: The Thematic*

Apperception Test and the art of projection (pp. 163–175). Washington, DC: American Psychological Association. doi:10.1037/10334-012.

Mead, G. H. (1934). *Mind, self and society: From the standpoint of a social behaviorist* (Ed. with intro by C. W. Morris.). Chicago: University of Chicago Press. Miller.

Mead, G. H. (1967). Bibliographical note. *The American Journal of Sociology*, *72*(5), 551-557.

Merolla, D. M., Serpe, R. T., Stryker, S., & Schultz, P. (2012). Structural precursors to identity processes: The role of proximate social structures. *Social Psychology Quarterly*, *75*(2), 149–72.

Millar, M. G. (2011). Predicting dental floss behaviour: The role of implicit and explicit responses and beliefs. *Basic and Applied Social Psychology*, *33*, 7-15.

Millisecond Software Inquisit 3.0 [Computer software]. (2008). Seattle, WA: Millisecond Software.

Murray, H. A. (1943). Thematic apperception test.

Olson, M. A., Fazio, R. H., & Hermann, A. D. (2007). Reporting tendencies underlie discrepancies between implicit and explicit measures of self-esteem. *Psychological Science*, *18*(4), 287-291.

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

Rosenburg, M. (1979). *Conceiving the self*. New York: Basic Books.

Serpe, R. T. (1987). Stability and change in self: A structural symbolic interactionist perspective. *Social Psychology Quarterly*, *50*, 40-55.

Sheeran, P., Gollwitzer, P. M., & Bargh, J. A. (2013). Nonconscious processes and health. *Health Psychology*, *32*, 460-473.

- Stets, J. E., & Burke, P. J. (2003). A sociological approach to self and identity. In M. R. Leary, & J. P. Tangney (Eds.), *Handbook of self and identity* (pp. 128–152). New York: The Guilford Press.
- Stevens J. (1996). *Applied multivariate statistics for the social sciences*, 3rd ed. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Strachan, S. M., & Brawley, L. R. (2008). Reactions to a perceived challenge to identity. *Journal of Health Psychology, 13*, 575-588.
- Strachan, S. M., Brawley L. R., Spink K. S., & Jung, M. E. (2009). Strength of exercise identity and identity-exercise consistency. *Journal of Health Psychology, 14*(8), 1196-1206.
- Strachan, S. M., Flora, P. K., Brawley, L. R., & Spink, K. S. (2011). Varying the cause of a challenge to exercise identity behaviour: Reactions of individuals of differing identity strength. *Journal of Health Psychology, 16*(4), 572-583.
- Strachan, S. M., Woodgate, J., Brawley, L. R., & Tse, A. (2005). The relationship of self-efficacy and self-identity to long-term maintenance of vigorous physical activity. *Journal of Applied Biobehavioural Research, 10*, 98-112.
- Stryker, S. (1968). Identity salience and role performance. *Journal of Marriage and the Family, 4*, 558– 564.
- Stryker, S. (1980). *Social interactionism: A social structural version*. Menlo Park, CA: The Benjamin/Cummings Publishing Company.
- Stryker, S. (2008). From Mead to structural symbolic interactionism and beyond. *Annual Review of Sociology, 34*, 15–31.

- Stryker, S. & Serpe, R. T. (1982). Commitment, identity salience, and role behaviour: Theory and research example. In W. Ickes & E. S. Knowles (Eds.), *Personality, roles, and social behaviour* (pp. 199-218). New York: Springer-Verlag.
- Stryker, S. & Serpe, R. T. (1994). Identity salience and psychological centrality: Equivalent, overlapping, or complementary concepts? *Social Psychology Quarterly*, 57, 16-35.
- Webb, T. L. & Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychological Bulletin*, 132, 249-268.
- Wilson, T. D., Lindsey, S., & Schooler, T. Y. (2000). A model of dual attitudes. *Psychological Review*, 107, 101–126.
- Winter, D. G. (1999). Linking personality and "scientific" psychology: The development of empirically derived Thematic Apperception Test measures. In L., Gieser & M. I., Stein (Eds.), *Evocative images: The Thematic Apperception Test and the art of projection* (pp. 107–124). Washington, DC: American Psychological Association.

STUDY 3

EXERCISE IDENTITY AND SELF-PRESENTATIONAL RESPONSES TO A 6-WEEK PHYSICAL ACTIVITY PLUS IMAGERY INTERVENTION

Benefits of regular exercise are publicized throughout local communities, in the mass media, and in academic publications. Canadian and international guidelines commonly cite 150 minutes of moderate-vigorous exercise per week as the minimum standard to obtain substantial health benefits (Haskell et al., 2007). Yet, current findings suggest that a mere 17% of men and 14% of women achieved the guidelines for adults, while just 9% of boys and 4% of girls ages 5 through 17 met the youth guidelines (Garriguet, Janssen, Craig, Clarke, & Tremblay, 2011). Research has demonstrated that those not meeting the minimum guidelines are at an increased risk for cardiovascular disease, stroke, type II diabetes, and certain forms of cancers (Warburton, Nicol, & Bredin, 2006). Moreover those meeting guidelines typically have better mental health, including decreased anxiety symptoms, lower levels of depression, and increased positive mood. Inadequate levels of exercise are not purely a Canadian problem, but a worldwide epidemic as well; The World Health Organization (WHO) forecasts that each year, virtually 2 million deaths are attributable to a deficiency in physical activity (World Health Organization, 2002). Fortunately, low levels of individual exercise are considered a modifiable risk factor and a reversible trend. As a result, researchers across the world are at work to develop and refine practical interventions to improve current physical activity levels.

Imagery

One such intervention, the use of imagery to increase physical activity levels, has been widely investigated and verified as an effective tool by researchers and exercise psychologists

alike. A classic definition by Denis (1985) describes imagery (occasionally referred to as mental practice, cognitive rehearsal, or visualization) in the following way:

Imagery is a psychological activity which evokes the physical characteristics of an absent object (either permanently or temporarily absent from the visual field). It is worth emphasizing here that imagery is not restricted to recollection of the appearance of static objects, but it extends to moving objects, objects undergoing transformations, in other words, to dynamic events. The scope of imagery is not limited to recalling objects or events that have been perceived in the past, but imagery also refers to objects or events that have not yet been accomplished. Imagery allows people to anticipate future (or even purely theoretical) events.

Numerous theories have been forwarded to explain how imagery functions and its effect on behaviours, moods, and cognitions. Early on, Sackett (1934) posited that mental practice gives the performer a chance to practice the order of movements as symbolic components of the task. Imagery aids motor mechanisms to the extent that one is able to cognitively process the characteristics of the task. During initial stages of learning, imagery may provide a rough blueprint of a task's cognitive elements that may assist in performance effects for novice individuals. With mental practice, feedback from various senses shape an architecture of cognitive elements that are useful to draw upon when the task is to be later executed.

Indications are that minor levels of muscular tension are psychologically preparing the performer for an appropriate level of arousal for future execution of a given task (Feltz & Landers, 1983). In the same way some submaximal pre-tension of the muscle has been shown to improve reaction times, the effect of imagery on doses of muscular innervation can partially explain how visualization enhances performance on speed and strength tasks. Accordingly,

imagery the action right before its execution can prime the muscles in a manner that allows for optimal proficiency throughout coordinated movements.

While much of the earlier studies had been aimed at sport-specific paradigms, Hall (1995), applying considerations from Bandura's (1986) social cognitive theory, initially suggested that imagery could work to incite positive motivational effects in the exercise domain, similar to those observed in sport. Hall's premise forwarded that self-efficacy, self-confidence, and outcome expectancies would all linearly impact physical activity participation. Chief to this proposition was that imagery could help modulate anxiety levels, such that participants could visualize themselves reaching positive achievements in an exercise setting. As a consequence, this mentally rehearsed performance attainment would boost self-confidence to such a degree that it would sustain favorable levels of anxiety, cyclically leading to added gains in confidence.

Imagery interventions have indeed been effective. In their widespread meta-analysis concerning the effects of mental practice, Feltz and Landers (1983) determined that although mental practice was not as effective as physical practice, mental practice provided a significant benefit over doing nothing at all. In fact, over a variety of fields, it has been confirmed that imagery added to physical practice is of more benefit than physical practice alone (Schuster et al., 2011). Specifically in the sport and physical activity domain, there have been a few published research findings that bear relevancy. Researchers have collaborated with coaches in an array of sports, including golf (Hammond, 2010), swimming (Post, Muncie, & Simpson, 2012), squash (O, Munroe-Chandler, Hall, & Hall, 2014), tennis (Guillot, Genevois, Desliens, Saieb, & Rogowski, (2012), badminton (Callow, Hardy, & Hall, 2001), and basketball (Post, Wrisberg, & Mullins, 2010) to successfully demonstrate the efficacy of imagery interventions.

Although more pervasive in sport, documented imagery interventions have been less

commonplace in the area of exercise and strength training. In one of the few studies conducted using imagery along with an applied exercise intervention, researchers conducted a 12-week cardio-focused exercise program (Duncan, Rodgers, Hall, & Wilson, 2011). Participants were randomized to one of three imagery groups targeting a specific type of self-efficacy (SE). Each group received 5-minute guided imagery sessions during week one, and were instructed to mentally practice their specific imagery script on the days they did not exercise. Analyses determined that task, coping, and scheduling SE were differentially impacted over time as a result of the unique imagery interventions. These results supported the authors' hypothesis that targeted, guided imagery sessions focusing on a certain type of SE would appropriately influence that specific type of SE more than the others. This points to the utility of imagery interventions in influencing specific exercise-related cognitions.

Although this study by Duncan and colleagues was pioneering in some of its discoveries, it was not without limitations. The attrition rate was high (only 61 of the initial 205 participants completed the study); the authors speculated that a more personalized training program might have helped to avert this problem. Secondly, despite its large sample size, the group consisted of females only. Lastly, a follow-up measure was not employed after the 12-week study terminated. It may have been prudent to examine self-reported exercise levels and exercise-related cognitions further down the road to ascertain if any differential effects persisted between the three imagery groups after study termination.

Research concerning the use of imagery to enhance strength training has also been scarce. However, the few results that have been published are encouraging. A prior study determined if imagery alone could enhance grip strength. Outcomes were promising, with participants in the imagery group exhibiting a strength increase of 23.3% from baseline (Smith, Collins, & Holmes,

2003). Additional studies have employed the PETTLEP imagery model to increase strength performance. The PETTLEP model was developed based on the principle of maximizing functional equivalence. The model aims to do so by addressing 7 integral components during the implementation of any motor-based imagery program: Physical, Environmental, Task, Timing, Learning, Emotion, and Perspective (Holmes & Collins, 2001).

One study examined imagery practice over 6 weeks to enhance a one-repetition maximum of a bicep curl (Wright & Smith, 2009). Fifty university students were divided evenly into five groups: a PETTLEP imagery plus physical training (combination) group, a physical training alone group, a PETTLEP imagery alone group, a traditional imagery alone group, and a control group. The traditional imagery group focused on the surroundings and actions rather than the feelings associated with the actions. Analyses revealed that the imagery plus physical training group, the physical training alone group, and the PETTLEP imagery alone group improved significantly from pre-test to post-test ($p < 0.05$), whereas the traditional imagery and control groups did not. Further, the combination training group improved significantly more than the PETTLEP imagery alone group, and marginally more than the physical training alone group. It was noted that using a combination of imagery and exercise might have been superior than exercise alone because it supports the further development of muscular strength without causing fatigue and associated decrements in muscular performance triggered by further physical practice (Wilmore & Costill, 1988). These findings reinforce the understanding that imagery can be a highly useful tool when used in conjunction with strength training adaptations. The authors noted that future imagery interventions must reflect how people truly exercise. This entails developing imagery programs to meet a diverse and complex set of body systems over the course of a strenuous and moderate-to-high variation training session, rather than simply using one select

movement (i.e., a bicep curl).

Self-presentation

While imagery interventions are effective at improving various outcomes of interest, more research is required on specific forms of imagery that target key psychosocial variables. Two of these constructs that offer promise in promoting physical activity and well-being are self-presentational concerns and exercise identity. Self-presentation is the attempt to control how the self is viewed by real or imagined audiences (Schlenker, 1980). It is carried out in an effort to direct how we are perceived or treated by others. Typically, people desire to self-present in a socially desirable manner by way of appearing intelligent, generous, physically attractive, and so forth. Research has demonstrated that self-presentational concerns are able to influence various behaviours within exercise settings such as activity choice, affect, and motivation (Leary, 1992). It has been suggested that these concerns can have multiple effects on exercise behaviour. Firstly, they can prompt people to exercise more, typically as a means of improving physical appearance, which generates a more positive impression. Conversely, they may act as a roadblock to sustained physical activity, as exercising may put a 'spotlight' on people and highlight their perceived lack of competence or negative aspects of their appearance (Leary). Self-presentation is generally manifested in physical activity settings in two common ways: self-presentational efficacy and social physique anxiety.

Self-presentational efficacy (SPE) is an individual's subjective confidence in his or her ability to be seen in a preferred way (Leary & Atherton, 1986). SPE has been linked to exercise in a variety of contexts (Gammage, Hall, & Martin Ginis, 2004). When individuals engage in physical activity, particularly in a social setting, and they expect to convey a desirable impression

(e.g., being seen by others as physically coordinated) it is more likely they will continue to engage in this behaviour. On the other hand, when people do not believe they can achieve this desirable social impression while exercising, decreases in future exercise behaviour may result. These results have been consistent findings throughout the literature (Lamarche, Gammage, Sullivan, & Gabriel, 2013). There is strong theoretical support for the underpinnings of this relationship, as self-efficacy has routinely been shown as the strongest correlate to physical activity (Troost et al., 2002). Further, SPE has demonstrated a meaningful correlation with the use of imagery (Gammage et al.), particularly for the function of attaining a fit-looking body (appearance) and performing a set of skills correctly (technique).

Social physique anxiety (SPA) is a construct that is manifested through a collection of cognitive and affective experiences (Schlenker & Leary, 1982). When we are concerned with the possibility that our body is being evaluated publically there may be tendencies to withdraw, feel inferior, or become preoccupied with one's self-image (Hart, Leary, & Rejeski, 1989). SPA has a mixed relationship with exercise behaviour, as it can either act to promote or deter exercise. However, it has been associated with greater appearance-related motives for exercise (Crawford & Eklund, 1994), negative perfectionism (Hasse, Prapavessis, & Owens, 2002), and is typically higher among the female population (Frederick & Morrison, 1996). It has been suggested that sociocultural pressures to look and perform a certain way in public settings lead to increases in SPA, which can in turn trigger a variety of maladaptive behaviours (e.g., disordered eating; Hasse et al.). In correlational analyses, SPA and SPE are inversely related (Gammage et al., 2004). Previous findings have indicated that simply believing others will see you as fit, toned, coordinated, or in shape is more important in reducing social physique anxiety than the broader belief that exercising will lead to personally desired outcomes (Maddux, Norton, & Leary, 1988).

Thus, it has been reasoned that future interventions aiming to increase physical activity would be better served addressing SPE rather than SPA, directly.

Exercise Identity

Besides self-presentational concerns, the development of a formidable exercise identity is another factor that has shown to be reliably allied with exercise. Identity theory (Burke & Tully, 1977; Stryker, 1987) forwards that the self-concept is a collection of beliefs about oneself, and therefore, a variety of self-identities are formed on the basis of the roles one occupies within society. Largely, we regard an identity as a set of meanings that define individuals in terms of certain roles, groups, or attributes within society. Thus, people have numerous identities and they are of different kinds (Stets & Serpe, 2013). The expectations and meanings of each particular identity set standards that inform behaviour. The availability and control of resources (the processes that sustain persons, materials, or interactions that permit role identification) play a central role in the development of an identity (Freese & Burke, 1994). That is, being surrounded by and maintaining a grasp of properties applicable to an identity benefit the process of role-identity formation. Brandth (2002) states it most plainly by saying that the concept of identity deals with who we are and who others are.

Researchers have associated the formation of an exercise identity with many health-promoting behaviours, including frequency of weekly exercise (Strachan & Brawley, 2008), total duration of weekly exercise (Anderson, Cychosz, & Franke, 1998), and vigorous exercise routines (Strachan, Woodgate, Brawley, & Tse, 2005). Moreover, prospective designs have confirmed the relationship between exercise identity and exercise behavior (Cardinal & Cardinal, 1997). Not only did this prospective design reveal a corresponding exercise behavior-exercise

identity relationship at every test point, but it was also discovered that week 1 and 7 exercise identity results were able to significantly predict continual exercise engagement through week 14 of the study. The evidence indicates that the strength of one's exercise identity is significantly related to exercise adherence. This is expressly important to researchers and practitioners given universally high dropout and non-adherence rates (Dishman, 1991).

Patterns of behavior are important in the development of an exercise identity. As people are immersed in physically active domains, their exercise identity is fortified, which in turn increases the likelihood they'll engage in additional physical activity down the road. This cyclical reinforcement is core to the advancement of a salient exercise identity, leaving the individual poised to value this identity as an important component of their self-concept.

As previously described, imagery has a substantiated track record of success within the purview of exercise interventions. To date, no published research has directly explored how developing an exercise identity can be included into an imagery program aimed at promoting sustained physical activity. However, some related work has examined how integrated regulation can be enhanced through an imagery plus exercise program (Duncan, Hall, Wilson, & Rodgers, 2012). Self-determination theory (SDT; Deci and Ryan 1985) is a universal theory that describes how understanding motivation can be useful in understanding long-term exercise behaviours. One of the autonomous types of extrinsic motivation - integrated regulation - describes motivation related to a sense of personal importance and self-identity. In fact, the authors stated that, "...it was hoped that allowing the participants to exercise in their preferred setting would help them to establish an exercise related identity that was consistent with their natural environment..." (Duncan et al., pg. 457). In our view, there is meaningful overlap between integrated regulation and EI.

Duncan and colleagues (2012) determined that a program of mental imagery plus cardiovascular exercise was effective in enhancing integrated regulation among a group of non-exercising women, as compared to a control group. This study was effective in demonstrating imagery designed at targeting certain exercise-related cognitions, despite an attrition rate of 43%. Building upon this constructive program, we believe that future research would do well to: feature a degree of 1-on-1 personal training to lessen dropout rate, incorporate both genders into the study design, integrate a strength training focus alongside a cardiorespiratory protocol, and compare various forms of imagery content to determine if certain forms are more effective than others. Given the proven track record of both imagery and identity within the literature, we believe this would be worthwhile to explore their joint effectiveness.

In addition to exercise identity, self-presentation does have somewhat of an established relationship among imagery interventions. Gammage, Hall, and Rodgers (2000) showed that appearance and technique imagery accounted for 22.9% of the variance in these self-presentational concerns. This demonstrates that self-presentational concerns (i.e., the motivation to foster a desired impression) are effectively related to imagery use. Accordingly, individuals who have a strong desire to be viewed as an exerciser (e.g., as active and toned) might visualize themselves in such a light. In a separate study, researchers concluded that appearance imagery alone accounted for significant variance in social physique anxiety; that is, imaging the desired outcomes of exercise may have actually served to increase anxiety (Gammage, et al., 2004). Yet, the researchers posited that self-presentational efficacy (SPE) may mediate the imagery-SPA relationship. This suggests that contextually specific indications of self-efficacy may partly buffer the relationship between imagery use and its psychosocial outcomes. This forwards the notion that, if used correctly, SPE imagery could very well serve to decrease anxiety, much like it

does in sport-focused trials (Vadocz, Hall, & Moritz, 1997).

Hence, we are faced with the prospect of testing the utility of both exercise identity-based imagery (EII) along with SPE-based imagery (SPEI). In light of this, our purpose is to compare the efficacy of EII and SPEI, distinctly, via the examination of key psychosocial and physical outcome measures; namely: EI, SPE, SPA, cardiorespiratory (aerobic) fitness, core strength, and upper body strength. More specifically, we aim to find out if EI imagery and SPE imagery differentially affect these outcomes through a multi-week, personalized physical activity intervention with integrated follow-up. We hypothesize that i) EII will be more effective in increasing EI than SPEI, ii) SPEI will be more effective in increasing SPE than EII, iii) both EII and SPEI will be effective in decreasing SPA, and iv) that measures of fitness will increase significantly across both groups and be maintained through follow-up.

Method

Participants

The participants were 30 infrequent exercisers attending a Canadian University. 24 completed the program and were included in the analysis. The sample was composed of both males ($n = 19$) and females ($n = 5$), while their ages ranged from 21 to 35 ($M = 26.75$, $SD = 3.60$) Of the participants, 17 indicated that they were full-time undergraduate students, while the other 7 indicated they were enrolled in graduate studies. Caucasian was the predominant ethnicity ($n = 10$) while Asian ($n = 7$), Middle-Eastern ($n = 5$), and Latino ($n = 2$) comprised the remaining portion of our sample. Eligibility criteria included being between the ages of 18 and 40, enrolled as a full-time university student, and not having exercised more than once per week for the period of at least 6 months prior to study enrolment. Potential participants were excluded

if they possessed any major contraindications to exercise that may have impaired with the progress of an exercise program (i.e., heart problems, recent injury, pregnancy). A flow chart of the participants can be seen in figure 1. An online power calculation was conducted in order to determine sample size requirements.

Measures

Exercise Identity (EI). The Exercise Identity Scale (Anderson & Cychosz, 1994) measures how important being ‘an exerciser’ is to one’s sense of self. EI is assessed on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). The scale consists of 9-items, therefore 63 is the highest possible identity score, and represents exercise as a thoroughly internalized behaviour that is fundamentally important to one’s self-concept. Two sample items used in the survey are ‘I have numerous goals relating to exercise’ and ‘I would feel a real loss if I were forced to give up exercising’. This scale has demonstrated strong convergent validity, internal consistency, and test-retest reliability in previous studies (Anderson & Cychosz, 1995). Internal reliability for this measure in the present study was satisfactory at each time point ($\alpha = 0.94$, 0.94, and 0.91, respectively).

Self-Presentational Efficacy (SPE). SPE was assessed using a 5-item Self-Presentational Efficacy Scale developed by Gammage, Hall, and Martin Ginis (2004). This scale was designed to measure the extent of the participant’s confidence in their ability to present themselves favourably in the following five dimensions: physical coordination, tone & fitness, stamina, exercising habitually, and being in good shape. Anchors ranged from 0% (not at all confident) to 100% (completely confident). An example of one such item was, “these other people will think that (I) have good stamina.” This scale has demonstrated sufficient validity and reliability (Lamarche, Gammage, Sullivan, & Gabriel, 2013). Internal reliability for this measure

in the present study was satisfactory at each time point ($\alpha = 0.92, 0.90,$ and $0.90,$ respectively).

Social Physique Anxiety (SPA). SPA was assessed using the 9-item Social Physique Anxiety Scale developed by Martin, Rejeski, Leary, McAuley, and Bane (1997). This questionnaire appraises the anxiety experienced by individuals when they perceive their physique to be evaluated by others. Each item was rated on a 5-point Likert scale ranging from 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*). An example of one such item was, “It would make me uncomfortable to know others were evaluating my physique/figure.” In the present study, internal reliability was satisfactory at each time point ($\alpha = 0.88, 0.88,$ and $0.88,$ respectively).

Cardiorespiratory Fitness. All participants completed a single-stage submaximal treadmill-walking test established by Ebbeling, Ward, Puleo, Widrick, and Rippe (1991) to estimate VO_{2max} . The submaximal protocol, which has been determined suitable for healthy, non-athletic adults, consisted of two 4-min phases. The first 4 minutes consists of a warm-up where participants walk at 3.4mph in order to reach a heart rate somewhere in the range of 50-70% of their HR_{max} . Following the warm-up, the participants are kept at the same speed for an additional 4 minutes at a grade inclined to 5%. The average heart rate of the final 20 seconds of this incline phase is recorded (termed the steady state heart rate; ssHR). The participant is then permitted 2 minutes at a lower speed to “cool-down” allowing their heart rate to return closer to its resting level. An estimated VO_{2max} is consequently determined using the following equation:

Estimated VO_{2max} (in $mL \cdot kg^{-1} \cdot min^{-1}$) = $15.1 + (21.8 \times \text{speed in mph}) - (0.327 \times \text{ssHR in bpm}) - (0.263 \times \text{speed} \times \text{age in years}) + (0.00504 \times \text{ssHR} \times \text{age in years}) + (5.98 \times (1 \text{ if male, } 0 \text{ if female}))$.

Upper-Body Strength. A push up test was used to gauge progress in upper-body strength. Participants were instructed both verbally and through a demonstration how to do a technically sound push up. They were instructed to keep a straight neck, keep their shoulders stable, place their hands under the plane of their shoulders, keep their hips and torso straight, and to go through the full range of motion in a controlled tempo. Sixty seconds was allotted for each person to complete as many push ups as they could, so long as proper form was maintained throughout.

Core-Endurance. A maximum sit up test was conducted to note progress in core strength/endurance. Participants were provided a yoga mat, and given instruction how to complete a technically sound sit up. They were told to relax their neck muscles, keep their feet flat on the floor while bending their knees to form a “triangle”, and to sit up until roughly a 45 degree angle was created between their back and the floor, while their fingers on each hand touched the top of their knees (without “swinging” upwards to create momentum). In order to control for variability between subjects, a metronome set at 45_{bpm} was used to ensure a standardized pace. At each beat of the metronome, the participant would sit up, wait for the next beat, and return to starting position. At this pace 22 ½ full sit ups would be completed each minute. This test was continued until either the participant fell off pace or they voluntarily stopped due to fatigue.

Exercise Behaviour Follow-Up. A four-week exercise follow-up measure, which commenced immediately after the program post-test results were obtained, was carried out. Each of the 24 participants that remained in the study was sent an email with an embedded table template. The table was easy to follow and provided columns for each participant to record his or her date, location, duration, and intensity of exercise, along with a brief (< 10 word) description

of the physical activity.

In addition, a subsample of participants was randomly selected to have their participation objectively assessed. Participants were told in the laboratory that they might be randomly selected to determine the accuracy of their reported exercise habits. This was made possible since the University's Recreation Centre maintains a log of entry-exit times to the gym using a card-swipe system. The reported accuracy of 8 participants (one-third of the remaining sample, 4 from each group) was appraised at random. It was determined that of the reported exercise that took place in the university gym, 100% of the log details provided correctly matched the computer system's register. This quality assurance authenticated the veracity of the follow-up data.

In order to calculate a value for exercise, the sum of all exercise (in minutes) with a Borg intensity (Borg, 1982) of greater than or equal to 15 was added, and divided by 4 (number of follow-up weeks), thus providing an average weekly duration of 'vigorous intensity exercise'. '15' was chosen as the relevant cut-point as this is where exercise transitions to "hard" as indicated on the visual-numeric Borg scale. The sum of all exercise (in minutes) with a Borg intensity of less than or equal to 14 was added, and divided by 4, thus providing an average weekly duration of 'low-moderate intensity exercise'.

Demographic Questionnaire. At baseline participants were asked to complete a demographic questionnaire, which gathered information about age, ethnicity, exercise frequency, and university program. In addition, the investigator obtained participant weight and height, however this was merely to provide an initial snapshot of the sample. Participant goals varied widely from slimming down (weight loss) to increased muscle mass (weight game), therefore assessing BMI would not have been an appropriate outcome measure.

Procedure

Recruitment. Prior to participant recruitment, this study was granted approval by the host university's research ethics board. Program coordinators from many of the major university departments (e.g., English, Engineering, Dentistry) were emailed directly with the request of forwarding an invitation for the current study. Seven faculties agreed to forward their students the following message: "Students who are inactive but willing to take part in a 6-week guided exercise program are invited to take part in a research study on campus. You will be provided with free 1-on-1 guidance at the Rec Centre with an exercise facilitator. All exercise can be completed at your own convenience. For more information and to determine your eligibility for the study, please contact our research team at the email below...". Interested individuals who contacted the investigator were provided with the letter of information via e-mail and screened for eligibility using demographic and PAR-Q questionnaires. The PAR-Q helps determine if individuals are presently ready for an exercise regimen or if they should first consult with their physician (Thomas, Reading, & Shephard, 1992).

Randomization. The first 30 interested parties who met the inclusion and exclusion criteria were included in the study. Two groups were randomly generated, with 15 participants in each group: the exercise identity imagery + exercise group (EII) and the self-presentational efficacy imagery + exercise group (SPEI). There were 3 exercise facilitators who were responsible for the training of 10 participants each, over the course of the 6-week imagery + intervention. Consequently, a repeated-block randomization structure was employed, using gender as the first block to ensure that a roughly matched number of males and females were assigned to each imagery condition. Next, each of the 3 exercise facilitators was assigned 5 participants from each of the imagery conditions, again employing a gender-block method to ensure the gender breakdown remained as close to even as possible between the 3 exercise

facilitators.

Pre-test. The 30 interested participants who agreed to go forward with the study were scheduled for a 30-minute initial assessment sometime during the calendar week before the intervention commenced. Study protocol was explained in detail, any questions the participants had were answered, and informed consent was obtained by signature. Participants were informed that the purpose of the study was to assess how different types of imagery effect psychological and physical outcomes over the course of a prescribed exercise program. Demographic information was obtained, the questionnaire package was completed, and the participants completed the PAR-Q. Next, participants performed the 8-minute Ebbeling sub-maximal fitness test. Lastly, participants completed both the max-push up and sit up endurance tests. All fitness assessments (pre-, post-, and follow-up) were conducted by the same research investigator to preserve reliability. The investigator was a PhD-level kinesiologist with first aid and CPR certification.

Imagery. Each participant was randomly assigned to listen to either the EII script or the SPEI script. The goal of each script was to enhance the respective identity/efficacy in each individual. The EII script was created first and was 1,056 words in length (6:30 recorded audio). It incorporated both generic (e.g., “You put on your workout attire and place your bag securely inside a locker. You sit down on the wooden benches in front of the lockers to tie your shoes”) and central, targeted elements. These 13 *central phrases* were the sole variances between the EII script and the SPEI script. The central phrases for the imagery script (e.g., If you were forced to turn back from this exercise session now, you would feel a real loss.) were selected and integrated by a researcher whose academic area of interest is exercise identity. The completed script was then sent to a researcher whose academic area of interest is self-presentational

concerns, whereby each of the 13 central phrases were replaced with ones chosen to augment self-presentational efficacy (e.g., you fit in with others at the gym, and they can tell you belong too). Thus, each script was identical excluding the central, theoretical underpinnings designed to enhance cognitions by group designation. Both scripts were then sent to a 3rd, independent researcher for a quality comparison check. Together, the scripts integrated elements from validated applied imagery models to bolster effectiveness (PETTLEP: Holmes & Collins, (2001); cognitive & motivational functions of imagery: Paivio [1985]).

The duplicate generic content of each script was slightly modified at the conclusion of weeks 2 and 4 during the 6-week intervention. This served two purposes. First, the changes reflected subtle changes more closely aligning the increasing familiarity with the gym with the content of the script. That is, after the first two weeks the script would no longer “welcome” the participants to the “new” gym. Second, in anticipation that participants would become progressively more uninterested by listening to the same script 3 times per week over the course of the 6-week intervention, it was decided that some form of variation would assist in script adherence.

Each version of the script was recorded using audio editing software on a MacBook computer, and the audio file was emailed to each participant so they were could listen on a device of their choosing (laptop, iPod, phone, etc.). Participants were instructed to listen to their imagery script 3 times each week; once immediately prior to their gym session, and twice at their own convenience at any time they could find a quiet place to close their eyes and carry out the visualization. One imagery session was carried out on the exercise facilitator’s phone, with the facilitator present, to ensure that every participant was at minimum engaging in one imagery session every week during the program.

Exercise Program. Each participant was prescribed to go to the Recreation Centre three times per week at their own convenience. On one of these sessions they were accompanied by their exercise facilitator for one-on-one guidance. The purpose of this was to provide support to the participant so that they were able to familiarize themselves with the gym, while also receiving instruction on how to carry out effective exercises when they went alone. The exercise routine for each participant (with their facilitator) was designed to be one hour in length, as a semi-structured 6-week plan. This allowed the exercise facilitator and each participant to follow a basic framework, but also permitted autonomy in choosing which specific exercises were chosen to target the system/muscle group of choice. Participants commenced with 10 minutes of cardiovascular exercise (usually completed on the treadmill), followed by 30 minutes of resistance training, 10 minutes of core strengthening exercises and dynamic stretching, and finished off with 10 additional minutes of cardiovascular exercise (usually completed on a stationary bicycle or elliptical). The resistance training incorporated diverse exercises by way of free weights, fixed machines and cable machines, that focused on the following 6 muscle groups: chest, back, biceps, triceps, shoulders, and legs. The program involved a progressive increase in both intensity and complexity, and was individualized to the participant's evolving competency.

When exercising the two additional times each week without the assistance of an exercise facilitator, each participant was permitted to perform any form of exercise they chose (including fitness classes), so long as it was completed at the Recreation Centre. Compliance to the program was monitored each week via an email that asked each participant the date and duration of his or her exercise session. A supplementary check for compliance was measured by checking a random one-third of the groups' Recreation Centre student card log that records the date and time the gym was accessed.

Post-test and Follow-Up. Upon completion of the 6-week exercise program (18 gym sessions + 18 imagery sessions) the participants were brought once again into the Exercise Health and Psychology Laboratory (EHPL) where they underwent a fitness and psychological assessment. For a second time, they completed the aforementioned four questionnaires and three fitness tests. At this point in time, they were informed that their commitment to the study was near completion. They no longer had to perform the imagery or meet their exercise facilitator at the gym. They merely had to continue exercise as they wished at their own convenience (with no mandates), keep an exercise log of the next 4-weeks of independent exercise (the follow-up), and return to the laboratory in 28 days (+/- 2 days) from the date of their post-test assessment. When they returned for their follow-up assessment they completed, for the last time, the battery of fitness tests and questionnaires and were informed their participation in the study had officially concluded.

Results

Treatment of Data

Missing Data and Outliers. Missing data were replaced with the mean item score from participants of the same exercise condition when 5% or less of the data were missing (Tabachnick & Fidell, 1996). This occurred only 3 times. Overall, there were 6 dropouts throughout the intervention. These individuals attended the baseline assessment and enrolled in the exercise program, but failed to complete the full 6 weeks of exercise training. One of the dropouts contracted a mild case of pneumonia, while the other five withdrew because of a mix of scheduling difficulties and an overall lack of enthusiasm for exercise. These six dropouts, three from each condition, were subject to casewise deletion and are not included in any of the analyses. A further three individuals completed the six weeks of exercise training, but were not

able to attend follow-up assessment within the acceptable time period (28 days, +/- 2 days) from the date of their post-test assessment. One individual was in Guatemala on a research trip, one individual had a conflict because of her final graduate examination, and one was individual unresponsive to phone calls and emails.

Preliminary Analyses: A sequence of t-tests (with a Bonferroni correction to control for type I errors) indicated that there were no differences in psychosocial variables (i.e., EI, SPE, SPA) or physical variables (i.e., cardiorespiratory fitness, upper-body strength, or core endurance) between the (24) study compliers and the (6) dropouts at baselines. Please refer to Table 1 for descriptive statistics. A second sequence of t-tests (with a Bonferroni correction to control for type I errors) was carried out to examine if there were physical or psychosocial baseline differences between those receiving the EII intervention ($n = 12$) and those receiving the SPEI intervention ($n = 12$). Findings were non-significant. Please refer to Table 2 for detailed descriptive statistics.

Group Differences in Psychosocial Outcomes. Three mixed 2 (Imagery Condition: EII vs. SPEI) x 3 (Time: baseline, post-test (week 6), follow-up (week 10)) repeated measures ANOVAs were run on each of the psychosocial outcome variables examined within the questionnaire package. For exercise identity, there was no significant interaction between imagery condition and time, Wilks' Lambda = .98, $F(2, 21) = 0.18$, $p > .05$. There was, however, a significant main effect across time, Wilks' Lambda = .23, $F(2, 21) = 35.04$, $p < .001$, partial $\eta^2 = .77$, with both imagery conditions showing an increase in Exercise Identity scores across the three time points. The main between-subjects effects comparing these two conditions was not significant, $F(1, 22) = 2.02$, $p > .05$. The main effect for time indicated, and paired-samples t-

tests conducted post hoc confirmed, that exercise identity rose significantly for both groups from baseline to week 6. See Figure 2 for a graphical depiction of these results.

With respect to self-presentational efficacy, there was no significant interaction between imagery condition and time, Wilks' Lambda = .97, $F(2, 21) = 0.31$, $p > .05$. There was, again, a significant main effect across time, Wilks' Lambda = .25, $F(2, 21) = 31.55$, $p < .001$, partial $\eta^2 = .75$, with both imagery conditions showing an increase in self-presentational efficacy scores across the three time points. The main between-subjects effects comparing these two conditions was not significant, $F(1, 22) = 0.99$, $p > .05$. The main effect for time indicated, and paired-samples t-tests conducted post hoc confirmed, that SPE was significantly increased for both groups from baseline to week 6. See Figure 3 for a graphical depiction of these results.

SPA also did not encounter a significant interaction concerning imagery condition between the groups and time, Wilks' Lambda = .90, $F(2, 21) = 1.20$, $p > .05$. There was, however, no significant main effect across time, Wilks' Lambda = .85, $F(2, 21) = 1.84$, $p > .05$, as the imagery conditions failed to exhibit either an increase or decrease in social physique anxiety across the three time points. The main between-subjects effects comparing these two conditions was not significant, $F(1, 22) = 0.04$, $p > .05$. See Figure 4 for a graphical depiction of these results.

Group Differences in Physical Outcomes. Three mixed 2 (Imagery Condition: EII vs. SPEI) x 3 (Time: baseline, post-test (week 6), follow-up (week 10)) repeated measures ANOVAs were run on each of the physical outcome variables measured during lab testing. For cardiorespiratory fitness (measure via maximal oxygen uptake; VO_2 max), there was no significant interaction between type of imagery and time, Wilks' Lambda = .99, $F(2, 21) = 0.05$, $p > .05$. There was, however, a significant main effect across time, Wilks' Lambda = .57, $F(2,$

21) = 7.90, $p < .01$, partial $\eta^2 = .43$, with both imagery conditions showing an increase in VO_2 max across the three time points. The main between-subjects effects comparing these two conditions was not significant, $F(1, 22) = 0.05$, $p > .05$. Post hoc t-tests indicated that for both groups, VO_2 max increased significantly between baseline and week 6. Although mean scores exhibited a decrease in VO_2 max between 6 and 10 weeks for both groups this was not a significant change ($p > 0.05$). See Figure 5 for a graphical depiction of these results.

With regards to upper-body strength, there was no significant interaction between type of imagery and time, Wilks' Lambda = .97, $F(2, 21) = 0.37$, $p > .05$. There was, again, a significant main effect across time, Wilks' Lambda = .20, $F(2, 21) = 41.30$, $p < .001$, partial $\eta^2 = .80$, with both imagery conditions showing an increase in maximum number of push-ups across the three time points. The main between-subjects effects comparing these two conditions was not significant, $F(1, 22) = 0.65$, $p > .05$. Post hoc t-tests indicated that for both groups, upper-body strength increased significantly between baseline and week 6. See Figure 6 for a graphical depiction of these results.

Finally, core endurance did not reveal a significant interaction between imagery groups and time, Wilks' Lambda = .79, $F(2, 21) = 2.77$, $p > .05$. There was a significant main effect across time, Wilks' Lambda = .37, $F(2, 21) = 17.74$, $p < .001$, partial $\eta^2 = .63$, as the imagery conditions were associated with a general increase in core-endurance across the three time points. The main between-subjects effects comparing these two conditions was not significant, $F(1, 22) = 1.47$, $p > .05$. Paired samples t-tests conducted post hoc indicated that for both groups, core endurance increased significantly between baseline and week 6. See Figure 7 for a graphical depiction of these results.

Follow-up Physical Activity. To test for differences in physical activity over the four weeks that comprised our follow-up period, a one-way ANOVA was conducted in order to determine if our two imagery conditions were associated with any differences in self-reported moderate or vigorous exercise levels. Our hypotheses did not explicitly anticipate there being any differences. Participants in the EII group reported, on average 64.81 minutes of moderate exercise 95% CI [26.82, 102.80] and 50.00 minutes of vigorous exercise 95% CI [11.18, 88.82] during the follow-up period. Participants in the SPEI group reported, on average just 26.83 minutes of moderate exercise 95% CI [2.01, 51.66] and 40.69 minutes of vigorous exercise 95% CI [-0.98, 82.37] during the follow-up period. However, there was no statistical difference between groups in relation to moderate exercise, $F(1,19) = 2.96, p = 0.10$, although this result was trending towards significance. Likewise, there was no statistical difference between groups for vigorous exercise, $F(1,19) = 0.13, p = > 0.05$.

Discussion

The primary aim of this study was to examine if EII and SPEI differentially impacted three key psychosocial variables and three key physical outcome variables. On the whole, the hypotheses were not supported. However, the outcomes still demonstrated favourable results for participants who completed the study. EII as an intervention component did not improve exercise identity more than the SPEII intervention. Likewise, SPEI did not improve self-presentational efficacy more than the EII intervention. For this study, content-specific imagery was ineffective in improving its paired, target outcome any better than its counterpart. These results indicate that it may not be the specific imagery content that is the chief determinant of resultant effects, but rather engaging in any form of exercise-focused imagery (coupled with personalized, in-gym exercise guidance) may bring about significant benefits to one's self-concept and self-

confidence. It is conceivable that the overall intervention package was robust enough that it washed out the study's targeted effects of imagery. Instead, this may have resulted in aggregate improvements that crossed over to both the EI and SPE domains, notwithstanding the specific imagery configuration.

Over the course of the intervention, both of the imagery groups demonstrated substantial improvements to their collective EI and SPE. These changes are critical from a health-standpoint, as strong EIs and SPEs have been associated with higher levels of physical activity (Anderson, Cychosz, & Franke, 1998; Woodgate, Martin Ginis, & Sinden, 2003). This imagery intervention may have acted to enhance both SPE and EI through the process known as evaluative conditioning (Gawronski & Bodenhausen, 2006). By continually pairing the reassuring audio imagery script directly before engagement in a bout of exercise, this could have driven the processes of evaluative conditioning. Over the course of the six weeks, this would precipitate favourable changes in associated EI or SPE, mainly because of parallels between the real and imagined experiences (Walther, 2002).

It was hypothesized that SPA, which has been associated with greater appearance-related motives for exercise (Crawford & Eklund, 1994) could be reduced through an EII intervention, since exercise identity is affiliated with greater levels of integrated (rather than extrinsic) regulators (Ryan & Deci, 2000). Moreover, we speculated that since SPA is negatively associated with SPE (Liardi, Gammage, & Hall, 2012), that SPEI might act to diminish SPA. Yet, despite the marked improvements in both EI and SPE, this intervention failed to yield significant decreases in SPA. These results add to the body of literature that demonstrates its mercurial nature. This result may be partially explained by the nature of our college-enrolled sample. Research has suggested that in young adults, SPE does not moderate the SPA-exercise

relationship (Gammage, Lamarche, & Drouin, 2014). Self-presentational concerns are liable to hold much clout within this age group (Marquez & McAuley, 2001). For young adults, making a good impression related to one's appearance and physical fitness may be more central to their reasons for exercising, and thus less amenable to alterations (specifically, decreases in SPA) via intervention.

Physical outcome measures, on the other hand, demonstrated favourable results. Although all three key outcomes (cardiorespiratory fitness, upper-body strength, and core endurance) were subject to significant increases over the course of the study, there were no differences between groups over time. This may speak more to the invaluable nature of engaging in physical activity than it might the imagery aspect of the intervention. Nonetheless, it demonstrates that both EI and SPE-focused interventions are equally effective in inducing positive physical fitness changes. It is worth noting that all three fitness outcomes maintained their respective improvements even after the conclusion of the study. This finding reveals that the objective improvements gained over the course of this intervention were not simply transient advances in fitness, but rather were durable even without the support of an exercise facilitator.

A secondary aim of this study was to test whether EII or SPEI was more useful as an intervention tool in promoting lasting exercise behaviour change. This investigation exhibited the utility of both intervention protocols in promoting exercise during the follow-up exercise. However, we would be remiss not to point out that the EII group engaged in roughly 70% more exercise during the follow-up period (EII: 115 weekly minutes vs. SPEI: 68 weekly minutes). This result approached significance (our follow-up sample was relatively small), and future research may want to explore if focusing on improving exercise identity in individuals is a more deeply entrenched antecedent for subsequent physical activity. Preliminary indications, through

correlational research conducted by Liardi, Gammage, and Hall (2012) support the assumption that EI is much more strongly correlated to exercise in both males (EI: $r = 0.58$; SPE: $r = 0.38$) and females (EI: $r = 0.61$; SPE: $r = 0.33$).

This study owns a few key limitations that must be addressed. Firstly, we failed to use a manipulation check to guard against the possibility that the experimental effects between imagery conditions could have been due to differential vividness or ease of imagery among participants. The ease with which an individual is capable of imaging and the vividness of that imagery has been shown to influence its effectiveness, with superior imagery ability bringing about more effective performance (Hall, 1998). The Vividness of Movement Imagery Questionnaire (VMIQ-2; Roberts, Callow, Hardy, Markland & Bringer, 2008), going forward, should be used to assess both vividness and ease of imagery in cases where these imagery skills may influence study outcomes. Secondly, we did not include a manipulation check to assess that both the EII and SPEI groups were listening to their imagery scripts as prescribed by study protocol. Although we made sure a study coordinator administered one imagery session immediately before working out with the participant, there was no way of knowing if the participant was listening to the imagery script for the additional (2) required sessions. Perhaps a 'content recall' test could have been implemented to ensure both groups were able to recall roughly similar degrees of core content from each script. Thirdly, it is possible that since EI and SPE are somewhat related to one another (both through correlation analysis and via theoretical considerations previously discussed) our two imagery scripts may have contained a degree of overlap. This may have acted to influence, essentially, the same set of variables thus limiting our ability to truly differentially impact the outcomes as expected.

A fourth, readily apparent, limitation involves the lack of a control group. At the outset of

the study, the capacity to run three separate groups (EII, SPEI, control) was insufficient. This was mainly due to the study protocol that, by design, desired 1-on-1 personalized training sessions, which is highly demanding from a manpower standpoint. To employ these three groups, given the resources available, would have significantly underpowered this study and jeopardized its ability to detect statistical differences. With this in mind, it was decided that it would be more beneficial to the research community to directly compare two forms of imagery content rather than compare one form (say, EII) versus a control group. This was based on the notion that imagery combined with physical practice is already recognized as more beneficial to performance and skill than physical practice alone (Munroe, Giacobbi, Hall, & Weinberg, 2000). Nevertheless, without a control group it's difficult to distinguish which of the effects were indeed evoked by the imagery sessions and its associated content, and which of the effects unfolded for other reasons (e.g., the personalized training sessions themselves).

Despite its limitations, this study offered value to the exercise identity literature by demonstrating that an exercise identity-based imagery intervention can be successfully executed in an applied setting with a substantive follow-up measure in place. Future research would do well to develop and test app-based technology to deliver content-specific imagery to targeted populations. For example, creating exercise identity imagery for sedentary populations, and delivering the intervention through a downloadable app, could be a worthy pursuit. Smartphone penetration in the Canadian marketplace is expected to hit 56% through 2015 (eMarketer, 2015), and could provide a modern approach to delivering customizable imagery interventions while also permitting a high-degree of usage rate analytics. This method could also be applied to other forms of imagery, including but not limited to SPEI, healthy-eating imagery, etc.

As a next step for exercise identity research, investigators may wish to pursue other

means of bolstering one's EI besides imagery. For example, the benefits of journal writing (journaling or reflective writing) have been vetted more recently (Hiemstra, 2001; Blake, 2005; O'Connell & Dymont, 2011). Having exercise initiates express their thoughts reflectively in journal entry form, while specifically paying mind to how their exercise self-concept is progressing, has yet to be explored. This medium, and more, offers a variety of opportunities for emerging EI research to combat the pernicious effects of sedentary behaviour.

Table 1

Physical and Psychological Outcome Variables: Study Compliers versus Dropouts at Baseline

Variable	Study Compliers (<i>n</i> = 24)		Study Dropouts (<i>n</i> = 6)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
EI	28.00	8.57	24.17	9.56
SPE	39.63	16.10	33.93	11.68
SPA	27.52	7.47	32.50	5.99
VO ₂ Max (ml/kg/min)	39.50	5.26	41.48	5.26
Upper-Body Strength (# of push ups)	5.94	10.56	6.17	7.63
Core-Endurance (# of sit ups)	29.29	6.59	18.50	9.42

Note. The means reflect differences between key characteristics at baseline of the study compliers compared to the dropouts. Exercise Identity (EI) scores can range from 7 to 63. Self-presentational efficacy scores can range from 0 to 100. Social physique anxiety (SPA) scores can range from 9 to 45.

Table 2

Physical and Psychological Outcome Variables at Baseline: Between Groups

Variable	Exercise Identity Imagery & Exercise Condition ($n = 12$)		SPE Imagery & Exercise Condition ($n = 12$)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
EI	25.33	9.00	30.67	7.54
SPE	38.67	17.41	40.58	15.39
SPA	27.25	6.97	27.79	8.23
VO ₂ Max (ml/kg/min)	39.80	5.94	39.20	4.74
Upper-Body Strength (# of push ups)	7.46	13.81	4.42	6.14
Core-Endurance (# of sit ups)	27.33	5.85	31.25	6.94

Note. The means reflect differences between key characteristics at baseline between those receiving the exercise identity imagery intervention and those receiving the self-presentational efficacy imagery intervention. Exercise Identity (EI) scores can range from 7 to 63. Self-presentational efficacy scores can range from 0 to 100. Social physique anxiety (SPA) scores can range from 9 to 45.

Flow of Participants

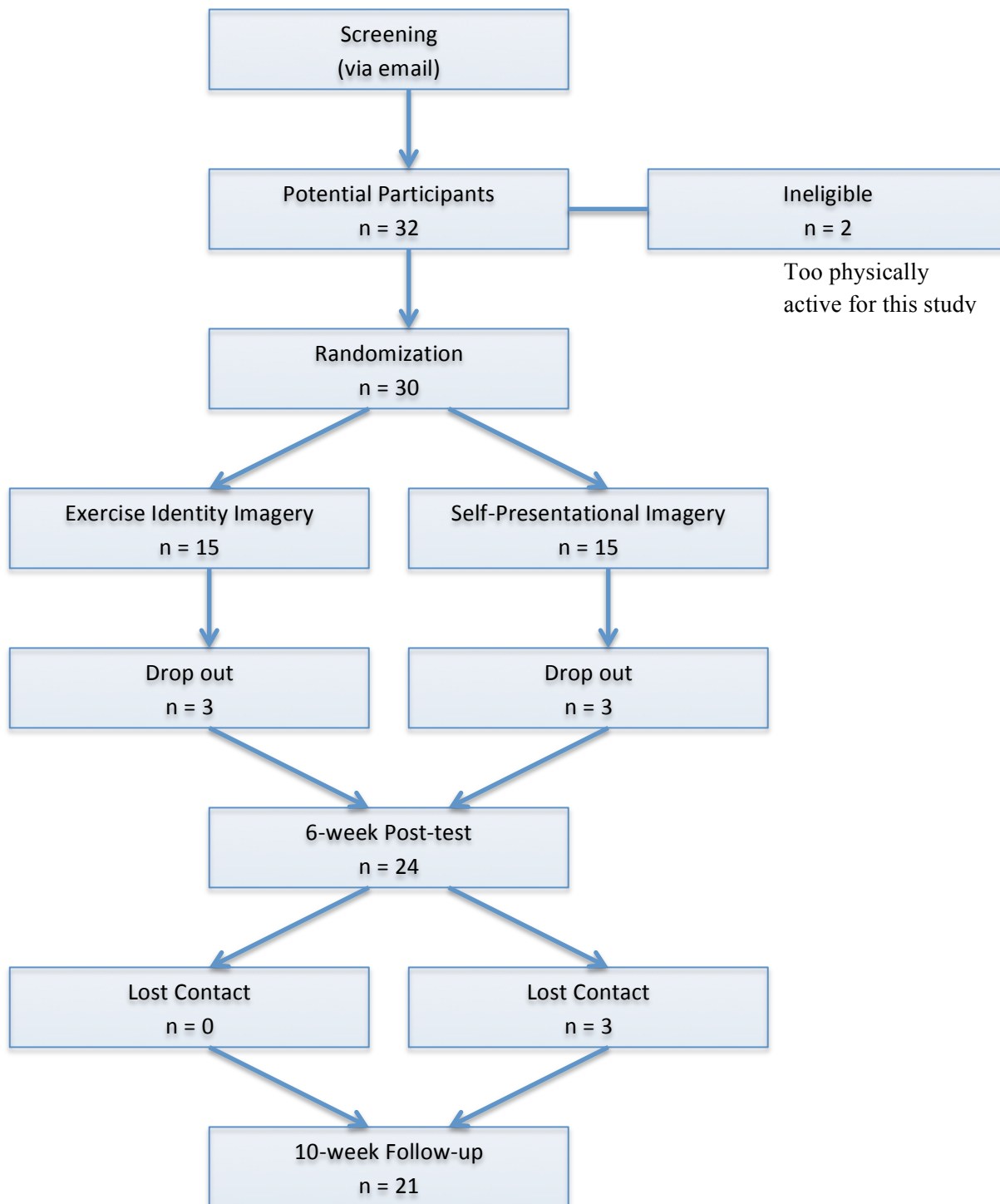


Figure 1. Comprehensive participant flow through the physical activity plus imagery intervention

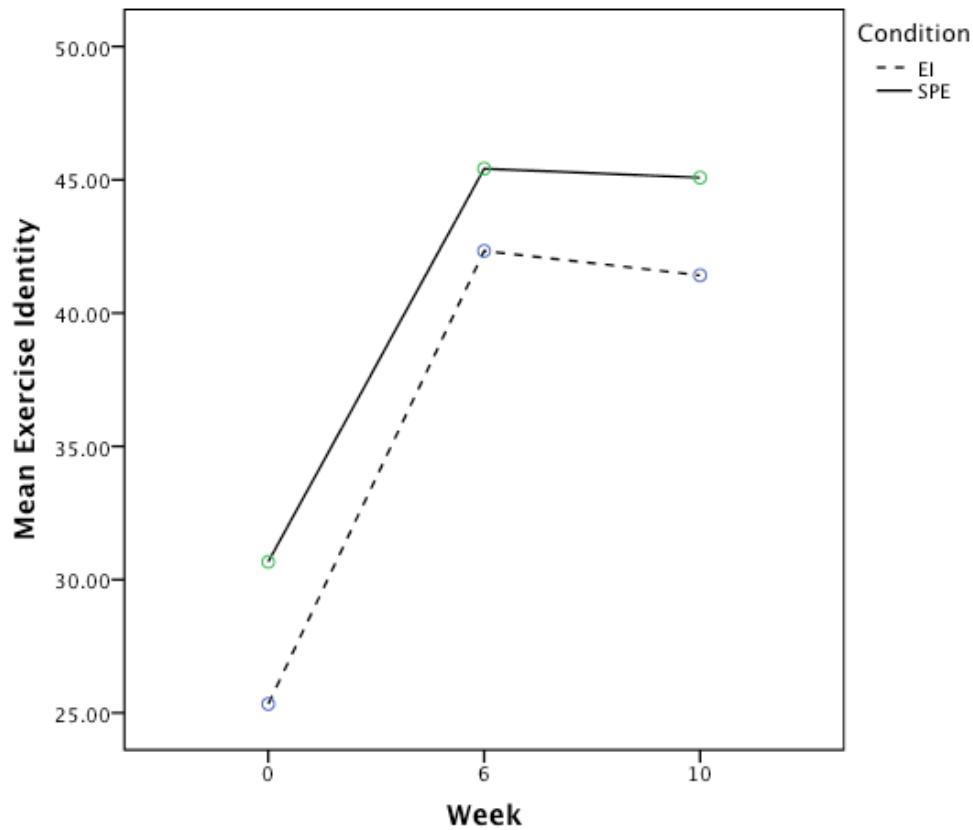


Figure 2. Plot of exercise identity scores (min = 9, max = 63) between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up).

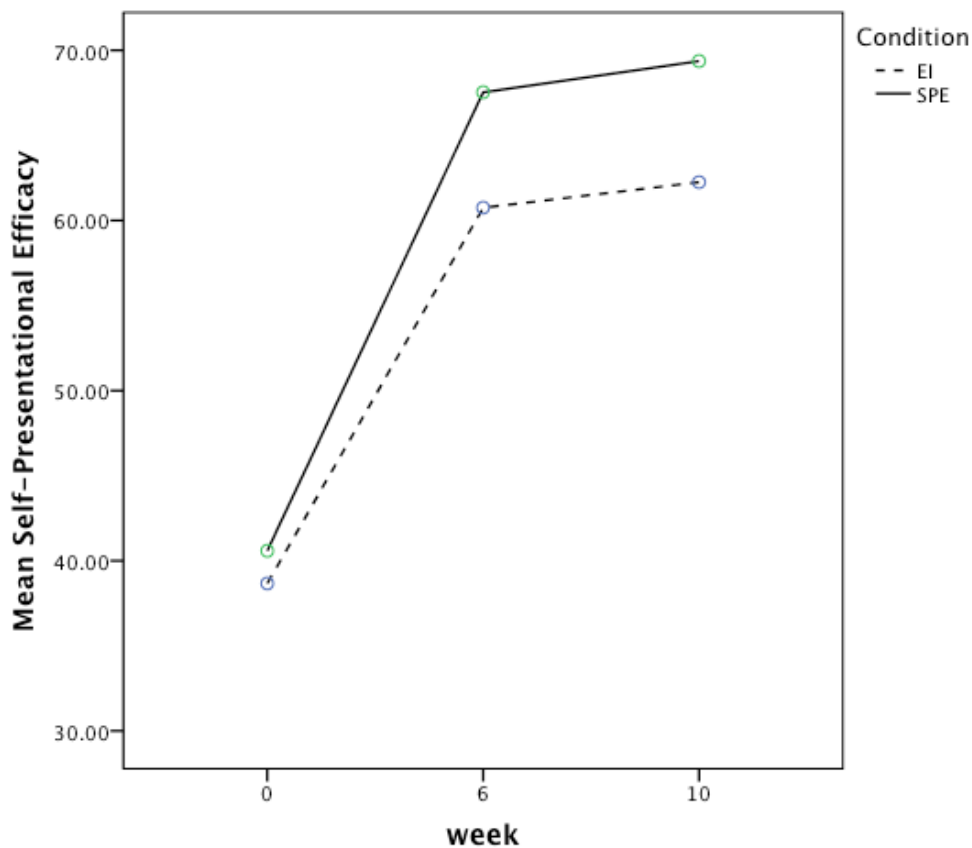


Figure 3. Plot of self-presentational efficacy scores (min = 0, max = 100) between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up).

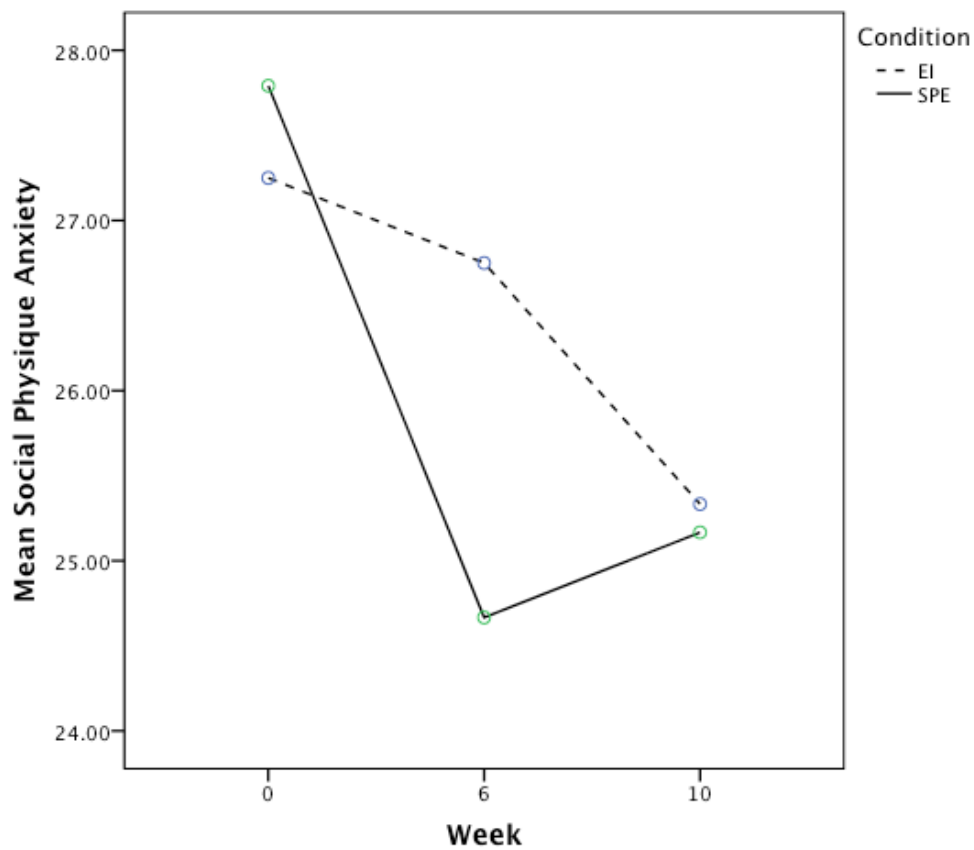


Figure 4. Plot of social physique anxiety scores (min = 9, max = 45) between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up).

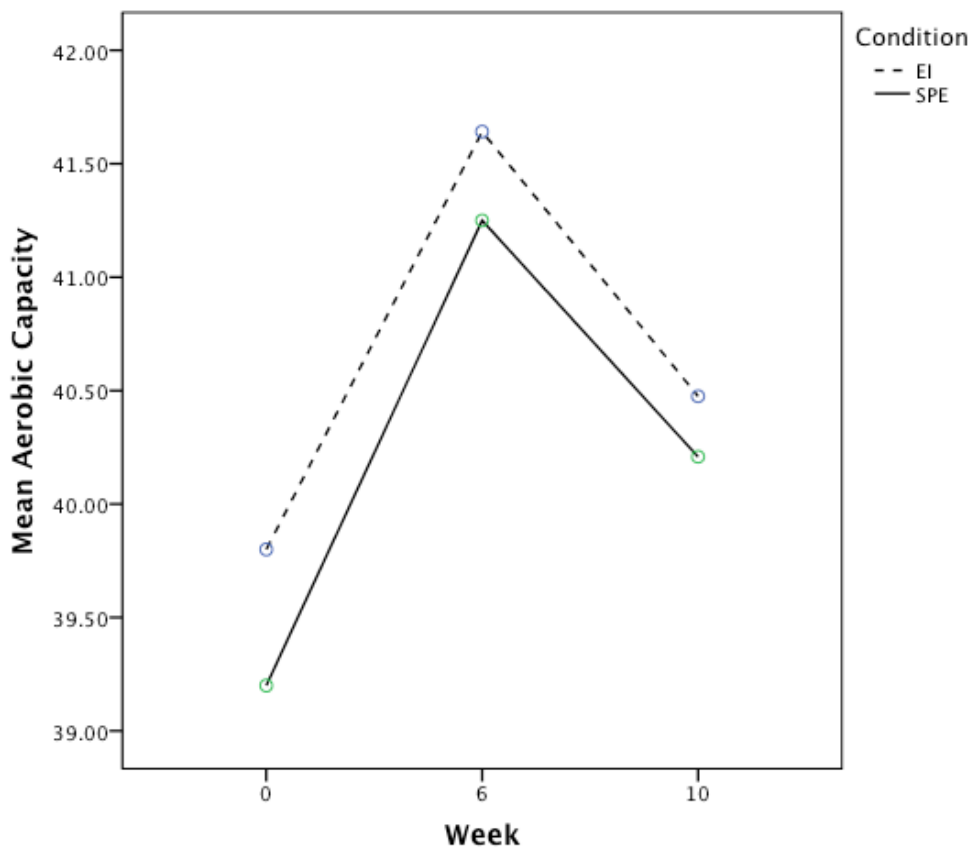


Figure 5. Plot of aerobic capacity (estimated VO₂max) scores between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up).

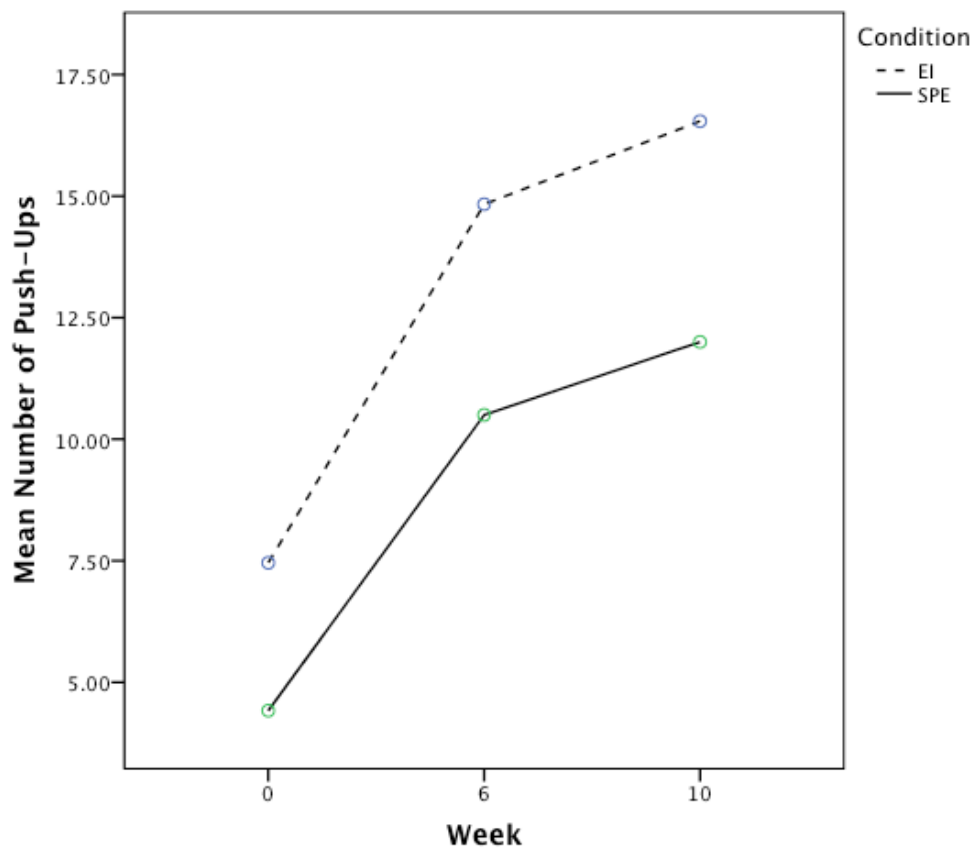


Figure 6. Plot of upper body strength (push-ups) between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up).

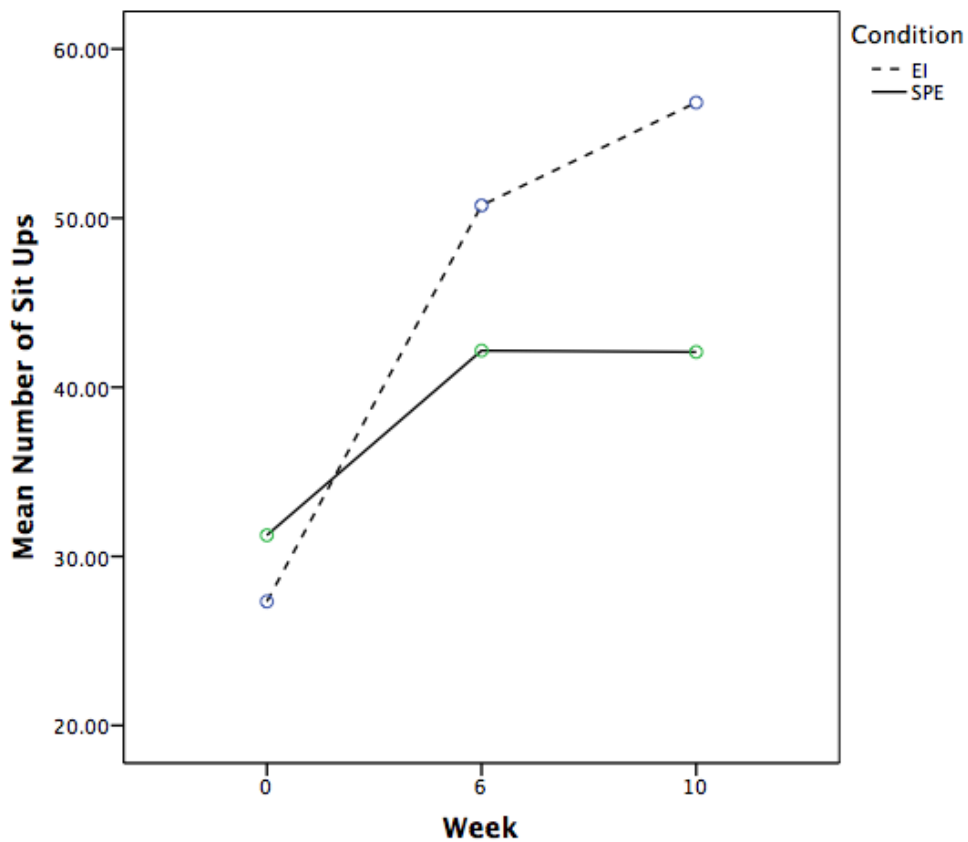


Figure 7. Plot of core strength (sit ups) between two conditions (those receiving the exercise identity imagery intervention (EI) and those receiving the self-presentational efficacy imagery intervention (SPE)) across three time points of the intervention (commencement of intervention, cessation of intervention, and follow-up).

References

- Anderson, D. F., & Cychosz, C. M. (1994). Development of an exercise identity scale. *Perceptual and Motor Skills, 78*, 747-751.
- Anderson, D. F., & Cychosz, C. M. (1995). Exploration of the relationship between exercise behavior and exercise identity. *Journal of Sport Behavior, 18*(3), 159-166.
- Anderson, D. F., Cychosz, C. M., & Franke, W. D. (1998). Association of Exercise Identity with Measures of Exercise Commitment. *Journal of Sport Behavior, 21*(3), 233-241.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall, Inc.
- Blake, T. K. (2005). Journaling; An active learning technique. *International Journal of Nursing Education Scholarship, 2*(1).
- Borg, G. A. (1982). Psychophysical bases of perceived exertion. *Medicine & Science in Sports & Exercise, 14*(5), 377-381.
- Brandth, B. (2002). Gender identity in European family farming: A literature review. *Sociologia Ruralis, 42*(3), 181-200.
- Burke, P. J., & Tully, J. C. (1977). The measurement of role identity. *Social Forces, 55*(4), 881-897.
- Callow, N., Hardy, L., & Hall, C. (2001). The effects of a motivational general-mastery imagery intervention on the sport confidence of high-level badminton players. *Research Quarterly for Exercise and Sport, 72*(4), 389-400.

- Cardinal, B. J., & Cardinal, M. K. (1997). Changes in exercise behavior and exercise identity associated with a 14-week aerobic exercise class. *Journal of Sport Behavior, 20*(4), 377.
- Crawford, S., & Eklund, R. C. (1994). Social physique anxiety, reasons for exercise, and attitudes toward exercise settings. *Journal of Sport and Exercise Psychology, 16*, 70-70.
- Denis, M. (1985). Visual imagery and the use of mental practice in the development of motor skills. *Canadian journal of applied sport sciences. Journal canadien des sciences appliquees au sport, 10*(4), 4S-16S.
- Dishman, R. K. (1991). Increasing and maintaining exercise and physical activity. *Behavior Therapy, 22*(3), 345-378.
- Duncan, L. R., Rodgers, W. M., Hall, C. R., & Wilson, P. M. (2011). Using Imagery to Enhance Three Types of Exercise Self-Efficacy among Sedentary Women. *Applied Psychology: Health and Well-Being, 3*(1), 107-126.
- Ebbeling, C. B., Ward, A., Puleo, E. M., Widrick, J., & Rippe, J. M. (1991). Development of a single-stage submaximal treadmill walking test. *Medicine and science in sports and exercise, 23*(8), 966-973.
- eMarketer: Over Half of Canada's Population to Use Smartphones in 2015* (n.d.). Retrieved November 1, 2015, from eMarketer website, www.emarketer.com/Article/Over-Half-of-Canadas-Population-Use-Smartphones-2015/1011759
- Feltz, D. L., & Landers, D. M. (1983). The effects of mental practice on motor skill learning and performance: A meta-analysis. *Journal of sport psychology.*

- Frederick, C. M., & Morrison, C. S. (1996). Social physique anxiety: Personality constructs, motivations, exercise attitudes, and behaviors. *Perceptual and motor skills*, 82(3), 963-972.
- Freese, L., & Burke, P. J. (1994). Persons, identities, and social interaction. *Advances in group processes*, 11, 1-24.
- Gammage, K. L., Hall, C. R., & Martin Ginis, K. A. (2004). Self-presentation in exercise contexts: Differences between high and low frequency exercisers. *Journal of Applied Social Psychology*, 34(8), 1638-1651.
- Gammage, K. L., Hall, C. R., & Rodgers, W. M. (2000). More about exercise imagery. *Sport Psychologist*, 14(4), 348-359.
- Gammage, K. L., Lamarche, L., & Drouin, B. (2014). Self-presentational efficacy: Does it moderate the relationship between social physique anxiety and physical activity in university students? *International Journal of Sport and Exercise Psychology*, 12(4), 357-367.
- Garriguet, D., Janssen, I., Craig, C. L., Clarke, J., & Tremblay, M. S. (2011). Physical activity of Canadian children and youth: accelerometer results from the 2007 to 2009 Canadian Health Measures Survey.
- Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: an integrative review of implicit and explicit attitude change. *Psychological bulletin*, 132(5), 692.

- Guillot, A., Genevois, C., Desliens, S., Saieb, S., & Rogowski, I. (2012). Motor imagery and 'placebo-racket effects' in tennis serve performance. *Psychology of Sport and Exercise*, *13*(5), 533-540.
- Hall, C. R. (1995). The motivational function of mental imagery for participation in sport and exercise. *Exercise addiction: Motivation for participation in sport and exercise*, 15-21.
- Hall, C. R. (1998). Measuring imagery abilities and imagery use. *Advances in sport and exercise psychology measurement*, 165-172.
- Hart, E. A., Leary, M. R., & Rejeski, W. J. (1989). The measurement of social physique anxiety. *Journal of Sport and exercise Psychology*, *11*(1), 94-104.
- Hammond, T. G. (2010). The effects of a motivational general-mastery imagery intervention on the imagery ability and self-efficacy of inter-collegiate golfers.
- Haskell, W. L., Lee, I. M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., ... & Bauman, A. (2007). Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation*, *116*(9), 1081.
- Haase, A. M., Prapavessis, H., & Owens, R. G. (2002). Perfectionism, social physique anxiety and disordered eating: A comparison of male and female elite athletes. *Psychology of sport and Exercise*, *3*(3), 209-222.
- Hiemstra, R. (2001). Uses and benefits of journal writing. *New directions for adult and continuing education*, *2001*(90), 19-26.

- Holmes, P. S., & Collins, D. J. (2001). The PETTLEP approach to motor imagery: A functional equivalence model for sport psychologists. *Journal of Applied Sport Psychology, 13*(1), 60-83.
- Lamarche, L., Gammage, K. L., Sullivan, P. J., & Gabriel, D. A. (2013). A psychometric evaluation of the self-presentational efficacy scale. *Measurement in Physical Education and Exercise Science, 17*(2), 120-134.
- Leary, M. R. (1992). Self-presentational processes in exercise and sport. *Journal of Sport and Exercise Psychology, 14*, 339-339.
- Leary, M. R., & Atherton, S. C. (1986). Self-efficacy, social anxiety, and inhibition in interpersonal encounters. *Journal of Social and Clinical Psychology, 4*(3), 256-267.
- Liardi, V. L., Gammage, K. L., & Hall, C. R. (2012, June). The role of exercise identity and self-presentational efficacy: Together in an exercise context. Abstract In *Journal of Sport & Exercise Psychology* (Vol. 34, pp. S252-S252).
- Maddux, J. E., Norton, L. W., & Leary, M. R. (1988). Cognitive components of social anxiety: An investigation of the integration of self-presentation theory and self-efficacy theory. *Journal of Social and Clinical Psychology, 6*(2), 180-190.
- Marquez, D. X., & McAuley, E. (2001). Physique anxiety and self-efficacy influences on perceptions of physical evaluation. *Social Behavior and Personality: an international journal, 29*(7), 649-659.
- Munroe, K. J., Giacobbi Jr, P. R., Hall, C., & Weinberg, R. (2000). The four Ws of imagery use: where, when, why, and what. *The Sport Psychologist*.

- O, J., Munroe-Chandler, K. J., Hall, C. R., & Hall, N. D. (2014). Using Motivational General-Mastery Imagery to Improve the Self-efficacy of Youth Squash Players. *Journal of Applied Sport Psychology, 26*(1).
- O'Connell, T. S., & Dymont, J. E. (2011). The case of reflective journals: is the jury still out?. *Reflective practice, 12*(1), 47-59.
- Paivio, A. (1985). Cognitive and motivational functions of imagery in human performance. *Canadian journal of applied sport sciences. Journal canadien des sciences appliquées au sport, 10*(4), 22S-28S.
- Post, P., Muncie, S., & Simpson, D. (2012). The effects of imagery training on swimming performance: an applied investigation. *Journal of Applied Sport Psychology, 24*(3), 323-337.
- Post, P. G., Wrisberg, C. A., & Mullins, S. (2010). A field test of the influence of pre-game imagery on basketball free throw shooting. *Journal of Imagery Research in Sport and Physical Activity, 5*(1).
- Roberts, R., Callow, N., Hardy, L., Markland, D., & Bringer, J. (2008). Movement imagery ability: Development and assessment of a revised version of the vividness of movement imagery questionnaire. *Journal of Sport & Exercise Psychology, (30)*, 200-21.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist, 55*(1), 68.
- Sackett, R. S. (1934). The influence of symbolic rehearsal upon the retention of a maze habit. *The Journal of General Psychology, 10*(2), 376-398.

- Schlenker, B. R. (1980). *Impression management: The self-concept, social identity, and interpersonal relations* (pp. 21-43). Monterey, CA: Brooks/Cole Publishing Company.
- Schlenker, B. R., & Leary, M. R. (1982). Social anxiety and self-presentation: A conceptualization model. *Psychological bulletin*, *92*(3), 641.
- Schuster, C., Hilfiker, R., Amft, O., Scheidhauer, A., Andrews, B., Butler, J., ... & Ettlin, T. (2011). Best practice for motor imagery: a systematic literature review on motor imagery training elements in five different disciplines. *BMC medicine*, *9*(1), 75.
- Schwartz, D. L., & Black, J. B. (1996). Analog imagery in mental model reasoning: Depictive models. *Cognitive Psychology*, *30*(2), 154-219.
- Smith, D., Collins, D., & Holmes, P. (2003). Impact and mechanism of mental practice effects on strength. *International Journal of Sport and Exercise Psychology*, *1*(3), 293-306.
- Stets, J. E., & Serpe, R. T. (2013). *Identity theory* (pp. 31-60). Springer Netherlands.
- Strachan, S. M., & Brawley, L. R. (2008). Reactions to a Perceived Challenge to Identity A Focus on Exercise and Healthy Eating. *Journal of Health Psychology*, *13*(5), 575-588.
- Strachan, S. M., Woodgate, J., Brawley, L. R., & Tse, A. (2005). The Relationship of Self-Efficacy and Self-Identity to Long-Term Maintenance of Vigorous Physical Activity¹. *Journal of Applied Biobehavioral Research*, *10*(2), 98-112.
- Stryker, S. (1987). Identity theory: developments and extensions.
- Thomas, S., Reading, J., & Shephard, R. J. (1992). Revision of the physical activity readiness questionnaire (PAR-Q). *Canadian journal of sport sciences*.

- Trost, S. G., Pate, R. R., Dowda, M., Ward, D. S., Felton, G., & Saunders, R. (2002). Psychosocial correlates of physical activity in white and African-American girls. *Journal of Adolescent Health, 31*(3), 226-233.
- Vadocz, E. A., Hall, C. R., & Moritz, S. E. (1997). The relationship between competitive anxiety and imagery use. *Journal of Applied Sport Psychology, 9*(2), 241-253.
- Walther, E. (2002). Guilty by mere association: evaluative conditioning and the spreading attitude effect. *Journal of personality and social psychology, 82*(6), 919.
- Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Canadian medical association journal, 174*(6), 801-809.
- Wilmore, J. H., & Costill, D. L. (1988). *Training for sport and activity: The physiological basis of the conditioning process*. Brown & Benchmark.
- Wright, C. J., & Smith, D. (2009). The effect of PETTLEP imagery on strength performance. *International Journal of Sport and Exercise Psychology, 7*(1), 18-31.
- Woodgate, J., Martin Ginis, K. A., & Sinden, A. R. (2003). Physical activity and social physique anxiety in older women: The moderating effects of self-presentation efficacy. *Journal of Applied Biobehavioral Research, 8*(2), 116-127.
- World Health Organization. (2002). *The world health report 2002: reducing risks, promoting healthy life*. World Health Organization.

GENERAL DISCUSSION

The purpose of the present program of research was to shed light on the utility of exercise identity (EI). The combined results of these studies demonstrated that EI is a key determinant of exercise and warrants consideration when designing exercise interventions. In addition, the findings revealed EI's relationships with social physique anxiety (SPA), self-presentational efficacy (SPE), and implicit cognition.

The primary focus of study 1 was to ascertain the relationships EI has with key self-presentation variables: SPE and SPA. A secondary focus was to further validate the claim that a strong EI plays a role in fostering robust exercise habits. We discovered that for both males and females, EI is positively correlated to SPE. Current work suggests that identity verification can lead to enhancements in self-efficacy (Cast & Burke, 2002), however future research is needed to substantiate this claim with an exercise context. If this is in fact true, there is much potential to seize on a key relationship since self-efficacy has such a well-documented bearing on exercise (Marcus, Selby, Niaura, & Rossi, 1992). This study also demonstrated that for both males and females, EI is not correlated with SPA. Moreover, EI did not act as a moderator between the SPA-exercise relationship. This finding adds to the relatively obscure link SPA has long maintained with exercise habits (Gammage, Lamarche, & Drouin, 2014). In some instances, SPA is related to increased physical activity (Frederick & Morrison, 1996), while in others it is related to suppressed physical activity habits (Hausenblas & Fallon, 2002). The notion that EI does not moderate the SPA-exercise relationship is in line with a similar finding that SPE also does not play a moderating role in the SPA-exercise relationship (Gammage et al.).

In addition, Study 1 clearly demonstrated EI's strong connection with exercise behaviour. Not only was EI correlated with weekly METS, but it also accounted for a significant quantity of the variance in vigorous exercise behaviour after controlling for self-presentation variables. This

finding adds to body of research that paints a clear picture that a strong exercise identity plays an important role in engendering beneficial exercise habits (Anderson, Cychosz, & Franke, 1998).

Study 2 was focused on delving deeper into the mechanisms of identity by establishing whether or not there is an implicit identity (II), and if so, if it plays an operative role in exercise choices. A test of II was developed using an adapted version of the IAT (Greenwald, McGhee, & Schwartz, 1998) blended with the core concepts included in the exercise identity scale (Anderson & Cychosz, 1994). Findings suggested that, in fact, we do have an implicit cognitive track that is distinct from explicit measures of EI. This aligns with conclusions in other areas of research, such as self-esteem, that have embraced a dual-process model of cognition (Buhrmester, Blanton, & Swann Jr., 2011). This measure of II was significantly correlated to vigorous exercise behaviour, and ultimately captured an additional 11% of variance in exercise behaviour, even after controlling for EI.

Further to Study 2, we sought to examine the issue of identity salience within an exercise context. To date, we are the first study to do so. Identity theory accepts that individuals living in many societies have numerous identities tied to the self-concept, which are organized hierarchically. Identity salience is defined as the relative standing a particular identity maintains amongst one's identity hierarchy (Merolla, Serpe, Stryker, & Schultz, 2012). Consequently, identity salience governs our tendencies to invoke a particular role-identity in a certain situations, which in turn, directly effects our choice(s) of behaviour. The notion of a salient exercise identity prompting behaviour was supported. Our results confirmed the assumption that those who embrace exercise identity as one of their three most central identities do in fact exercise at significantly greater rates than those who hold exercise identity amongst their bottom three. This

finding speaks to the comparative nature of identities, and their relative importance to behaviour, within the diversified self-concept.

Ultimately, in study 3, it was determined that applying exercise identity within an intervention setting would be most serviceable. For this study, we wanted to build on some of the notable work that has employed imagery as a vehicle for positive changes in exercise habits (Gammage, Hall, & Rodgers, 2000). Imagery, also referred to as visualization, is akin to playing a movie in our minds. It has been said that “we can be aware of ‘seeing’ an image, feeling movements as an image, or experiencing an image of smell, taste or sounds without experiencing the real thing” (White & Hardy, 1998, p. 389). We endeavored to package exercise identity concepts into the systematic use of imagery over the course of a six-week exercise intervention. Our study was designed to compare the efficacy of EI-based imagery (EII) with self-presentational-based imagery (SPEI) in order to determine if one form is more beneficial than the other. This form of content-specific (i.e., targeted) imagery has been used in prior research, but without directly comparing distinct forms. Furthermore, we designed an intervention that would employ more personal contact (in hopes of increasing adherence), involve males as well as females (as most of the research on self-presentation has focused on women), and included a follow-up assessment to test the resilience of this protocol.

The results were mixed. On one hand, EII did not improve EI any better than did SPEI. Likewise, SPEI did not improve SPE at a greater rate than did EI. This may have been caused, in part, by the impact of the exercise component of the study outweighing the impact of the imagery component. Going forward, it would be valuable to run a dose-response exercise imagery study to find out if greater amounts of imagery practice (e.g., 7x per week) would be more beneficial than the amount prescribed in this present study (3x per week). Further, both EII and SPEI failed

to prove effective in reducing SPA. The durable nature of SPA could have been partially shaped by our sample characteristics, as young adults and females tend to have the highest levels of SPA (Frederick & Morrison, 1996). Young adults tend to place more value on aesthetic appearance, and less of the underlying health risk factors (e.g., risk of coronary heart disease) than their older counterparts. With that said, over the course of the six-week intervention, 80% of participants completed the study. This adherence rate alone is well-above what is typically accepted for a short-medium term intervention (Dishman, 1982). Positive findings demonstrated substantial increases in EI, SPE, cardiorespiratory fitness, upper-body strength, and core endurance. What's more, these improvements were maintained even after the imagery and exercise training protocols concluded.

This points to the utility of imagery plus exercise interventions to meaningfully improve both psychosocial and physical outcomes. Imagery interventions are relatively low-cost and easy to implement, providing a favorable cost-benefit ratio (Kossert & Munroe-Chandler, 2007). On a practical level, understanding where one's exercise identity ranks on the overall salience hierarchy can help identify non-exercisers or low-frequency exercisers who are more at risk to drop out of an exercise program. This could be of value to certain practitioners (e.g., personal trainers) to require new clients take this quick questionnaire, thus allowing them to assess exercise identity in relative, not absolute, terms. Taken together, this journey of examining both the properties and merits of exercise identity has been fulfilling.

Future research should continue to explore how exercise identity manifests in relation to behaviour choice. One potential avenue is examining, at a more precise level, if people have various sub-identities that comprise an overall exercise identity. For example: cycling identity, swimming identity, weight-lifting identity, jogging identity, and so forth. Research examining

differing ways to bolster exercise identity also offer much potential. Using imagery to nurture identity is just one technique, but future studies may want to explore unexamined methods (such as systematic journal writing). Moreover, our research on implicit exercise identity is rather novel. This concept of EI should be applied to a variety of future studies as a comparative measure that a) has been shown to be reliably related to greater levels of exercise (particularly vigorous forms) and b) is resistant to intentional or unintentional misrepresentation of cognitions that can more commonly present with explicit measures. Exercise identity has a role to play, however large, in the effort to set our communities, countries, and the world on a pathway to health.

References

- Anderson, D. F., & Cychosz, C. M. (1994). Development of an exercise identity scale. *Perceptual and Motor Skills, 78*(3), 747-751.
- Anderson, D. F., Cychosz, C. M., & Franke, W. D. (1998). Association of Exercise Identity with Measures of Exercise Commitment. *Journal of Sport Behavior, 21*(3), 233-241.
- Buhrmester, M. D., Blanton, H., & Swann Jr, W. B. (2011). Implicit self-esteem: nature, measurement, and a new way forward. *Journal of personality and social psychology, 100*(2), 365.
- Cast, A. D., & Burke, P. J. (2002). A theory of self-esteem. *Social forces, 80*(3), 1041-1068.
- Dishman, R. K. (1982). Compliance/adherence in health-related exercise. *Health psychology, 1*(3), 237.
- Frederick, C. M., & Morrison, C. S. (1996). Social physique anxiety: Personality constructs, motivations, exercise attitudes, and behaviors. *Perceptual and motor skills, 82*(3), 963-972.
- Gammage, K. L., Hall, C. R., & Rodgers, W. M. (2000). More about exercise imagery. *Sport Psychologist, 14*(4), 348-359.
- Gammage, K. L., Lamarche, L., & Drouin, B. (2014). Self-presentational efficacy: Does it moderate the relationship between social physique anxiety and physical activity in university students? *International Journal of Sport and Exercise Psychology, 12*(4), 357-367.
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: the implicit association test. *Journal of personality and social psychology, 74*(6), 1464.

- Hausenblas, H. A., & Fallon, E. A. (2002). Relationship among body image, exercise behavior, and exercise dependence symptoms. *International Journal of Eating Disorders, 32*(2), 179-185.
- Kossert, A. L., & Munroe-Chandler, K. (2007). Exercise imagery: A systematic review of the empirical literature. *Journal of Imagery Research in Sport and Physical Activity, 2*(1).
- Marcus, B. H., Selby, V. C., Niaura, R. S., & Rossi, J. S. (1992). Self-efficacy and the stages of exercise behavior change. *Research quarterly for exercise and sport, 63*(1), 60-66.
- Merolla, D. M., Serpe, R. T., Stryker, S., & Schultz, P. W. (2012). Structural precursors to identity processes the role of proximate social structures. *Social Psychology Quarterly, 75*(2), 149-172.
- White, A., & Hardy, L. (1998). An in-depth analysis of the uses of imagery by high-level slalom canoeists and artistic gymnasts. *Sport Psychologist, 12*, 387-403.

APPENDIX A

Research Ethics Approval Notices



Use of Human Participants - Ethics Approval Notice

Principal Investigator: Dr. Craig Hall
Review Number: 181835
Review Level: Full Board
Approved Local Adult Participants: 300
Approved Local Minor Participants: 0
Protocol Title: Evaluating Exercise Identity, Motives for Exercising and Physical Appearance Anxiety Characteristics in a Sample of Adult Women
Department & Institution: Kinesiology, University of Western Ontario
Sponsor:
Ethics Approval Date: July 20, 2011 **Expiry Date:** June 30, 2012

Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
UWO Protocol		
Letter of Information & Consent		
Advertisement		

This is to notify you that The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the applicable laws and regulations of Ontario has granted approval to the above named research study on the approval date noted above.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the NMREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

Members of the NMREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussions related to, nor vote on, such studies when they are presented to the NMREB.

The Chair of the NMREB is Dr. Riley Hinson. The UWO NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Ethics Officer to Contact for Further Information

This is an official document. Please retain the original in your files.

The University of Western Ontario
 Office of Research Ethics
 Support Services Building Room 5150 • London, Ontario • CANADA - N6A 3K7
 PH: 519-661-3036 • F: 519-850-2466 • ethics@uwo.ca • www.uwo.ca/research/ethics



Use of Human Participants - Ethics Approval Notice

Principal Investigator: Dr. Craig Hall
Review Number: 181915
Review Level: Full Board
Approved Local Adult Participants: 300
Approved Local Minor Participants: 0
Protocol Title: Evaluating Exercise Identity, Body Image Perceptions, and Physical Appearance Anxiety Characteristics in a Sample of Adult Men
Department & Institution: Kinesiology, University of Western Ontario
Sponsor:
Ethics Approval Date: July 20, 2011 **Expiry Date:** June 30, 2012

Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
UWO Protocol		
Advertisement		
Letter of Information & Consent		

This is to notify you that The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the applicable laws and regulations of Ontario has granted approval to the above named research study on the approval date noted above.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the NMREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

Members of the NMREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussions related to, nor vote on, such studies when they are presented to the NMREB.

The Chair of the NMREB is Dr. Riley Hinson. The UWO NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Ethics Officer to Contact for Further Information

This is an official document. Please retain the original in your files.

The University of Western Ontario
Office of Research Ethics

Support Services Building Room 5150 • London, Ontario • CANADA - N6A 3K7
PH: 519-661-3036 • F: 519-850-2466 • ethics@uwo.ca • www.uwo.ca/research/ethics



Use of Human Participants - Ethics Approval Notice

Principal Investigator: Dr. Craig Hall
 File Number: 103165
 Review Level: Full Board
 Approved Local Adult Participants: 30
 Approved Local Minor Participants: 0
 Protocol Title: Exercise Identity and Self-Presentational Responses to a 6-week Physical Activity plus Imagery Intervention
 Department & Institution: Health Sciences/Kinesiology, Western University
 Sponsor:
 Ethics Approval Date: January 16, 2013
 Ethics Expiry Date: September 30, 2013

Documents Reviewed & Approved & Documents Received for Information:

Document Name	Comments	Version Date
Other	Questionnaires - Demographic, Exercise Identity Scale, Impression Motivation, Self-Presentational Efficacy Social Physiques Anxiety Scale, PAR-Q and Imagery Scripts	2012/11/12
Western University Protocol		
Letter of Information & Consent	Revised Letter of Information and Consent Form	2012/12/18
Advertisement	Email	

This is to notify you that the University of Western Ontario Health Sciences Research Ethics Board (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced study on the approval date noted above. The membership of this HSREB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the University of Western Ontario Updated Approval Request form.

Member of the HSREB that are named as investigators in research studies, or declare a conflict of interest, do not participate in discussions related to, nor vote on, such studies when they are presented to the HSREB.

The Chair of the HSREB is Dr. Joseph Gilbert. The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.



Signature

Ethics Officer to Contact for Further Information



This is an official document. Please retain the original in your files.

APPENDIX B

Exercise Identity Scale

Studies 1-3

Exercise Identity Scale

Please indicate on the scale provided the degree to which you disagree (1) or agree (7) with each statement as it applies to you.

	Strongly Disagree						Strongly Agree
I consider myself an exerciser	1	2	3	4	5	6	7
When I describe myself to others, I usually include my involvement in exercise	1	2	3	4	5	6	7
I have numerous goals related to exercising	1	2	3	4	5	6	7
Physical exercise is a central factor to my self-concept	1	2	3	4	5	6	7
I need to exercise to feel good about myself	1	2	3	4	5	6	7
Others see me as someone who exercises regularly	1	2	3	4	5	6	7
For me, being an exerciser means more than just exercising	1	2	3	4	5	6	7
I would feel a real loss if I were forced to give up exercising	1	2	3	4	5	6	7
Exercising is something I think about often	1	2	3	4	5	6	7

APPENDIX C

Self-Presentational Efficacy Scale

Studies 1-3

Self-Presentational Efficacy

Think about your next exercise workout. Using any values from this scale (0 to 100%), please indicate how confident you are for each of the following:

0%-----50%-----100%

Not at all confident

Confident

Completely

How confident are you that...

1. These other people will think that you have good physical co-ordination. _____
2. These other people will think that your body looks fit and toned. _____
3. These other people will think that you have good stamina. _____
4. These other people will think that you are someone who works out regularly. _____
5. These other people will think that you are in good shape. _____

APPENDIX D

Social Physique Anxiety Scale

Studies 1 & 3

Social Physique Anxiety Scale

Read each of the following statements carefully and indicate the degree to which the statement is characteristic or true of you, according to the following scale:

1 = Not at all characteristic of me

2 = Slightly characteristic of me

3 = Moderately characteristic of me

4 = Very characteristic of me

5 = Extremely characteristic of me

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

APPENDIX E

Impression Motivation Subscale

Study 1

Impression Motivation

Response Scale					
1	2	3	4	5	6
Strongly	Moderately	Somewhat	Somewhat	Moderately	Strongly
Disagree	Disagree	Disagree	Agree	Agree	Agree

1. I value the attention and praise of others when they regard me as being in good shape. _____
2. I enjoy the praise I receive for exercising. _____
3. I try to appear toned or fit to others. _____
4. I value the attention and praise offered by others in regard to appearing physically fit. _____

APPENDIX F

Letter(s) Of Information

Study 1



Evaluating Exercise Identity, Motives for Exercising, and Physical Anxiety Characteristics in a Sample of Adult Women

Letter of Information

Greetings! You are being asked to participate in a research study titled “Evaluating Exercise Identity, Motives for Exercising, and Physical Anxiety Characteristics in a Sample of Adult Women.” The purpose of the current investigation is to determine how exercise identity, exercise motivational factors, and physical activity anxiety variables are related.

Research has indicated that individuals who maintain a strong exercise-related identity (i.e., they think of themselves as ‘an exerciser’) are more likely to engage in regular exercise (Duncan, Hall, Wilson, & O, 2010). The concept of identity has gained traction as playing a role in decisions pertaining to the starting, maintaining, and ending of physical activity. Research of this nature may provide society with a better understanding of exercise identity. Consistent with this perspective, past research has highlighted that a major driving force behind exercise participation in females is to maintain a fit physique. This is likely an attempt to meet the perceived female ‘body image ideal’. Additionally, research has demonstrated that social anxiety can be a barrier for some to participate in exercise. Your participation in this investigation may contribute to better understanding the extent of how one’s thoughts about exercising are related to feelings of anxiety, reasons to exercise, and concerns about presenting oneself as a competent exerciser. In the future, this information may be helpful in constructing psychological interventions to assist those with body image concerns or who have hesitations about exercising.

If you agree to take part in this study, you will be asked to complete 7 online questionnaires during your own time. This will take approximately 20 minutes to complete. We are requesting your consent to participate, allowing your data to be used for research purposes and potential publication. Completion and final submission of all questionnaires will serve to indicate you are agreeable to this. All data collected in the study is confidential. If the results of this study are published, your name will not be used and no information that discloses your identity will be published, as all data will be

presented in the form of group results. Your questionnaire data is downloaded to a Microsoft Excel spreadsheet and results are analyzed using a statistics program. No paper copies of your answers will be printed, and any electronic data will be stored on a USB drive, locked in a cabinet in a secure room, and destroyed after three years. There are no known risks associated with your participation in this study. Participation in this study is voluntary, you may refuse to participate, refuse to answer any questions, or withdraw from this study at any time.

This letter is yours to print and keep (if you so choose). If you have any questions about the ethical conduct of this study or your rights as a research subject, you may contact: The Office of Research Ethics, The University of Western Ontario, 519-661-3036. Feel free to contact any of the investigators listed below if you have questions about the study. Further, if you feel you are suffering from depression, an eating disorder, an anxiety disorder, or any other potentially debilitating condition, please do not hesitate to contact any of the listed investigators. We will be able to provide with an appropriate contact to help you deal with your issue.

Evaluating Exercise Identity, Body Image Perceptions, and Physical Appearance Anxiety Characteristics in a Sample of Adult Men

Letter of Information

Greetings! You are being asked to participate in a research study titled “Evaluating Exercise Identity, Body Image Perceptions, and Physical Anxiety Characteristics in a Sample of Adult Men.” The purpose of the current investigation is to determine how exercise identity, body image attitudes, and physical activity anxiety variables are related.

Research has indicated that individuals who maintain a strong exercise-related identity (i.e., they think of themselves as ‘an exerciser’) are more likely to engage in regular exercise (Duncan, Hall, Wilson, & O, 2010). The concept of identity has gained traction as playing a role in decisions pertaining to the starting, maintaining, and ending of physical activity. Research of this nature may provide society with a better understanding of exercise identity. Consistent with this perspective, past research has highlighted that a major driving force behind exercise participation in males is a drive for muscularity. This is likely an attempt to meet the perceived male ‘body image ideal’. Additionally, research has demonstrated that social anxiety can be a barrier for some to participate in exercise. Your participation in this investigation may contribute to better understanding the extent of how one’s thoughts about exercising are related to feelings of anxiety, reasons to exercise, and concerns about presenting oneself as a competent exerciser. In the future, this information may be

helpful in constructing psychological interventions to assist those with body image concerns or who have hesitations about exercising.

If you agree to take part in this study, you will be asked to complete 7 online questionnaires during your own time. This will take approximately 20 minutes to complete. We are requesting your consent to participate, allowing your data to be used for research purposes and potential publication. Completion and final submission of all questionnaires will serve to indicate you are agreeable to this. All data collected in the study is confidential. If the results of this study are published, your name will not be used and no information that discloses your identity will be published, as all data will be presented in the form of group results. Your questionnaire data is downloaded to a Microsoft Excel spreadsheet and results are analyzed using a statistics program. No paper copies of your answers will be printed, and any electronic data will be stored on a USB drive, locked in a cabinet in a secure room, and destroyed after three years. There are no known risks associated with your participation in this study. Participation in this study is voluntary, you may refuse to participate, refuse to answer any questions, or withdraw from this study at any time.

This letter is yours to print and keep (if so you choose). If you have any questions about the ethical conduct of this study or your rights as a research subject, you may contact: The Office of Research Ethics, The University of Western Ontario, 519-661-3036. Feel free to contact any of the investigators listed below if you have questions about the study. Further, if you feel you are suffering from depression, an eating disorder, an anxiety disorder, or any other potentially debilitating condition, please do not hesitate to contact any of the listed investigators. We will be able to provide with an appropriate contact to help you deal with your issue.

Thank you!

Investigators:

Dr. Craig Hall

Vincent Liardi

Dr. Kimberley Gammage

UWO - Professor

UWO - PhD Candidate

Brock - Professor

School of Kinesiology

School of Kinesiology

Physical Education and Kinesiology

APPENDIX G

Godin Leisure Time Exercise Questionnaire (GLTEQ)

Study 1

Godin Leisure-Time Exercise Questionnaire

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

	Times Per Week
<p>a) STRENUOUS EXERCISE (HEART BEATS RAPIDLY) (e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)</p>	_____
<p>b) MODERATE EXERCISE (NOT EXHAUSTING) (e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)</p>	_____
<p>c) MILD EXERCISE (MINIMAL EFFORT) (e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking)</p>	_____

2. During a typical **7-Day period** (a week), in your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

OFTEN	SOMETIMES	NEVER/RARELY
1. ☐	2. ☐	3. ☐

APPENDIX H

Identity Salience Hierarchy Measure

Study 2

Identity Salience Hierarchy

Take your time looking over the following list. Please rank the identities in order of your personal importance, where 1 = most important and 7 = least important

Political/Civic Identity _____

Ethnic/Cultural Identity _____

Exercise/Physical Activity Identity _____

Family/Friends Identity _____

Organizations/Groups Identity _____

Religious/Spiritual Identity _____

Academic/Intellectual Identity _____

APPENDIX I

International Physical Activity Questionnaire

Study 2

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

No vigorous physical activities → **Skip to question 3**

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

No moderate physical activities → **Skip to question 5**

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

No walking → **Skip to question 7**

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

Don't know/Not sure

APPENDIX J
Letter Of Information
Study 2

Participant Information Sheet

Identities and Reaction Times

Student researchers: Lindsey Hurst
Vincent Liardi

Supervisor: Dr David Markland

You are being invited to take part in a research study. Before you agree to take part it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. If you wish, discuss it with friends and relatives. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you wish to take part.

Background

This aim of this study is to examine relationships between reaction times, exercise, future intentions, and self-relevant identities.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are free to withdraw at any time and without giving a reason. If you are a student at Bangor University, this will not affect the marks you receive, the outcome of your period of study at SSHES or your standing with your supervisor, other staff members or with the School. The study will involve completing a computer-based reaction time (RT) task and a questionnaire package consisting of 7 questionnaires. You are free to choose whether to participate in the study or not.

What will happen to me if I take part?

You will be asked to complete a test of reaction times, which is run on a PC, in addition to filling out a questionnaire package. The time to complete all data collection should take approximately 25 minutes. You will be asked to complete the RT computer task either before or after filling out the questionnaires. The RT task will consist of sorting words on a computer screen using assigned keys on the keyboard. The goal is to make a decision as quickly as possible while keeping errors to a minimum. A further explanation of how to perform the RT task will be displayed on the screen before you commence.

Disadvantages and risks of participation

There are no known risks associated with completing the RT task and the questionnaires.

Possible benefits of participation

A benefit in taking part is that will learn more about the research process. The findings from the study could potentially increase our understanding of identities, intentions, and reaction times

and how they relate to exercise. Results will be made available upon request in the months following data collection.

Confidentiality

All information, which is collected about you during the course of the research, will be kept strictly confidential. It will not be possible to identify you in any report or publication arising from the study.

Study review

The study has been reviewed and approved by the SSHES Ethics Committee.

Feedback on the study

SSHES is always keen to hear the views of research participants about their experience. If you would like to give feedback, please ask your researcher to provide you with Form 6 – Participant Feedback Form from the Ethics Guidelines Handbook. Completion of this form is optional. The completed form should be returned to Professor Tim Woodman. All information will be treated in a strictly confidential manner.

Any Questions?

Please ask us if you have any questions. You should not sign the form consenting to take part in the study if you still have unanswered questions or any doubts.

Contacts:

Dr D. Markland
School of Sport, Health & Exercise Sciences – Bangor University

Lindsey Hurst
School of Sport, Health & Exercise Sciences – Bangor University

Vincent Liardi
Department of Kinesiology - Western University

APPENDIX K
Letter of Information
Study 3

Western HealthSciences

Exercise Identity and Self-Presentational Responses to a six-week Physical Activity plus Imagery Intervention

Letter of Information Principal Investigator: Dr. Craig Hall

Greetings! You are being asked to participate in a research study titled “Exercise Identity and Self-Presentational Responses to a six-week Physical Activity plus Imagery Intervention.” The purpose of the current investigation is to determine how exercise identity, exercise motivational factors, and physical activity anxiety variables are related.

Logic Behind The Study

Research has indicated that individuals who maintain a strong exercise-related identity (i.e., they think of themselves as ‘an exerciser’) are more likely to engage in regular exercise (Duncan, Hall, Wilson, & O, 2010). The concept of identity has gained traction as playing a role in decisions pertaining to the starting, maintaining, and ending of physical activity. Additionally, self-presentation refers to the process by which individuals attempt to monitor and control how others perceive and evaluate them. Research has demonstrated that greater self-presentational concerns (worries over the impressions people make on others) can increase feelings of social anxiety and apprehensions towards exercise. This is a potential barrier for some to participate in physical activity. Imagery is a psychological tool that may help increase exercise identity and alleviate self-presentational concerns. It involves the mental visualization of an object, scene, or sensation as though it were occurring in the physical reality (Denis, 1985). Research has demonstrated that in certain instances, such as those requiring the acquisition of a novel skill, imagery can be as effective as physical practice (Sanders, Sadoski, Bramson, Wiprod, Walsum, 2004).

Potential Benefits

Our goal is to recruit 28 participants (14 men and 14 women) to take part in this study. Your participation in this investigation may contribute to better understanding the extent of how multiple sessions of exercise and imagery over the course of six weeks affect one’s anxiety and concerns about presenting oneself as a competent exerciser. Further, we will gain insight into the extent of physical fitness improvements over the course of this intervention. In the future, this information may be helpful in constructing psychological interventions to assist those with body image concerns or who are interested in making exercise a greater part of their identity.

Your Commitments

If you agree to take part in this study, you will be asked to complete 6 weeks of prescribed exercise training and imagery sessions, plus one follow-up assessment approximately one month afterwards. The three exercise sessions per week are to be completed at the Western Student

Recreation Center, and will last approximately one hour each, for a total of 18 gym-based exercise sessions. You will be asked to complete the physical activity readiness questionnaire to ensure you are sufficiently healthy for participation in this study. A research assistant will accompany you to the facility on one of these sessions each week to ensure you have an understanding of the program, as well as making sure you feel comfortable with how to use the equipment in the gym. The sessions will be designed based on the participant's physical condition and will incorporate a mix of cardiorespiratory and strength training. You are free to ask the research assistant anything during these sessions if you feel like it will make you more confident and able in an exercise setting. There will be no cost associated with this one-on-one exercise assistance. Each workout will take approximately 60 minutes to complete. There will be a baseline assessment at the start of the program to assess muscular endurance and cardio fitness. These include a short (8-minute) treadmill walking test derive an estimate of your $VO_2\text{max}$, a push-up test, and a sit-up test. The push-up and sit-up tests will ask you to perform as many of these repetitions as you can to the pace of a 1-second interval determined by a metronome. This same assessment will also be conducted immediately after finishing the 6-week intervention. In addition to the physical exercise, we are requesting that you listen to an imagery script three times each week, on separate days, at your own leisure (totaling 18 imagery sessions over the course of the 6 weeks). Depending on which study condition you are in, your imagery script will either focus on exercise identity or the self-presentational aspects of exercising. You will be provided with an audio script that can be played on your iPod, computer, etc. that talks about going to the gym and having a positive workout experience. Each imagery session will last approximately 5 minutes. At the end of these six weeks, you will be asked to continue exercising as much as you like (there are no minimum requirements). You are free to carry on as you see fit. However, we ask that you participate in a final assessment (the same test you already completed) one-month after the conclusion of the 18 gym and imagery sessions to gauge the cumulative, lasting effects of the study.

Risks, Confidentiality, and Additional Procedures

We are requesting your consent to participate, allowing your data to be used for research purposes and potential publication. Completion and final submission of all questionnaires will serve to indicate you are agreeable to this. All data collected in the study is confidential. Your data will be tracked with a unique subject ID coding number. At the start of the study your name will be linked to a code number (the link will be secured in a locked drawer only accessible to the principal investigator), and subsequently all collected data will be identified with this unique, safe coding identifier. If the results of this study are published, your name will not be used and no information that discloses your identity will be published, as all data will be presented in the form of group results. Your questionnaire data will be input to a Microsoft Excel spreadsheet and results are analyzed using a statistics program. The paper copies of your answers will be shredded, and any electronic data will be stored on a USB drive, locked in a cabinet in a secure room, and destroyed after one year. As with any form of exercise, there are some risks involved. You may experience some of the discomforts associated with physical exercise including; muscle soreness, muscle or joint injury, heat exhaustion/ stroke, increased heart rate, and in very rare instances heart attack. Every effort will be made to minimize the above risks. Our research investigator, who is certified in first aid & CPR will do his/her best to familiarize you with the equipment (treadmill, weights, etc.) and help you exercise in a manner that will lead to a more fit body; one that is able to reap the full extent of the health benefits associated with exercise. You

may feel nervous and/or uneasy going to the gym because you don't exercise very frequently. However, the goal of this is to reduce stress so exercising can become a part of your everyday activities in order to preserve and improve overall health. You will not be compensated for your participation in this study". If additional cost may be incurred (ex: parking/travel costs) please indicate that these expenses will not be reimbursed. Participation in this study is voluntary, you may refuse to participate, refuse to answer any questions, or withdraw from this study at any time with absolutely no effect to your future employment or academic status.

In Closing

This letter is yours to print and keep (if you so choose). If you have any questions about the ethical conduct of this study or your rights as a research participant, you may contact: The Office of Research Ethics, Western University, 519-661-3036. Feel free to contact any of the investigators listed below if you have questions about the study. Further, if you feel you are suffering from depression, an eating disorder, an anxiety disorder, or any other potentially debilitating condition, please do not hesitate to contact any of the listed investigators. We will be able to provide with an appropriate contact to help you deal with your issue. You will be given a copy of this letter of information and consent form once it has been signed.

Thank you!

Investigators:

Dr. Craig Hall, UWO

Vincent Liardi, UWO

Dr. Kimberley Gammage, Brock University

APPENDIX L

Follow-Up Exercise Email

Study 3

“Hi! Thanks for opening this document. As mentioned in the lab, most of your commitment to the program has now been completed (congratulations!). You no longer have to meet your exercise facilitator at the gym, nor do you have to listen to the imagery audio. I do, however, need to follow your physical activity over the course of approximately four weeks. Again, although we hope you continue with your more active lifestyle, the amount of activity you choose to do is completely up to you. You can do 7 days a week, or zero; I just ask that you please be honest in your responses, and that you reliably track your exercise in the table below. The columns are mostly self-explanatory. Under the ‘Borg scale’ heading, please rate (6 to 20) your exercise perceived level of exertion during your workout: (least effort)-6-7(very, very light)-8-9(very light)-10-11(fairly light)-12-13(somewhat hard)-14-15(hard)-16-17(very hard)-18-19(very, very hard)-20(maximum effort). Please keep track of your records for the full four weeks. I will send you weekly reminders to do so.”

APPENDIX M

Physical Activity Readiness Questionnaire (PAR-Q)

Study 3

Physical Activity Readiness
Questionnaire - PAR-Q
(revised 2002)

PAR-Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

YES	NO	
<input type="checkbox"/>	<input type="checkbox"/>	1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?
<input type="checkbox"/>	<input type="checkbox"/>	2. Do you feel pain in your chest when you do physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	3. In the past month, have you had chest pain when you were not doing physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	4. Do you lose your balance because of dizziness or do you ever lose consciousness?
<input type="checkbox"/>	<input type="checkbox"/>	5. Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
<input type="checkbox"/>	<input type="checkbox"/>	7. Do you know of any other reason why you should not do physical activity?

If
you
answered

YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want — as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programs are safe and helpful for you.

NO to all questions

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:

- start becoming much more physically active — begin slowly and build up gradually. This is the safest and easiest way to go.
- take part in a fitness appraisal — this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively. It is also highly recommended that you have your blood pressure evaluated. If your reading is over 144/94, talk with your doctor before you start becoming much more physically active.

DELAY BECOMING MUCH MORE ACTIVE:

- if you are not feeling well because of a temporary illness such as a cold or a fever — wait until you feel better; or
- if you are or may be pregnant — talk to your doctor before you start becoming more active.

PLEASE NOTE: If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

Informed Use of the PAR-Q: The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

No changes permitted. You are encouraged to photocopy the PAR-Q but only if you use the entire form.

NOTE: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

"I have read, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction."

NAME: _____

SIGNATURE: _____

DATE: _____

SIGNATURE OF PARENT
or GUARDIAN (for participants under the age of majority): _____

WITNESS: _____

Note: This physical activity clearance is valid for a maximum of 12 months from the date it is completed and becomes invalid if your condition changes so that you would answer YES to any of the seven questions.



APPENDIX N

Sample Exercise Identity Imagery (EII) Script – Week 3-4

Study 3

“Please close your eyes. Make yourself comfortable and relax. Take a deep breath in...now slowly exhale. Notice any tensions in your body and let them go. In your mind, picture yourself once again in the Western Student Recreation Center for one of your weekly workouts. The gym is bright and full of activity. People are talking with friends around you and smiling. You observe a few other exercisers walking up the stairs and readying themselves to begin their workout. After the past couple of weeks you have got the feeling that this is a pleasant atmosphere.

Imagine yourself getting prepared for your workout. After you have changed, you exit the change room to get a sip of water. Imagine how refreshing and cold the water feels on your lips. You know it’s a good idea to drink some water and to stay hydrated before your workouts. You then make your way up the stairs. You may be feeling nervous about your upcoming exercise session. **On more than one occasion you have thought about this upcoming exercise session.** You may be wondering how you are going to feel after your workout today! Every day is a challenge, but one you are embracing. Your feelings of nervousness that you felt when you started the program are gradually subsiding. You want to be healthy. That was a key reason why you responded to the initial email to join this program. **Think about your goals for this exercise program.** Think about the routine you have been getting into with your exercise facilitator for these six weeks. They have taught you some things you didn’t know you could do before. **More and more, you are becoming a regular exerciser! Your friends and family have faith in you, and see you as someone who will continue exercise consistently.**

Imagine that you are ready to begin your workout. You are dressed and are walking up the stairs towards the treadmills on the upper level. Imagine feeling excited to get started! Imagine feeling your heart start to beat a bit faster, not because you are scared, but because you are excited. **If you were forced to turn back from this exercise session now, you would feel a real loss.**

Now that you are ready to exercise, you are about to choose a machine to begin your workout. Today you have decided to start with some cardio to get your muscles warm and ready. You have found an open treadmill amongst a row of eager exercisers. Imagine yourself getting onto the equipment as you move your body at a slow pace. You are starting with just a walk for now, to get your body active and loose. Notice how nice it feels to get your body moving. Your legs and arms are in a comfortable rhythm as you warm up. Imagine yourself turning up the speed on the machine. Notice the change in your body. You are now moving faster and it feels good. Imagine that your heart rate starts to increase and your muscles and skin start to feel really warm. **Think about how**

exercising makes you feel better knowing that you are doing something beneficial for your body. You are feeling healthy, and beginning to feel like being an exerciser means more than just exercising. It gives you individual purpose.

Imagine that you have completed fifteen minutes. You make your way downstairs to where the weights are stationed. You see some of the machines that you have learned how to use, and others that you are enthusiastic to try in the future. **Exercise is becoming an important part of who you are.** Imagine yourself walking over to one of the machines. Maybe it will work out your legs, or maybe your arms. You take a seat and steadily use your muscles to move the weight. This is a feeling that you are getting used to. Deep within yourself, these feelings of exercise are confirming that exercise is part of your habits. A smile crosses your face, as you are pleased that you are making progress. You then make your way down to the other end of the gym to use a different machine. Your exercise facilitator has been very helpful in guiding you along. Now you are become more self-assured about how to do some of the many exercises in the gym. Next, imagine yourself going to an area in the gym and taking a seat on one of the mats to do some core exercises. Imagine yourself starting to do some sit-ups. You already notice an improvement from two weeks ago. You feel the burn in your abdominals but it's a good burn- a feeling that you are strengthening your muscles **and strengthening your identity as an exerciser.**

You notice an hour has gone by in your gym workout, and the time went by faster than you had anticipated. You might feel a bit tired, but you feel accomplished. **Your identity as an exerciser has been strengthened.** You are feeling your muscles relaxing, and you feel satisfied from this workout. Exercise is making you feel good about yourself. **Exercise is surely becoming more important to your self-concept.**

Your heart rate is slowing down and your breathing is returning to normal as you make your way to the change room. You change into your normal clothes and walk past the front desk, noticing how this place is becoming more and more familiar. **At the time you signed up for this study, you decided that exercise was important to you. You cannot wait to tell more people about your involvement in this exercise program.** Now that you have finished yet another workout you **feel proud that you are taking action to achieve your goals! You get the sense that exercise is becoming very important and fundamental part of your character."**

APPENDIX O

Sample Exercise Identity Imagery (EII) Script – Week 3-4

Study 3

“Please close your eyes. Make yourself comfortable and relax. Take a deep breath in...now slowly exhale. Notice any tensions in your body and let them go. In your mind, picture yourself once again in the Western Student Recreation Center for one of your weekly workouts. The gym is bright and full of activity. People are talking with friends around you and smiling. You observe a few other exercisers walking up the stairs and readying themselves to begin their workout. After the past couple of weeks you have got the feeling that this is a pleasant atmosphere.

Imagine yourself getting prepared for your workout. After you have changed, you exit the change room to get a sip of water. Imagine how refreshing and cold the water feels on your lips. You know it’s a good idea to drink some water and to stay hydrated before your workouts. You then make your way up the stairs. You may be feeling nervous about your upcoming exercise session. **You may be wondering who else will be at the gym while you are working out.** You may be wondering how you are going to feel after your workout today! Every day is a challenge, but one you are embracing. Your feelings of nervousness that you felt when you started the program are gradually subsiding. You want to be healthy, **and you also want others to see you that way as well.** Think about the routine you have been getting into with your exercise facilitator for these six weeks. They have taught you some things you didn’t know you could do before. **Soon, others will see you as a regular exerciser - your friends and family, the other people who work out at the gym, and your exercise facilitator!**

Imagine that you are ready to begin your workout. You are dressed and are walking up the stairs towards the treadmills on the upper level - **as you pass by others, they can tell that you are an exerciser and that you are going to work out now.** Imagine feeling excited to get started **with all the others in the gym!** Imagine feeling your heart start to beat a bit faster, not because you are scared, but because you are excited.

Now that you are ready to exercise, you are about to choose a machine to begin your workout. Today you have decided to start with some cardio to get your muscles warm and ready. You have found an open treadmill amongst a row of eager exercisers. Imagine yourself getting onto the equipment as you move your body at a slow pace. You are starting with just a walk for now, to get your body active and loose. Notice how nice it feels to get your body moving. Your legs and arms are in a comfortable rhythm as you warm up. Imagine yourself turning up the speed on the machine. Notice the change in your body. You are now moving faster and it feels good. Imagine that your heart rate starts to increase and your muscles and skin start to feel really warm. **Others in the gym can see you exercising - they can tell you are working hard, but that you are feeling**

comfortable. You look like someone who knows what they are doing in the gym, who is fit and coordinated, and who has been working out for a while.

Imagine that you have completed fifteen minutes. You make your way downstairs to where the weights are stationed. You see some of the machines that you have learned how to use, and others that you are enthusiastic to try in the future. **You are confident that you know the basics, and that others can tell you know what you are doing in the gym. You fit in with the others at the gym - they can tell that you belong too.** Imagine yourself walking over to one of the machines. Maybe it will work out your legs, or maybe your arms. You take a seat and steadily use your muscles to move the weight. This is a feeling that you are getting used to. A smile crosses your face, as you are pleased that you are making progress. You then make your way down to the other end of the gym to use a different machine. Your exercise facilitator has been very helpful in guiding you along. Now you are become more self-assured about how to do some of the many exercises in the gym. Next, imagine yourself going to an area in the gym and taking a seat on one of the mats to do some core exercises. Imagine yourself starting to do some sit-ups. You already notice an improvement from two weeks ago. Others in the gym can see you working out, **and get the sense that you are strong and skilled.** You feel the burn in your abdominals but it's a good burn- a feeling that you are strengthening your muscles.

You notice an hour has gone by in your gym workout, and the time went by faster than you had anticipated. You might feel a bit tired, but you feel accomplished. **And others at the gym can see that you are an exerciser as well - someone who is fit, coordinated, and strong.** You are feeling your muscles relaxing, and you feel satisfied from this workout. Exercise is making you feel good about yourself. **Imagine how you appear to others, as someone who regularly works out, who is healthy and physically attractive due to her hard work at the gym.**

Your heart rate is slowing down and your breathing is returning to normal as you make your way to the change room. You change into your normal clothes and walk past the front desk, noticing how this place is becoming more and more familiar. **At the time you signed up for this study, you decided that it was important to start exercising. You cannot wait to tell more people about your involvement in this exercise program so that everyone can know that you are now a regular exerciser.** Now that you have finished yet another workout you **feel proud that you look and feel stronger, attractive, and fit - not just to yourself but to your friends, family, co-workers, and others at the gym. Everyone will know now that you are active and fit."**

-- Vincent Liardi --
VITA

PERSONAL

Citizenship: Canadian
D.O.B. June 9th, 1987

EDUCATION

Sept., 2010 – Dec., 2015* (Ph.D.): Western University
Area: Exercise & Health Psychology
Title: Exercise Identity: Origins, Utility, and Future Applications
Advisor: Dr. Craig Hall

Sept, 2009 – June, 2010 (M.A.): Western University
Area: Exercise Psychology
Title: Examining Exercise Identity
Advisor: Dr. Craig Hall

Sept, 2005 - June, 2009 (B.A. hons): Western University
Major: Specialization in Kinesiology

AWARDS

<u>Title of Award</u>	<u>Type of Award</u>	<u>University of Tenure</u>	<u>Total Value</u>	<u>Period Held</u>
Joseph-Armand Bombardier Canada Graduate Scholarship (CGS)/SSHRC Doctoral Award	Academic - merit	Western University	\$60,000	2011-2013
Ontario Graduate Scholarship (OGS, PhD Level)	Academic - merit	Western University	\$17,500	2010-2011
Social Sciences and Humanities Research	Academic -	Western	\$17,500	2009-2010

Council of Canada (SSHRC) Bombardier Graduate Scholarship (CGS) – Master’s Award	merit	University		
Queen Elizabeth II (Aiming for the Top) Scholarship	Academic - merit	Western University	\$14,000	2005-2009
Western Scholarship of Distinction	Academic - merit	Western University	\$1,500	2005-2006
<i>Total Awards</i>	-	-	<i>\$110,500</i>	-

REFEREED ARTICLES

Published Manuscripts:

Liardi, V., & Carron, B. (2011). An Analysis of NHL Faceoffs: Implications for the Home Advantage. *The International Journal of Sport & Exercise Psychology*, 9(2), 102-109.

Manuscripts in Progress:

Liardi, V., Estrellado, J., & Atencio, M. (TBD). A Qualitative Analysis of the Physique Competition Process.

Liardi, V., & Martin, L. (TBD). Effectiveness of a Team Building Intervention for Elite Youth Water Polo Teams.

Liardi, V., Gammage, K., & Hall, C. (TBD). Exercise Identity and Its Relation to Self-Presentation and Body Image Concerns in Males and Females.

Liardi, V. & Hall, C. (TBD). Examining the Stability of Exercise-Related Identity.

Liardi, V., Hall, C., & Gammage, K. (TBD). Exercise Identity and Self-Presentational Responses to a Six-Week Physical Activity plus Imagery Intervention.

Liardi, V. & Markland, D. (TBD). Implicit and Explicit Exercise Identity, Identity Salience, and the Relationship to Exercise Behavior.

REFEREED PRESENTATIONS

(a) Symposia/Seminar

Wright, E.M., **Liardi, V.**, O, J., & McCullagh, P. (2014, July). *Dropout Dilemma: Towards a Better Understanding of Youth Sport Disengagement*. Research presented at the 19th European College of Sport Science Congress held in Amsterdam, NED.

Liardi, V., & Markland, D. (2013, June). *Implicit and Explicit Exercise Identity, Identity Salience, and the Relationship to Exercise Behavior*. Research presented at the North American Society for the Psychology of Sport and Physical Activity (NASPSPA) conference held in New Orleans, LA.

Liardi, V., Gammage, K., & Hall, C. (2012, June). *Exercise Identity and Its Relation to Self-Presentation and Body Image Concerns in Males and Females*. Research presented at the North American Society for the Psychology of Sport and Physical Activity (NASPSPA) conference held in Honolulu, HI.

Liardi, V., Cooke, L., & Hall, C. (2011, June). *Examining Stages of Exercise with Exercise-Identity*. Research presented at the North American Society for the Psychology of Sport and Physical Activity (NASPSPA) conference held in Burlington, VT.

Cooke, L., **Liardi, V.**, & Hall, C. (2011, June). *Does the shoe FIT? Examining the relationships of exercise identity with exercise frequency, intensity, and duration*. Research presented at the North American Society for the Psychology of Sport and Physical Activity (NASPSPA) conference held in Burlington, VT.

Liardi, V., & Hall, C. (2010, June). *Examining the stability of exercise-related identity*. Poster presented at the International Society of Behavioral Nutrition and Physical Activity (ISBNPA) conference held in Minneapolis, MN.

Liardi, V., & Carron, B. (November, 2008). *NHL rules as a factor in the home advantage?* Poster presented at the Canadian Society for Psychomotor Learning and Sports Psychology (SCAPPS) conference held in Canmore, AB.

TEACHING EXPERIENCE

The following courses span a variety of foci, including theory-based lecture courses, laboratory classes, as well as activity courses:

- **KIN 1610: Introduction to Kinesiology Lecture** (15 sections x 4 units), CSU East Bay course instructor, September 25th, 2013 – December 14th, 2015.

- KIN 3545: **Competition Conditioning** (1 section x 1.3 units), CSU East Bay course instructor, September 23rd, 2015 – December 14th, 2015
- KIN 3740: **Philosophical Foundations of Kinesiology** (1 section x 4 units), CSU East Bay course instructor, June 20th, 2015 – September 5th, 2015
- KIN 3750: **Sport in Contemporary Society** (1 section x 4 units), CSU East Bay course instructor, June 20th, 2015 – September 5th, 2015
- KIN 0487: **Motor Development Lecture** (1 section x 4 units), San Francisco State University course instructor, January 26th, 2015 – June 2nd, 2015.
- KIN 3330: **Motor Learning and Control Laboratory** (13 sections x 2 units), CSU East Bay course instructor, September 25th, 2013 – June 14th, 2015.
- KIN 3330: **Motor Learning and Control Lecture** (2 sections x 4 units), CSU East Bay course instructor, January 5th, 2015 – June 14th, 2015.
- KIN 1010: **Beginner Weight Lifting Activity** (2 sections x 1.3 units), CSU East Bay course instructor, September 25th, 2013 – March 22nd, 2015.
- KIN 0763: **Motivation & Performance Seminar** (1 section x 4 units), San Francisco State University course instructor, August 25th, 2014 – January 6th, 2015.
- KIN 3350: **Sport and Exercise Psychology Lecture & Labs** (2 sections x 5 units), CSU East Bay course instructor, January 6th, 2013 – March 23rd, 2014.
- KIN 1044: **Boot Camp Fitness Activity** (1 section x 1.3 units), CSU East Bay course instructor, September 25th, 2013 – December 15th, 2013.
- KIN 1044: **Beginner Aerobic Walking Activity** (2 sections x 1.3 units), CSU East Bay course instructor, September 25th, 2013 – June 14th, 2015.