AN IDENTITY THEORY AND SOCIAL COGNITIVE THEORY EXAMINATION OF THE ROLE OF IDENTITY IN HEALTH BEHAVIOUR AND BEHAVIOURAL REGULATION

by

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I hereby declare that I am the sole author of this dissertation. This is a true copy of the dissertation, including any required final revisions as accepted by my examiners.

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Abstract

The self has been identified as the "psychological apparatus that allows individuals to think consciously about themselves" (Leary & Price Tangney, 2003, p.8). Further, the self has been identified as a worthwhile construct of investigation in relation to health behaviour (Contrada & Ashmore, 1999). Two self-related variables that have been useful in the study of health behaviour are *identity* (e.g. Anderson, Cychosz, & Franke, 1998; Petosa, Suminski & Hortz, 2003; Storer, Cychosz, & Anderson, 1997) and *self-efficacy* (Maddux, Brawley & Boykin, 1995). Identity Theory posits that individuals regulate their behaviour in a manner that is consistent with their goal identity (Gecas & Burke, 2003). Social Cognitive Theory provides a means of measuring social cognitions that may be important in behavioural regulation relative to identity. Further, self-efficacy beliefs may influence individuals' persistence at aligning their identity and behaviour. Research to date has investigated the link between identity and exercise (e.g. Anderson, Cychosz & Franke, 1998; Petosa, et al., 2003). Further, researchers are beginning to investigate the link between identity and other health behaviours (e.g. Armitage & Conner, 1999; Kendzierski and Costello, 2004; Storer, Cychosz, & Andersen, 1997). However, research has not utilized the predictive frameworks offered by Identity Theory and Social Cognitive Theory to investigate the relationships between identity, behaviour and behavioural regulation.

Study One investigated the role of identity and self-efficacy beliefs in the maintenance of vigorous physical activity. Results were consistent with both Identity Theory and Social Cognitive Theory. Individuals who strongly identified with the runner identity expressed stronger task and self-regulatory efficacy beliefs. They also exercised more frequently and for longer durations than did those who only moderately identified with running.

Study Two further explored the relationship between exercise identity, exercise behaviour and the self-regulatory processes involved in behavioural regulation. Identity Theory and Social Cognitive Theory were used as guiding frameworks for this investigation. High and moderate exercise identity groups were compared in term of their affective and cognitive reactions to a hypothetical behavioural challenge to exercise identity. Consistent with Identity Theory, results indicated that participants appeared to be regulating their behaviour in a manner that was consistent with their exercise identity. Specifically, in response to the behavioural challenge to identity, high exercise identity participants, in contrast to their moderate counterparts, showed (a) less positive and (b) greater negative affect about the challenge, (c) higher self-regulatory efficacy for future exercise under the same challenging conditions, (d) stronger intentions for this future exercise, as well as for (e) using self-regulatory strategies to manage the challenging conditions and (f) intending to exercise more frequently under those conditions.

Study Three investigated whether identity with *healthy eating* could also be useful in understanding behaviour and behavioural regulation. Similar to Study Two, extreme healthy-eater identity groups' reactions to a hypothetical behavioural challenge to identity were compared. Results were similar to Study Two. Participants responded in a manner that suggested that they would regulate their future behaviour relative to their healthy-eater identity. In response to the behavioural challenge to identity, individuals who highly identified as healthy-eaters expressed less (a) positive affect, greater (b) negative affect, (c) self-regulatory efficacy for managing their healthy eating in the future challenging weeks, (d) intentions to eat a healthy diet, (e) generated more self-regulatory strategies and had (f) stronger intentions to use those strategies in future weeks under the same challenging conditions than did individuals who

moderately identified themselves as healthy-eaters. Further, prospective relationships between healthy-eater identity and social cognitive variables, and healthy eating outcomes were examined. As was found in Study One in the context of exercise, healthy-eater identity and social cognitions predicted healthy eating outcomes.

Taken together, the three studies suggest that identity may be important in understanding health behaviours and the regulation of these behaviours. Also, the present findings support the compatible use of Identity Theory and Social Cognitive Theory in the investigation of identity and health behaviour.

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General Introduction

A physically active lifestyle and a healthy diet are associated with numerous health benefits (Health Canada, 2004; Healthy People 2010). However, much of the general population fails to meet physical activity (Miller, Sales, Kopjar, Fihn & Bryson, 2005) and dietary (Briefel & Johnson, 2004) recommendations. Those who do initiate change in these domains often do not adhere (Dishman, 1994; Michenbaum & Turk, 1987; Wing, 2000). Accordingly, understanding the factors associated with adherence to these health behaviours is a research priority (Orleans, 2000).

The Self and Health

The *self* has been recognized as a worthwhile construct of investigation in relation to health (Contrada & Ashmore, 1999). Indeed, self-ratings of health, illness and disease are linked with health outcomes (Benyamini, Leventhal & Leventhal, 1999; Contrada & Ashmore, 1999). The self is thought to be reciprocally related to health (Contrada & Ashmore, 1999). Enactment of aspects of the self often underlies health-related behavioural choices such as sport and exercise participation, substance use, eating practices (Martin, Leary & O'Brien, 2001) and risk-taking behaviour (Leary, Tchividijian & Kranberger, 1994; Martin Ginis & Leary, 2004). Health status or initiation of health behaviour may affect how one experiences the self. Furthermore, self-related variables such as expectancy-value, self-efficacy, self-regulation and self-presentation have been incorporated into theories and models used to understand health behaviour. In realization of the link between the self and health, Contrada and Ashmore (1999) encourage researchers to explore the multiple facets of self and health. Prior to a more in depth investigation of the role of self-related variables in health behaviour, a more detailed description of the self is provided.

The Self

The self has been identified as the "psychological apparatus that allows organisms to think consciously about themselves" (Leary & Price Tangney, 2003, p. 8). This reflexive core of the self is thought to enable individuals to experience, perceive, think, and feel in relation to themselves, as well as regulate themselves (Leary & Price Tangney, 2003). While the self seems individual in nature, this construct is seen as arising out of social experiences where the self is affected by and affects the social world (Gecas & Burke, 1995; Stets & Burke, 2003). In a recent chapter regarding the use of self in research, Leary and Price-Tangney (2003) outline many variables that fall under the general rubric of *self.* These researchers emphasize the conceptual and methodological importance of distinguishing between these different aspects of the self. They also encourage researchers to investigate these different self variables in relation to one another. Two self-related variables that have been useful in the study of health behaviour are *identity* (e.g. Anderson, Cychosz, & Franke, 1998; Petosa, et al., 2003; Storer, Cychosz, & Anderson, 1997) and *self-efficacy* (Maddux, et al., 1995). Each variable and their respective theoretical backgrounds are discussed below.

Identity

Identity asks the question, "*who am I*"? Viewed as subcomponents of the self, identities are the self situated in the context of a particular role (e.g. self as mother, self as friend; Stets & Burke, 2000). Identities hold accompanying expectations from both the individual holding that identity and from others and are thought to guide behaviour (Gecas & Burke, 1995; Stets & Burke, 2003). Further, people are thought to differ in the extent to which they assimilate a particular identity into their sense of self (Ryan & Deci, 2003).

Identity Theory

The works of Stryker (1980) and Burke (1980) have had a great impact on the development of Identity Theory. Stryker's (1980) work introduces the concept of *identity salience* - the importance of an identity relative to other identities. Identity salience is thought to influence how individuals act in a given situation; the higher the salience of an identity, the greater the probability that behaviour will be in agreement with the expectations associated with that identity (Stryker & Burke, 2000).

Burke's work focuses on the internal dynamics of self processes (Stryker & Burke, 2000) and introduces a cybernetics model of control to explain the relationship between identity and behaviour (Burke, 1991). According to this model, identities and their associated expectations serve as a standard of reference for behaviour. When an identity is activated in a situation that demands it, self-relevant meanings from the situation are compared to the expectations and meanings associated with the identity. If a difference is detected between these two, behaviour is modified in an attempt to bring about congruency between behaviour and identity (Stets & Burke, 2003; Stryker & Burke, 2000). While this model does not formally incorporate emotion and cognitions, predictions have been offered regarding these variables. A mismatch between identity and behaviour is thought to create negative emotions while matching is thought to lead to positive emotions (Stets & Burke, 2003). In terms of cognitions, Stryker and Burke (2000) have commented that increased self-efficacy would be expected by successful role performance.

Identity and Behaviour

Identity Theory has proven useful in predicting behaviour. Stryker and Serpe (1982) found that level of commitment to a religious identity predicted salience of that same identity and amount of time spent engaging in religious activities. As well, identification with the blood

donor identity prospectively predicted number of donations (Callero, 1985). Salience of identity as a mother has also been found to predict acceptance of the motherhood role and willingness to make sacrifices for one's children among a sample of first time mothers (Nuttbrock & Freudinger, 1991).

Social Cognitive Theory

Social Cognitive Theory is an approach to understanding human cognition, motivation and emotion which assumes that people are active agents in shaping their environments (Bandura, 1986, 1987; Maddux, 1993; Maddux & Gosselin, 2003). This theory assumes that people are able to symbolize their experiences into internal models of action that allow them to engage in forethought to purposefully direct their behaviour. Further, Social Cognitive Theory assumes that people are capable of self-reflecting about their behaviour and experiences. Through this self-reflection they can self-regulate their behaviour. Finally, this theory sees inner personal factors, environmental events and behaviour as all mutually interacting in a reciprocal manner (Maddux, 1993).

Self-Efficacy

Social Cognitive Theory incorporates an important self-related variable having to do with personal agency: *self-efficacy*. Self-efficacy asks the question, "*what can I do"*? This construct is viewed as individuals' beliefs about their ability to carry out the courses of action necessary to lead to an outcome (Bandura, 1997) and is thought to have important implications for behaviour (Maddux & Gosselin, 2003). Specifically, self-efficacy beliefs are thought to influence the choice of goals, attempts and persistence at reaching those goals, as well as reactions to setbacks along the way (Maddux, 2003; Maddux, 1993).

Identity and Self-Efficacy

While Identity Theory and Social Cognitive Theory emerge from different perspectives, the theories share key assumptions about individuals. Both theories posit that behaviour is goal directed and see individuals as active in determining their behaviour (Bandura, 1997; Gecas & Burke, 1995; Maddux, 1993). Also, both theories recognize the role of others in shaping behaviour (Bandura, 1997; Stets & Burke, 2003). Identity Theory posits that individual behaviour is influenced by others' expectations. Further, individuals gauge others' reactions to their behaviour in a situation so as to determine success at portraying a particular goal identity (Burke, 1980). Social Cognitive Theory also recognizes the role of others in shaping behaviour. Vicarious experience and verbal persuasion by others are seen as determinants of self-efficacy and this variable has been reliably shown to predict behaviour (Bandura, 1997). The present dissertation builds upon the common ground shared by these two theoretical perspectives and draws ideas from each, a practice that has been advocated by self researchers (Brawley, 1993; Leary & Price Tangney, 2003; Stryker & Burke, 2000). Specifically, the present dissertation asks the question, what can be learned about health behaviour by asking "*who am I*"? and "*what can I do*"?

Through asking the question "*who am I*"?, identity provides a means of assessing a goal or standard for behavioural regulation. When individuals see themselves as an "*exerciser"* or a "*healthy-eater",* this identity and its associated expectations should provide a standard for behaviour. According to Identity Theory, these individuals should regulate their behaviour in a manner that is consistent with the expectations associated with being an "*exerciser"* or *"healthy-eater"*. The predictions about how and why identity influences behaviour offered by Identity Theory have to do with social cognitive variables such as affect, intentions and efficacy beliefs

(Stets & Burke, 2003; Stryker & Burke, 2000). However, Identity Theory does not offer formal ways of measuring the cognitive, emotional and behavioural regulatory processes that may be involved in identity leading to behaviour.

Through asking the question, "*what can I do*?" Social Cognitive Theory may be useful in providing a framework for measuring these aspects of behavioural regulation. Further, self-efficacy's influences on behavioural regulation (e.g. goal choices, effort expenditure, persistence in the face of challenges, and emotional responses to progress; Badura, 1996; 1997; Maddux, 1993; Maddux & Gosselin, 2003) may provide insight into some of the affective and cognitive processes that may link identity to behaviour. For example, efficacy beliefs may influence the persistence that individuals devote to attempts to enact behaviour that is consistent with their goal identity. While the above relationships may imply that social cognitions mediate the identity-behaviour relationship, it was not the purpose of present thesis to test these relationships. Rather, as a preliminary step, relationships between identity and social cognitions and identity and behaviour were examined.

Relationships between Identity and Health Behaviour

Identity has been investigated in relation to physical activity. Identity as an exerciser has been shown to relate to self-reported minutes of weekly exercise (Anderson & Cychosz, 1995; Anderson, et al., 1998; Storer, Cychosz & Anderson, 1997), number of weeks of exercise participation, level of perceived exercise exertion, muscular endurance, percent body fat and fitness level (peak $VO_{2;}$ Anderson, et al., 1998). Furthermore, level of identity as an exerciser has been found to increase across level of exercisers (i.e., non exercisers, walkers and vigorous exercisers; Anderson and Cychosz, 1995) and over the course of an exercise program (Cardinal & Cardinal, 1997).

A few studies have examined exercise-identity in conjunction with other self-related variables in predicting exercise. Self-regulation, outcome expectancy value, social support, positive exercise experience (Petosa, et al., 2003), and self-efficacy (Miller, Ogletree & Welshimer, 2002; Petosa, et al., 2003) have been used with exercise-identity to predict exercise behaviour.

In a related body of research, Kendzierski uses a schema approach to assess the relationship between self-definition as exerciser and exercise behaviour. Self-schema is a mental representation of the self that influences the processing of information and future behaviour (Markus, 1977). Kendzierski's (1988) measure of exercise self-schema classifies individuals as either (a) exerciser schematics (exercise is extremely self-descriptive and important to self image) (b) exerciser aschematics (exercise is moderately descriptive or non-descriptive and is not considered important to self-image) and (c) nonschematics (exercise is extremely non self-descriptive and not important to self-image; Kendsierski, 1994). Kendzierski has found that exercise schematics show more favourable exercise behaviour and related cognitions (Kendzierski, 1994) than aschematics. In a related study using the Theory of Planned Behaviour, Sheeran and Orbell (2000) found that self-schema as an exerciser moderated the intention-behaviour relationship. Self-schemas and identity may be conceptually similar. However, self-schemas place an emphasis on how information is processed. Identities, emerging from a sociological perspective, focus on associated expectations and meanings and how these interact to affect behaviour. However, the findings that exercise schematics show more positive exercise and related cognitive outcomes than exercise non-schematics are consistent with exercise-identity research.

Finally, research is beginning to investigate identity in relation to other health behaviours. Preliminary analyses suggest that the *wellness-rejecter-identity* is inversely related to health enhancing behaviours and positively related to unhealthy behaviours such as smoking and drinking (Storer, Cychosz, & Andersen, 1997). Using the Theory of Planned Behaviour, Fekadu and Kraft (2001) found that identity predicted intentions to use condoms. In the context of healthy eating behaviour, identity as a health conscious individual was found to predict intentions to eat a low fat diet when studied in the context of the Theory of Planned Behaviour (Armitage & Conner 1999). Recently, Kendzierski and Costello (2004) found that individuals who were classified as *healthy-eater schematics* consumed more fibre and less total fat than did individuals classified as *non-healthy-eater schematics.* Although these studies are driven by different theoretical perspectives, in all studies there appears to be some parallel between level of "identity" and corresponding behavioural pattern (i.e., nature of food eaten).

Relationships between Self-Efficacy and Health Behaviour

A vast body of literature has explored the relationship between self-efficacy and health behaviour (see Maddux, et al., 1995 for a review). In the physical activity domain, self-efficacy has been found to be a consistent predictor of physical activity behaviour (see McAuley & Blissmer, 2000 for a review). Further, self-efficacy has been associated with healthy eating behaviours (Bebetsos, Chroni, & Theodorakis, 2002), including fruit and vegetable consumption (Brug, Lechner & De Vries, 1995; Langenberg, Ballesteros, Feldman, Damron & Anliker, 2000; Steptoe, Perkins-Porras, Rink, Hilton & Cappuccio, 2004), and nutrition behaviour among shoppers (Anderson, Winett & Wojcik, 2000).

The purpose of this dissertation was to use two self-related theoretical perspectives, Identity Theory and Social Cognitive Theory, to further the understanding of the role of identity

in health behaviour and related behavioural regulation. Specifically, Study One examined the usefulness of identity and self-efficacy beliefs in predicting maintenance exercise behaviour. This study also compared high and moderate exercise identity maintainers on self-efficacy and exercise behaviour. Study Two evolved from Study One. In order to test some of the key assumptions of Identity Theory, a behavioural challenge to exercise-identity was presented. High and moderate exercise-identity participants were compared in terms of their affect, efficacy, and behavioural intentions after a behavioural challenge to identity. Finally, Study Three sought to determine if identity is also a useful construct in the context of another health behaviour, healthy eating. In this final investigation, the study design was based on both Study One and Study Two. Similar to Study One, healthy-eater-identity and concurrent social cognitions were used to prospectively predict healthy eating. As well, a similar design as Study Two was used. High and moderate healthy-eater-identity subjects were compared on affect, efficacy and behavioural intentions in terms of their reactions to a hypothetical behavioural challenge to healthy-eater identity.

Study One

In a special issue of Health Psychology about the maintenance of health behaviours, Orleans, (2000) noted that successes in adopting health behaviours have not been paralleled by similar successes in their maintenance. Rothman (2000) suggested that more research should address the psychological factors associated with the behaviour change process. This same point has been made by others in regard to physical activity and nutrition interventions (Baranowski, Anderson & Carmack, 1998). Orleans (2000) takes these recommendations a step further by emphasizing that future research should also assess the processes that underlie successful maintenance.

One reason for the limited research attention paid to psychological factors related to longer term exercise maintenance (e.g., regular weekly exercise for greater than 6 months; Marcus, Forsyth, Stone, Dubbert, McKenzie, Dunn & Blair, 2000) as compared to exercise initiation and action, may be the view that this maintenance behaviour eventually becomes habitual among successful maintainers. In some studies that have examined maintainers, social cognitions have been relatively weak or unsuccessful predictors of maintenance exercise behaviour (e.g., McAuley, 1992). Indeed, in some research, past behaviour has been a stronger predictor of future behaviour than some psychological factors (e.g. Eagly & Chaiken, 1993; McAuley, 1992). The conclusion drawn from this type of evidence is that physical activity may be habitual and conscious thought is less important for successful completion of maintenance actions. In other words, because actions become habitual, individuals perform actions automatically and a mindful, self-reflective state is less characteristic of maintenance. However, accepting the habit explanation and relying on the prediction of future behaviour from past behaviour to understand *how* people maintain exercise *tells us nothing about the psychological*

processes that characterize and contribute to maintenance. Is the exercise behaviour of highly successful exercise maintainers as mindless and automatic as the habit explanation suggests?

Indeed, when one examines the processes involved in maintaining a physically active lifestyle, it becomes clear that maintenance is anything but mindless (Maddux, 1997). Consider maintenance endurance runners. These vigorous exercisers must goal set (e.g. maintain a high level of fitness; successfully complete a race in a goal time) and this may in turn require the setting of many sub-goals, (tempo, hill, and distance runs; cross training; weekly mileage increases). To attain these goals, these individuals must schedule time for workouts, overcome barriers (e.g. bad weather conditions, time constraints) and cope with setbacks (e.g. injury, fatigue). At the same time, these individuals must continually use feedback (e.g. "how did I feel on that run"; "was I able to meet my mileage goal this week"), to self-monitor, evaluate and correct their behaviour when they deviate from their goal path (e.g. failure to meet mileage goal; failure to make time for workout on a busy day). Indeed, maintenance endurance runners must take an executive role in self-regulating these behavioural challenges and in doing so, engage in ongoing, conscious forethought and self-reflection (Bandura, 1997). The view that these individuals are actively involved in their maintenance is contrary to theories that propose that maintenance takes on habitual qualities (cf. Maddux, 1997)

According to this view of maintenance, ongoing self-regulation is a *fundamental* component of the maintenance of physical activity. It may be useful to identify factors that *affect the degree to which individuals self-regulate during maintenance* in order to better understand the factors related to, or causally linking self-regulation of exercise and its maintenance. Identity and self-efficacy are two psychological variables that may be important in the maintenance of exercise.

Identity is a self-related construct that may be an informative predictor of the degree to which individuals self-regulate during maintenance. According to Identity Theory (Burke, 1980) and social psychological theorizing about the self (Baumeister & Vohs, 2003), individuals will regulate their behaviour in a manner that is consistent with their goal identity. For example, individuals who have been consistently running or participating in resistance training identify with their activity as a part of who they are (i.e., exercise-identity). Accordingly, they may be motivated to regulate their behaviour such that they continue their preferred exercise to maintain this physical activity aspect of their identity. Individuals who engage in a behaviour may vary in the extent to which they identify that behaviour as a part of who they are. The extent to which they do (i.e., the strength of that identity) is thought to influence the degree of persistence and effort put towards the behaviour (Ryan & Deci, 2003).

As noted in the general introduction to this dissertation, past research suggests a link between identity and exercise (e.g. Anderson & Cychosz, 1995; Anderson, et al., 1998; Storer et al., 1997). Furthermore, exercise identity appears to increase in strength over the course of exercise involvement (e.g. Anderson & Cychosz, 1995; Cardinal & Cardinal, 1997). Therefore, the concept of identity with exercise may be especially relevant to maintainer exercisers whom have made a long-term commitment to an active lifestyle. Considering the accumulating research in support of an exercise identity- exercise behaviour link, it stands to reason that identity should be a strong predictor of behaviour for maintainer exercisers among whom high levels and a long-term commitment to exercise would be expected.

Further, the strength of identification with the exercise identity may have implications for social cognitions that are important in the regulation of maintenance exercise behaviour. A few studies have assessed exercise identity in conjunction with adherence-related social cognitions

(e.g. Miller, Ogeltree & Welshimer 2002; Petosa, et al., 2003). This research suggests that both exercise identity and social cognitions appear to be related to exercise behaviour. However, no research to date has used the Identity Theory-based perspective (Stryker & Burke, 2000) that suggests that identity is an informative predictor of the degree to which individuals self-regulate during maintenance. Does level of exercise identity serve as a marker for adherence-related social cognitions that may be important in the *maintenance* of physical activity?

The purpose of Study One was to assess the relationship between exercise identity, adherence-related social cognitions and the maintenance of exercise. The investigation was framed in terms of both Identity Theory (Stryker & Burke, 2000) and Social Cognitive Theory (Bandura, 1986). It was hypothesized that levels of exercise identity, task and self-regulatory efficacy would be predictive of level and duration of running behaviour of long-term maintenance distance runners (mean 8 years of running). It was also hypothesized that individuals who most strongly identified themselves as distance runners would be characterized by their greater self-efficacy beliefs and maintenance exercise (i.e. more frequent and longer bouts of activity) in comparison to those with less distinct runner identity.

Method

Participants and Design

In this prospective, observational study, a sample of runners who had successfully maintained an exercise program of vigorous running for several years (approximately nine years) was used in order to increase the understanding of the maintenance of exercise. Sixty-seven maintenance runners served as the sample and were recruited from running groups in different municipalities in Southern Ontario. Participants reported an average age of 40.6 years (SD = 10.79) and fifty-two percent were female. Participating running groups were not for the

exclusive purpose of competitive running. Although some members entered occasional amateur competition, the purpose of the groups was to provide members with a group atmosphere to support regular running. The occupational range of participants varied and included students, homemakers, business executives, clerical staff, medical professionals, and professors.

Measures (see Appendix A)

Demographics. The following demographic information was gathered from participants: age, gender, height, weight, occupation and number of years of consistent running (see Appendix A; section 1).

Runner-identity. The 10-item, validated Athletic Identity Measurement Scale (Brewer, Van Raalte, & Linder, 1993) was altered for use with this sample at time one. For example, the original scale phrased questions with reference to "athlete" (e.g. *"I consider myself an athlete"*). For use in this study, items were changed such that they referred to "runners" (e.g. *"I consider myself a runner").* Participants were asked to rate the extent to which they felt that each statement applied to them using a seven-point Likert scale where 1 = *strongly disagree* and 7 = *strongly agree* (see Appendix A; section two). A total mean score for runner identity was derived for each participant by summing the 10 items and dividing by the total number of items. Internal consistency for this measure was acceptable with an alpha level of .73 (Tabachnick & Fidell, 1996).

Self-regulatory self-efficacy. Two forms of self-regulatory self-efficacy were assessed at time one: (1) scheduling self-efficacy (see Appendix A; section three) and (2) barriers self-efficacy (see Appendix A; section four). Both forms of self-efficacy were measured consistent with recommendations by Bandura (1986). To assess scheduling self-efficacy, participants responded to ten items related to *making room in their schedule for personal and group running*

using a 0-100% scale (0%= *not at all confident*; 100% = *completely confident*). Barriers efficacy was measured using this same rating scale. Participants were asked to rate their confidence in *overcoming ten barriers to individual and group running*. Total scores for both forms of self-regulatory self-efficacy were created by taking the average score for the ten items making up each self-efficacy scale. All self-regulatory items were derived through elicitation and pilot testing on a separate small sample (n = 12) of maintenance runners prior to scale development. Alpha levels were acceptable at .89 and .88 for scheduling and barriers efficacy respectively (Tabachnick & Fidell, 1996).

Task self-efficacy. Task self-efficacy was measured in accordance with recommendations by Bandura (1986). Participants were asked to rate their confidence in running for various durations using a scale of 0% to 100% (0%= *not at all confident*; 100% = *completely confident*) at time one. The scale consisted of seven items and was graded such that participants were asked about their confidence in running increasingly long durations that began with a typical duration (thirty minutes) and increased to a duration that would likely be quite challenging even to the seasoned endurance runner (three and a half hours; see Appendix A, section five). An overall value for task self-efficacy was derived by summing the seven task-related items and dividing by the total number of items. This scale showed high internal consistency with an alpha level of .94 (Tabachnick & Fidell, 1996).

Running/vigorous physical activity behaviour. The physical activity recall questionnaire (PAR; Blair, Haskell, Paffenbarger, Vranizan, Farquhar & Wood, 1985) was administered at four weeks following administration of time one measures. This questionnaire was delivered by the researcher in interview format over the telephone in order to provide a view of participants' prospective exercise where exercise during weeks 3-4 was considered representative of

maintenance exercise behaviour. Participants were asked to think back to and report their running over the last week (week 3-4 post initial assessment). As well, participants were asked to report any other vigorous physical activity that they engaged in during that same week (see Appendix A, section six for an interview script). Total scores were derived for frequency and duration of running, other vigorous physical activity and total physical activity by totalling each of the number of times per week and duration per session over the course of the one-week recall period.

Procedures

Study One took place during a period of the year when runners were not likely to be actively training for any competitions but instead were maintaining weekly, vigorous endurance exercise. Data were collected during late fall and early winter. This season is perhaps one of the least convenient and most challenging times for individuals to maintain vigorous outdoor exercise. Participants were approached by the researcher at running group sessions. After a description of study participation, interested participants voluntarily filled out a questionnaire. Four weeks following this initial assessment, participants were contacted by the researcher over the phone in order to obtain a measure of their running behaviour (and other vigorous physical activity). Ninety percent (n = 60) of participants were successfully contacted for the follow-up interview and they provided information regarding their past exercise behaviour.

Results

Data Management

Data management strategies were used to address missing data, the presence of outliers, assess and insure normality and assess and guard against multicollinearity. These data

management procedures were used in all three studies, however, to avoid redundancy they will only be described here.

Missing Data. Missing data (<10%) was addressed in accordance with recommendations by Tabachnick and Fidell (1996). Specifically, if a participant was missing a value for a scale item, then the participant's item mean for the remainder of the items in the scale was entered, thereby capturing the most representative value of the participants' unique responses to that scale. However, if a participant was missing values for an entire scale, the sample mean for that scale was substituted.

Outliers. Outliers in the data sets were detected through examination of the range of values, graphs and standardized Z-scores for each variable. A value was deemed an outlier based on having a standardized Z-score greater than +/-3.29 (Tabachnick & Fidell, 1996). These values were then treated in accordance with Tabachnick and Fidell's (1996) recommendations. Specifically they were replaced with a score that was "one unit larger (or smaller) than the next most extreme score in the distribution" (p. 69). Outlier occurrence was minimal with less than twelve outliers being found across all variables in each data set.

Multicollinearity. Cohen and colleagues (2003) provide several indices and corresponding statistical rule-of-thumb cut-off values for measuring the degree of multicollinearity between several independent variables in multiple regression analyses. Specifically, they recommend variance inflation factors of no more than 10 and tolerance values of no less than .10. These cut-off values were used to check for multicollinearity among variables entered together as predictors in regression equations.

Analytical Plan

The analyses for Study One occurred in three stages. The first stage involved determining descriptive statistics for all assessed variables. The second stage of analysis involved the testing of the prospective relationship between identity and social cognitive variables, and the outcome variables of weekly running frequency and duration, through regression analyses. These regression analyses allowed for a test of the hypothesis that levels of identity and task and self-regulatory efficacy are predictive of frequency and duration of running. In a third stage of analysis, two extreme runner-identity groups were formed based on participants' scores on this variable. Subsequently, extreme identity groups were examined for differences on social cognitive variables and running behaviour using MANOVA procedures.

Descriptive Statistics

The sample of participants ranged in age from 19 to 69 years and had a mean age of 40.62 (*SD* = 10.79) years. Fifty-two percent of participants were female. On average, participants had been running for 8.69 (*SD* = 8.69) years. Participants' scores on the seven-point runner identity scale ranged from 2 to 5.6 with a mean value of 4.05 (*SD* = .90) and a median of 4.0. Participants engaged in an average of 5.1 (*SD* = 2.52) sessions of vigorous physical activity per week. In terms of running, participants ran an average of 3.28 (*SD* = 1.42) times per week, for a mean duration of 56.05 minutes (*SD* = 14.78). Participants engaged in an average weekly frequency of 1.86 (*SD* = 1.98) bouts of strenuous physical activities in addition to their running. Descriptive statistics for variables included in the analyses for the entire sample can be found in Appendix B.

Running Frequency

A hierarchical multiple regression analysis was used to determine the relationship between the predictor variables of runner identity, scheduling self-efficacy and barriers self-efficacy, and the outcome variable of running frequency. Significant correlations between the predictor variables (see Appendix C) were considered according to guidelines set forth by Cohen and colleagues (2003). Based on the criteria outlined in these guidelines, multicollinearity was not problematic in the regression analyses in the present analysis (i.e., VIF <1.71; tolerance >.580). Given previous literature suggesting that identity is a stable variable (Serpe, 1987) while efficacy beliefs are situation-specific (Bandura, 1986), runner identity was entered in the first block prior to efficacy beliefs. The goal of this entry was to ascertain the contribution of the person regardless of the situation. This block was followed by the entry of efficacy beliefs which are expressed as a function of the reaction to the situation. This ordering allowed for an examination of the unique contribution of efficacy beliefs beyond that contributed by the stable person variable of identity. The overall model (*Model adj.* $R^2 = .26$, $F\ (3, 62) = 8.67$, $p < .001$) was significant. Runner identity ($R^2\Delta = .16$, $p < .001$), scheduling self-efficacy ($R^2\Delta = .06$, $p < .03$) and barriers efficacy ($R^2\Delta = .07$, $p < .02$) contributed to the model (see Table One).

Table One

Study One Prediction of Running Frequency

	$adjR^2$	$R^2\Delta$	*p* of *F*Δ	β	*t*	*p*
Step 1						
Exercise Identity	.149	.162	.001	.265	2.29	.03
Step 2						
Scheduling Self-Efficacy	.202	.064	.025	.093	.680	.499
Step 3						
Barriers Self-Efficacy	.262	.069	.016	.329	2.47	.016

Note: model df (3, 62)

Duration of Running

A hierarchical multiple regression analysis was conducted in order to determine if predictor variables (identity and task self-efficacy) could prospectively predict duration of running. Again, identity was entered into the regression model prior to task self-efficacy for reasons outlined in the above analysis. While these two predictor variables were correlated, (see Appendix C), multicolliniarity was not problematic in the analysis (VIF < .138, tolerance > .88; Cohen et al., 2003). The two forms of self-regulatory self-efficacy were not included in the analysis as they were not correspondent with the running duration measure. The overall model was significant (*Model adjusted* R^2 = .28, F (2, 64) = 14.1, p < .001*)* and accounted for 28% of the variance in duration of running. Both identity ($R^2\Delta$ = .22, p < .001) and task self-efficacy ($R^2\Delta$ = .09, p < .006) contributed to the model (see Table Two).

Table Two

Study One Prediction of Duration of Running

	$adjR^2$	$R^2\Delta$	$adjR^2$	β	*t*	*p*
Step 1						
Exercise Identity	.207	.219	.207	.363	3.28	.002
Step 2						
Task Self-Efficacy	.284	.087	.284	.315	2.84	.006

Note: model df (2, 64)

Comparison of Extreme Runner Identity Groups

Participants' social-cognitions and running behaviour as a function of their levels of identity were compared. In order to examine whether maintenance participants perceived different amounts of efficacy and engaged in more frequent and longer runs, participants who held the more extreme views of identity were considered. It was reasoned that if identity is associated with social cognitions such as self-efficacy and stronger behavioural outcomes, then individuals most likely to exhibit characteristic differences in cognitions and behaviour would be those most extreme in their perceptions of their identity as a runner (Gyurcsik & Brawley, 2000). An observation of characteristic differences among maintenance runners would suggest that while they adhere to regular and frequent vigorous physical activity, they are not homogeneous in their beliefs about task and self-regulatory skills that assist maintenance or in the behaviours characteristic of maintenance.

To create the extreme groups, a tertile split was used to select individuals highest and lowest on runner identity. The tertile split resulted in a group that scored high (M = 5.06, SD = 3.10, n = 22) and a group that scored moderate (M = 3.04, SD = .487, n = 22) on the seven-point

runner identity measure. An independent sample t-test was conducted to confirm that the groups differed on identity and this was significant (t (1, 42) = 16.45, $p < .001$). A subsequent analysis of the social cognitive and behavioural characteristics of the truly different identity groups was carried out.

A one-way between groups MANOVA comparing extreme identity groups (high vs moderate) on social cognitive and behavioural variables was significant (*Wilk's* $\lambda = .61$, F (5, 38) = 4.95, $p < .001$, observed power = .96). Subsequent univariate F-tests demonstrated that those higher in runner identity showed significantly higher scores on scheduling self-efficacy (F (1, 42) = 5.76, $p < .02$, $\eta^2 = .12$), task self-efficacy (F (1, 42) = 10.66, $p < .002$, $\eta^2 = .20$), and ran more frequently (F (1) = 13.73, $p < .001$, $\eta^2 = .25$) and for longer durations (F (1, 42) = 8.81, $p < .005$, $\eta^2 = .17$) than did those moderate on identity (see Table Three).

Table Three

Study One Descriptive Statistics for Extreme Runner Identity Groups Comparisons

Variable	Moderate Identity Group (n = 22)		High Identity Group (n = 22)	
	Mean	*SD*	*Mean*	*SD*
Barriers Self-Efficacy	72.40	11.99	79.10	12.45
Scheduling Self-Efficacy*	78.18	16.23	87.38	9.14
Task Self-Efficacy*	59.35	23.58	81.56	18.38
Weekly Frequency of Running**	2.66	0.99	3.39	1.35
Mean Duration of Runner per Session (min)*	49.43	10.80	58.95	10.45

Note: Efficacy measures 0-100% Scale; expressed in percent

Note: Model df (5, 38)

* significant at $p < .05$. ** $p < .01$.

It could be argued that individuals' years of experience at running is a proxy measure for runner identity and social cognitions. That is, those who have been running for a long time may have a strong identification with being a runner as well as confidence in their ability to run long durations and regulate their running behaviour. If this is the case, identity and self-efficacy may not be predictive of running behaviour once number of years of running experience has been controlled. To explore this possibility, the above analyses were carried out controlling for number of years of running experience. These analyses are reported in Appendix D. To summarize, runner identity and self-efficacy variables accounted for significant additional proportions of the variance after years of running experience was entered into the regression

equation. In a MANCOVA analysis assessing extreme identity groups on behaviour and social cognitions, number of years of running experience was not a significant covariate.

Summary of Results. Runner identity and efficacy beliefs appeared to be prospectively related to frequency and duration of maintenance running. Further, high and moderate runner identity maintainer runners reported differing levels of self-efficacy beliefs and running behaviour. High runner identity individuals reported stronger scheduling and task self-efficacy beliefs related to running and reported more frequent and longer duration bouts of running than their moderate runner identity counterparts.

Discussion

The findings of Study One contribute to an understanding of the psychological factors involved in the maintenance of a physically active lifestyle. Two self-related variables, *identity* and *self-efficacy*, may be useful. As hypothesized, predictive models that consisted of identity, as well as task and self-regulatory self-efficacy were related to exercise behaviour among a sample of individuals who have maintained regular, vigorous activity for several years. It was also found that individuals who identified themselves most strongly with being a runner had greater confidence in their task and self-regulatory skills related to running, and reported more frequent and longer duration bouts of vigorous exercise than individuals who identified less strongly with being a runner.

Identity Theory

The findings of Study One provide support for Identity Theory and social-psychological theorizing about the self. In particular, it appears that identity may be important in the regulation of exercise behaviour. Maintainer exercisers who strongly identified with the runner identity showed higher levels of self-regulatory self-efficacy beliefs. These high exercise identity

individuals may have reflected on their maintenance experiences by comparing their effectiveness at exercise maintenance with the runner/exercise aspect of identity and then self-regulated behaviour consistent with this view. This suggestion is consistent with social psychological theorizing about the self and Identity Theory, which posit that the extent of identification with behaviour may influence the effort individuals devote to regulating their behaviour in a manner that is consistent with relevant aspects of identity (Baumeister & Vohs, 2003; Ryan & Deci 2003). By extension, individuals' self-reflection may provide relevant mastery information that may contribute to maintaining efficacy beliefs and future behaviours consistent with their identity (i.e., run frequently and for longer durations). However, confirming these hypotheses requires future study (see dissertation general discussion).

Identity and Behaviour

The finding that identity as a runner was predictive of future exercise behaviour supports the link between exercise identity and physical activity suggested by past research (e.g. Anderson, et al., 1998; Anderson & Cychosz, 1995; Storer, et al, 1997). However, the current study differs from previous research in that it establishes this link between identity and exercise behaviour among *maintenance* exercisers. The present study suggests that identity as a runner is related to running behaviour and may also serve as a marker for self-efficacy beliefs important in the maintenance of this behaviour (i.e. high identity is associated with strong self-efficacy beliefs for maintaining running behaviour).

Social Cognitive Theory

The findings of Study One also support the use of Social Cognitive Theory in the study of maintenance exercise. Task self-efficacy and two forms of self-regulatory self-efficacy (barriers and scheduling) were predictive of future exercise behaviour. These findings support

the view that maintainer exercisers are actively involved in the ongoing maintenance of their physical activity. This view is consistent with Bandura (1997) and Maddux (1997) who contend that even when behaviour is being maintained (i.e. well-established) individuals remain mindful and deliberate in the management of this behaviour.

Past Behaviour

It could be argued that the behaviour and cognitions that are explained by knowing one's level of identification with being a runner could be inferred from past behaviour. Not surprisingly, runner identity is correlated with years of past running; as the number of years involved in running increases, the individual comes to identify more strongly with the runner identity. In fact, research suggests that identity increases as involvement in the activity increases (Cardinal & Cardinal, 1997). However, even when past running experience was controlled for in regression analyses, social cognitions and identity remained significant predictors of behaviour (see Appendix D). In fact, the variance accounted for by identity once years of running experience was controlled, increased slightly. This finding suggests that years of running experience may be serving as a repressor variable. Maddux (1997) points out that even if behaviour can be explained by knowing past behaviour patterns, this explanation is not only circular, but is also uninformative. Knowing that an individual has run consistently in the past does not provide any insight into the psychological factors behind this behavioural engagement. The present findings suggest that knowing the extent to which individuals identify with and are confident in their abilities related to running, may provide insights as to why behaviour occurs.

Strengths

Study One provides a theory-driven, prospective investigation into psychological factors that may be important in the understanding of maintenance physical activity. As such, this study

adheres to Orleans' (2000) recommendation to conduct studies of maintenance on individuals who have maintained behaviour for *several years*. Participants' long history of involvement in running leaves no room for debate regarding their status as *maintenance* runners. As well, the maintainer exercisers chosen for this study were engaged in the maintenance of ongoing *vigorous* physical activity. The maintenance of this level of activity would undoubtedly present self-regulatory challenges and therefore provided an optimal sample in which to study the role of identity and social cognitions in the maintenance of exercise. Finally, the current study purposefully used self-efficacy predictors designed for the *maintenance* of physical activity which may be more correspondent with the skills and abilities used to maintain exercise than would be traditionally-used adoption-oriented predictors. However, the results of this study need to be considered in light of limitations.

Limitations

First, the current study only explored the compatibility of Social Cognitive and Identity theories by examining the *relationship* of psychological factors to maintenance behaviour. Future studies should use designs that attempt to causally implicate the influence of identity upon social cognitions and future behaviour. Second, in an effort to capture a captive sample of maintainer exercises, participants were recruited from running groups. The generalizability of these findings is therefore limited to this population. Future research should seek to examine the relationships observed among individuals who engage in a diverse set of exercise behaviours and also individuals who engage in other health behaviours (e.g. weight loss, healthy eating, and disease management).

Taken together, the findings from this preliminary investigation suggest that identity and social cognitions and their related theoretical perspectives, may be important to use in continuing

the study of the maintenance of physical activity. These findings emphasize that identification with exercise may be important in the regulation of and engagement in this behaviour. As well, the findings support the view that maintenance physical activity should not be considered "habitual behaviour" but rather requires conscious self-regulatory reflection Maddux (1997).

Study Two

Study One and past research (see General Introduction) suggest that exercise identity may be related to exercise behaviour outcomes. Further, Study One findings suggest that efficacy beliefs may be important in the regulation of this behaviour. In light of these suggestions, further investigation of the identity construct in the context of exercise is warranted. Whereas research in the physical activity context to date has considered the identity – behaviour link, it is surprising that no studies draw upon the theoretical propositions offered by Identity Theory (see General Introduction for a review). This theory offers detailed descriptions of a proposed relationship between identity and behaviour that could be used to guide research systematically.

According to Identity Theory, identity and the expectations associated with an identity are thought to serve as the standard of reference for behavioural regulation. If a difference is detected between behaviour and identity, behaviour should be modified to bring about congruency between behaviour and identity (Stryker & Burke, 2000). Further, the more salient an identity relative to other identities held by the individual, the greater the probability that behaviour will be in agreement with the expectations associated with the goal identity (Stryker & Burke, 2000). Identity Theory can incorporate emotion and cognition; a mismatch between identity and behaviour is thought to create negative emotions while the matching of these two variables is thought to lead to positive emotions (Stets & Burke, 2003). While identity theory does not formally incorporate self-efficacy predictions, Stryker and Burke (2000) have commented that increased self-efficacy would be expected by successful role performance.

Identity Theory and Social Cognitive Theory share many theoretical similarities (see General Introduction) and were used in a complementary fashion in the present investigation. According to Identity Theory, "identity" provides a standard for behavioural regulation. Further,

Identity Theory makes predictions about *how and why* identity (e.g. exerciser identity) should lead to identity-consistent behaviour (engagement in exercise behaviour). These Identity Theory predictions address affective and cognitive aspects of behavioural regulation (e.g. affect, intentions, self-efficacy). Social Cognitive Theory offers a framework for measuring these aspects of behavioural regulation not formally measured by Identity Theory. Further, Social Cognitive Theory posits that a strong sense of efficacy in a behavioural domain is associated with greater effort expenditure and persistence in the pursuit of goals, even in the face of challenges (Bandura, 1986; 1987; Maddux & Gosselin, 2003). These strong efficacy beliefs may have implications for individuals' degree of persistence when they are attempting to behave in a manner that is consistent with an identity. For these reasons, Social Cognitive Theory was used to complement Identity Theory in the present investigation.

Identity Theory and Social Cognitive Theory were used to further understand the role of identity in the context of exercise behaviour and its regulation. Identity Theory (Burke, 1980) suggests that if individuals identify with being an exerciser, they are aware of, and desire to adhere to, the expectations associated with that role (e.g. engage in regular exercise). However, if these same individuals behave in a manner that is *inconsistent* with their identity (e.g. they identify themselves as an active person but have not exercised for a week) the situation should have implications for affect, behaviour and cognitions, which in turn will influence behaviour and its regulation. For example, if faced with a situation where their identity and behaviour are inconsistent, individuals who strongly identify with the exercise identity should experience negative affect, and should desire, intend and attempt to have their behaviour be consistent with their goal identity. Social Cognitive Theory would suggest that in order to successfully regulate behaviour, individuals should hold strong efficacy beliefs which affect their goal choice, effort

expenditure, persistence in the face of challenges, and emotional responses to progress (Maddux & Gosselin, 2003). In turn, efficacy may have implications for individuals' attempts at regulating their behaviour such that it is consistent with their identity.

The purpose of the current investigation was to use Identity Theory and Social Cognitive Theory to design a behavioural challenge to identity and to examine the reactions of individuals to this challenge. In response to a behavioural challenge to identity, it was hypothesized that individuals who scored high on exercise identity would manifest several types of responses. Specifically, they should (a) respond with greater negative affect and less positive affect than individuals who score moderate on exercise identity. The former individuals should also (b) report more past exercise behaviour, (c) greater self-regulatory self-efficacy for exercise, (d) generate more self-regulatory strategies to manage their exercise behaviour and stronger intentions to use these strategies and finally, (e) intend to exercise more frequently and exhibit stronger intentions to engage in this intended exercise than individuals moderate in exercise identity.

As well, exercise identity and self-efficacy were hypothesized to predict intentions for weekly frequency (and strength of those intentions) of exercise as well as the strength of intentions to use self-regulatory strategies related to exercise. Essentially, these intentions represent goals for future physical activity (Bandura, 2004).

Finally, it was hypothesized that, in accordance with Identity Theory, individuals' level of exercise identity would be positively related to how salient individuals rate that identity relative to other identities. Further, it was hypothesized that those high identity individuals would rank the exercise identity as more salient relative to other commonly held identities than would their moderate exercise identity counterparts.

Method

Participants and Design

This study employed a cross-sectional, two-group post-test design. The sample consisted of 165 adult volunteer exercisers recruited from community and university exercise classes – therefore ensuring that participants had some involvement in exercise. Participants' ages ranged from 19-61 years (*M*age = 32.89 years, *SD* = 9.90). Seventy percent of the sample was female which is reflective of the general demographic of participants from fitness classes (Canadian Fitness and Lifestyle Research Institute, 2001).

Measures (see Appendix E)

Exercise identity. This nine-item questionnaire (Anderson & Cychosz, 1994) required participants to rate the extent to which each item applied to them using a seven-point Likert scale where 1 = *strongly disagree* and 7 = *strongly agree* (see Appendix E; section one). In the current study, *exercise identity* rather than *runner identity* was assessed because the current sample engaged in a variety of exercises whereas the sample in study one were recruited from a running group and therefore could be assumed to engage in running. Sample items include, "*I consider myself to be an exerciser"* and "*I have numerous goals related to exercise"*. Participants filled out this measure prior to reading the behavioural challenge to identity.

This scale has strong test-retest reliability (Tabachnick & Fidell, 1996) with a value of .93 and a Cronbach's alpha of .94 among a sample of health studies students (Anderson & Cychosz, 1994). A similarly high Cronbach's alpha value (.91) was observed among the current sample (Tabachnick & Fidell, 1996).

Identity salience. Salience (or importance of an identity relative to other identities) was measured as a check on exercise identity – that is exercise identity should be positively related to

a high salience rating of exercise identity relative to other identities. In accordance with Stryker's (1980) conceptualization of identity salience and other research in the area (e.g. Callero, 1985) participants were asked to rank seven identities in order of importance where one = *most important* and seven = *least important*. For example, if family/friend was the most salient identity to an individual, that identity would be given a score of "one". Identities included in the list to be ranked were: ethnic group/nationality, family/friend, organization/group, physical activity/exercise, politics, religion, and work/school identities (see Appendix E; section two for actual questionniare). Participants filled out this measure prior to reading the behavioural challenge to identity scenario.

Past exercise behaviour. A measure of recalled recent typical physical activity was desired for the present study in order to allow for a comparison of typical physical activity levels among high and moderate exercise-identity participants. A portion of the Godin Leisure-Time Exercise Questionnaire (Godin & Shepard, 1985) was used for this purpose. Participants were asked to report the number of thirty-minute bouts of mild, moderate and strenuous physical activity that they engaged in during a recent typical week. Example activities for each level of physical activity were provided to participants (see Appendix E; section three). Participants provided this information before they read the behavioural challenge to identity scenario. This measure shows reasonable test-retest reliability. Scores of .74 and .81 were found for a sample of 53 healthy adults (Godin & Shepard, 1985).

Demographics. Participants provided demographic information regarding their age, gender and types of physical activities in which they typically engaged (see Appendix E; section four).

Affect. The affect scale (Weiner, 1986) was used to assess participants' affective reactions to any perceived discrepancy between their identity and their behaviour as described in the challenge scenario. After reading the behavioural challenge to identity scenario, participants were asked to use a nine-point scale to indicate the extent to which they felt they would experience eight emotions if they found themselves in the hypothetical situation described in the scenario. The following rating scale was used to indicate the extent to which each participant would anticipate feeling each of the eight emotions: 1 = *don't feel at all*; 9 = *feel very much.* Feelings included those both positive (e.g. "*happy about being must less active than usual*") and negative (e.g. "*depressed about being much less active than usual*") in nature (see Appendix E; section five). Mean scores for positive and negative subscales were derived for each participant. In the current sample, both positive and negative subscales were internally consistent showing Cronbach's alpha values of .77 and .83 for the positive and negative scales, respectively (Tabachnick & Fidell, 1996).

Exercise intentions. Participants were asked to imagine that their *busier than usual* schedule, as described in the hypothetical scenario, would continue for the next three weeks. Participants were then asked to state their intentions for exercise over the next three weeks in this busier than usual situation. First, they indicated the number of days per week in which they would plan to be physically active for thirty minutes or more over the next three weeks. Second, participants used a nine-point Likert scale where 1 = *definitely will not exercise* and 7 = *definitely will exercise*, to rate the strength of their intentions to exercise (see Appendix E; section six). This measure was administered after the presentation of the behavioural challenge to identity scenario.

Self-regulatory strategies. After reading the behavioural challenge to identity scenario, participants were asked to list up to three self-regulatory strategies that they could use to exercise over the course of the next hypothetical busier than usual three weeks described in that scenario. As well, participants were asked to rate the strength of their intention to use that/these strategy(s) over this time course using a nine-point Likert scale (1 = *definitely will not use*; 9 = *definitely will use*; see Appendix E; section seven).

Self-regulatory self-efficacy. After reading the behavioural challenge to identity scenario, participants were asked to rate their confidence in engaging in seven self-regulatory strategies that may help them be physically active during the course of the hypothetical busier than usual three weeks described in the scenario. Participants rated their confidence on a 0-100% scale where 0% = *not at all confident* and 100% = *completely confident.* An example items is, "*How confident are you that you would find time in the little bit of free time that you have to get in your intended physically activity?"* (see Appendix E; section eight). The scale had acceptable reliability in the current sample with a Cronbach's alpha value of .85 (Tabachnick & Fidell, 1996).

Procedure

For data collection, participants were approached by the researcher at community and university fitness classes and were told about the opportunity to participate in a web-based study about factors related to exercise adherence. After hearing about the research ethics approved study and the anonymity of their responses, interested individuals (n = 178) provided their email addresses and were emailed a link to a confidential (password–protected) questionnaire website designed for the purposes of this study. Receipt of the study website link did not obligate participants to continue as they could withdraw at any time. Of those emailed, 167 completed the

questionnaire (94%). Interested participants completed the questionnaire at the confidential website after reading a general orientation and consent form. Exercise-identity, identity salience, physical activity and demographic variables were assessed first. Participants then read the brief hypothetical challenge scenario and provided their reactions in terms of affect, intentions (and associated strength), number of self-regulatory strategies generated (and associated strength of intention to use them) and self-regulatory efficacy. After submitting their web-based form, participants were provided with an online feedback form which provided a contact number should participants have any further questions.

Stimulus Material

As a means of testing the aforementioned tenets of Identity Theory and Social Cognitive Theory, participants' reactions to a hypothetical scenario where their exercise identity was challenged were measured. This hypothetical behavioural challenge to exercise identity scenario was designed to engage exercisers by asking them to place themselves in a situation where their ability to manage and participate in their normal level of weekly exercise was much challenged and reduced. The challenge aspect of the scenario was designed to present a common element (e.g. constrained time) that encouraged participants to consider a situation where their behaviour was far less than what they perceived to be normal for themselves (e.g. less exercise than usual). The challenge aspect of the scenario was purposefully described in general and broad terms (e.g., time constrained and far busier *than usual*) so that all participants would be exposed to a common element, constrained time, yet could relate to the scenario relative to their differing exercise experiences and the personal time constraints normally in their lifestyle. Thus, participants used a self-reference to imagine their life relative to the circumstances described in the scenario. Essentially, the scenario was purposefully ambiguous so that participants used

themselves as their own control or internal referent and responded to the scenario relative to this internal reference (cf. Sherif & Sherif, 1969).

Pilot testing. Pilot testing was conducted in order to develop the scenario. Different scenarios (e.g. vacationing, travelling for work) that constrained participants' circumstances for exercise, their time, and some social pressures were presented to a pilot sample (n = 12) of regular exercisers. This pilot sample was similar to the sample used in the main study in terms of age and gender distribution. Pilot testing was important in order to determine the perceived consistency of text meaning, clarity and coherence of text, perception of difficulty in being able to exercise in the circumstances described, and whether other psychological processes would engage participants or potentially alter responses (e.g., attributing reasons for not exercising). For example, if the scenario inadvertently engaged competing, equally, or more important identities such as a "family person" who was unwilling to use time on vacation with family for exercise, the exercise identity *may not have been challenged.* Instead, it may have been "set aside" in favour of family vacation because the time period in this scenario was temporary and thus exercise could be compromised in the short term without really conflicting with exercise identity. After several alternatives were examined, pilot participants reported that the chosen scenario was one with which they had the most past experience, was the most realistic and relevant, was clearest and least confusing, and provided the most consistency in the participants' reactions to the presented scenarios.

> **INSTRUCTIONS: Please read the following hypothetical situation carefully. The remainder of the questions will be in reference to this situation.**
>
> Imagine that for some reason, in the last three weeks, things at work/school have put more demands on your time than usual such that you are **FAR BUSIER THAN USUAL (that is, over and above your typical schedule)** .
>
> These recent time demands have interfered with your regular physical activity routine such that you have been much less active than you normally would be.

> Now think about how this situation would **BE MOST LIKELY TO MAKE YOU FEEL AND REACT.** Please answer the remaining questions in this questionnaire with these thoughts and feelings in mind.

Results

Analytical Plan

Study Two analyses were carried out in four steps. Step one involved determining descriptive statistics. The second analytical objective was to examine if high and moderate exercise identity groups differed on their reactions to the behavioural challenge to identity in a manner consistent with predictions made based on Identity Theory and Social Cognitive Theory. A MANOVA was used to test the hypothesis that individuals who strongly identified with being an exerciser would show higher levels of recent exercise behaviour as well as a different pattern of reactions to the hypothetical challenge to exercise identity than their moderate exercise identity counterparts. Specifically, the high identity participants were hypothesized to react to the behavioural challenge to identity with lower levels of positive affect, and greater levels of the following variables: negative affect, exercise intentions, strength of these intentions, self-regulatory efficacy, generation of self-regulatory strategies and intention to use these strategies, than moderate exercise identity participants.

In a third step, concurrent relationships that were of secondary interest were examined. In order to examine the relationship between the predictor variables of identity, self-efficacy, and the outcome variables of intentions for exercise and for self-regulation, a series of concurrent multiple regression analyses were conducted. Specifically, it was hypothesized that exercise identity and self-efficacy would predict concurrent intention for future weekly frequency of exercise, associated strength of those intentions, and strength of intention to use self-regulatory strategies related to exercise.

The last set of analyses dealt with the salience of the exercise identity. These analyses provided a check on exercise identity. According to Stryker (1980) identities that are likely to influence behaviour should be salient relative to other identities. First, the association between *identity salience* and *exercise* identity was assessed using a Spearman's Rho correlation appropriate for use with rank order data (Linton & Gallo, 1975). This analysis allowed for a test of the hypothesis that the stronger participants' scores on exercise identity, the more salient that identity should be relative to other commonly held identities. Second, a Chi-square analysis was carried out where the salience of the exercise identity was assessed for both high and moderate exercise identity groups.

Descriptive Statistics

Descriptive statistics indicated that participants' scores on the seven-point exercise identity scale ranged from 1.33 to 7.00. However, the distribution of scores was skewed in the direction of stronger exercise identity with a sample mean value of 5.49 (SD = 1.32) and a median of 5.78. As well, exercise identity was seen as more salient relative to other commonly held identities; participants ranked the exercise identity as the third most salient out of seven possible identities (M = 3.11, SD = 1.26). On average, participants engaged in 2.82 (SD = 2.64) thirty-minute or more bouts of mild, 2.80 (SD = 2.06) moderate and 3.39 (SD = 2.03) strenuous, physical activity respectively per week. In terms of the types of physical activities in which participants were engaged, 46.7% of the sample engaged in a variety of different physical activities. Running (21.8%), weight lifting (10.3%), sport participation (6.7%) and cycling (4.2%) were the more common specific physical activities reported by participants as the activity most descriptive of their physical activity. Descriptive Statistics for variables included in the analyses are listed in Appendix F.

Comparison of Extreme Exercise Identity Groups

In order to examine whether participants differed in terms of recent typical strenuous exercise behaviour and their reactions to a hypothetical behavioural challenge to identity as a function of their level of identity, those participants who held the more extreme views of exercise identity were considered. It was reasoned that if level of identity is associated with greater reaction to a discrepancy between identity and behaviour, then individuals most likely to exhibit characteristic differences on affective, behavioural and cognitive reactions would be those most extreme in their perceptions of their identity as an exerciser (Gyurcsik & Brawley, 2000).

To create the extreme groups, a tertile split was used to select the highest and lowest groups on exercise identity. This process resulted in one group with high (M = 6.63, SD = .22, n = 58) and one group with moderate (M = 3.99, SD = 1.17, n = 55) scores on exercise identity. An independent sample t-test was conducted to confirm that the groups differed on exercise-identity and this was significant (t (1, 111) = 16.39, $p < .001$). Therefore, subsequent analysis of the social cognitive and behavioural characteristics of the truly different identity groups was conducted.

A MANOVA comparing extreme exercise-identity groups (high vs moderate) on affective, cognitive and behavioural variables was significant (*Wilk's* $\lambda = .59$, F (8, 104) = 9.14, $p < .001$, observed power = 1.0). The means and standard deviations for the variables used in the analysis as a function of high and moderate exercise identity groups are presented in Table One. As hypothesized, univariate follow-up ANOVA analyses demonstrated that those higher in exercise-identity showed significantly less positive affect (F (1. 111) = 7.96, $p < .006$, $\eta^2 = .067$) and greater negative affect (F (1, 111) = 7.22, $p < .008$, $\eta^2 = .061$) in response to the challenge scenario than those who only moderately identified with being an exerciser. Further, those

higher on exercise identity intended to exercise more frequently (F (1, 111) = 26.65, $p < .001$, η^2 = .194) during the hypothetical busier than usual three weeks and reported stronger intentions to do so (F (1, 111) = 12.84, $p < .001$, η^2 = .104) than did those in the moderate exercise-identity group. When compared on confidence to use self-regulatory strategies to manage their exercise behaviour over the hypothetical busier than usual 3 weeks, the high identity group reported stronger self-regulatory efficacy (F (1, 111) = 39.78, $p < .001$, η^2 = .264). The two groups did not differ on the number of self-regulatory skills generated to try to be active during the hypothetical busier than usual three weeks, but they did differ on their intentions to implement the strategies they did generate (F (1, 111) = 11.46, $p < .001$, η^2 = .094). Finally, the groups differed on their levels of strenuous physical activity over a recent typical week (F (1, 111) = 42.82, $p < .001$, η^2 = .278) with the high exercise identity group showing more frequent levels.

Table One

Study Two Descriptive Statistics for Extreme Exercise Identity Group Comparisons

Variable	Moderate Identity Group (n = 55)		High Identity Group (n = 58)	
	Mean	*SD*	*Mean*	*SD*
Positive Affect*	2.23	1.44	1.58	1.08
Negative Affect*	6.01	1.82	6.89	1.84
Intentions to Exercise (Frequency per week)**	2.56	1.33	4.07	1.71
Strength of Intentions to Exercise**	6.74	1.89	7.84	1.13
Self-Regulatory Efficacy**	56.54	18.81	75.51	12.17
Number of Self-Regulatory Strategies for Exercise	2.09	.78	2.33	.75
Strength of Intention to use Strategies for Exercise**	7.00	1.64	7.85	.96
Weekly Frequency of Strenuous Physical Activity**	2.24	1.56	4.63	2.18

Note: Intention and affect;1-9 scale; Self-Regulatory Efficacy; 0-100% Scale and is expressed as a percent.

Note: Model df (8, 104)

significant at $p < .05$. ** $p < .01$.

Predictions of Behavioural and Self-Regulatory Intentions.

In order to test the hypothesis that exercise identity and self-regulatory efficacy would be predictive of behavioural and self-regulatory intentions, a series of hierarchical multiple regressions were conducted.

Prediction of intention for frequency of exercise. Hierarchical multiple regression analysis was used to determine the strength of the relationship between the predictor variables, exercise identity and self-regulatory efficacy, and the outcome variable of intention for frequency of exercise. As was the case in Study One, exercise identity was entered in the first block prior to the self-regulatory self-efficacy given previous literature suggesting that identity is a stable variable (Serpe, 1987) while efficacy beliefs are thought to be more situation-specific (Bandura, 1986). Mulitcollinearity was not a problem amongst predictor variables used in all regression analyses (VIF < .126, tolerance > .80) even though they were correlated (see Appendix G).

The overall model was significant, accounting for 26% of the total variance in intention for frequency of exercise (Model R^2Adj. = .250, F (2, 162) = 28.27, $p < .001$). Exercise identity ($R^2\Delta = .145$, $p = .001$) and self-regulatory efficacy ($R^2\Delta = .114$, $p = .001$) each significantly contributed to the overall model (see Table Two).

Table Two

Study Two Prediction of Intention for Frequency of Exercise

	$adjR^2$	$R^2\Delta$	*p* of *F*Δ	β	*t*	*p*
Step 1						
Exercise Identity	.140	.145	.001	.210	2.77	.006
Step 2						
Self-Regulatory Efficacy	.250	.114	.001	.378	4.99	.001

Note: model df (2, 162)

Prediction of strength of intention for exercise frequency. A second hierarchical multiple regression analysis was used to examine the relationship between the predictor variables, exercise identity and self-regulatory self-efficacy, and the outcome variable of strength of intention for frequency of exercise. The order of entry of predictor variables into the regression equation and the associated rationale was the same as in the first regression analysis.

The overall model was significant, accounting for 25% of the variance in intention strength (Model R^2Adj. = .24, *F* (2,162) = 26.40 *p* < .001). Exercise identity ($R^2\Delta$ = .072, *p* = .001) and self-regulatory self-efficacy ($R^2\Delta$ = .174, *p* = .001) contributed to the model (see Table Three).

Table Three

Study Two Prediction of Strength of Intention for Exercise Frequency

	$adjR^2$	$R^2\Delta$	*p* of *F*Δ	β	*t*	*p*
Step 1						
Exercise Identity	.066	.072	.001	.056	.734	.464
Step 2						
Self-Regulatory Efficacy	.237	.174	.001	.468	6.12	.001

Note: Model df (2, 162)

Prediction of strength of intention to use self-regulatory strategies. A third hierarchical multiple regression analysis was used to examine the relationship between the predictor variables, exercise identity and self-regulatory self-efficacy and the outcome variable of intention to use self-regulatory strategies. The same ordering of predictor variables as used in the previous two analyses was employed.

The overall model was significant, accounting for 30% of the variance in strength of intention to use self-regulatory strategies (Model R^2Adj. = .293, *F* (2, 162) = 34.91 *p* < .001). Exercise identity ($R^2\Delta$ = .105, *p* <.001) and self-regulatory efficacy ($R^2\Delta$ = .196, *p* < .001) made significant contributions to the model (see Table Four).

Table Four

Study Two Prediction of Strength of Intention to use Self-Regulatory Strategies Related to Exercise

	$adjR^2$	$R^2\Delta$	*p* of *F*Δ	β	*t*	*p*
Step 1						
Exercise Identity	.099	.105	.001	.099	1.34	.181
Step 2						
Self-Regulatory Efficacy	.293	.196	.001	.496	6.75	.001

Note: model df (2, 162)

Exercise Identity and Identity Salience

In order to test the hypothesis that the more individuals identify with being an exerciser, the more salient they will rank this identity relative to other identities, a Spearman's Rho correlation for ranked data was used based on recommendations by Linton & Gallo (1975). The correlation between these two variables revealed a significant negative relationship (r = -.392, p < .001) indicating that as identification with the exercise identity increased, the identity also became more salient relative to other identities (the identity is given a higher ranking as indicated by a smaller value).

Chi-square analysis was used to examine the salience ranking for the exercise identity made by participants differing in level of exercise identity. Two groups were created based on participants' salience rankings of the exercise identity; one group ranked this identity as among the three most salient identities (high salience) and one group ranked this identity as among the three least salient identities (low salience). Extreme exercise identity groups and high and low salience groups were then examined in a Chi-square analysis. The analysis revealed a significant

association between salience ranking of the exercise identity and level of exercise identity (c^2 (1, 111) =14.34 $p < .001$). Specifically, eighty-three percent of those scoring high on exercise identity ranked the exercise identity as being among their three most salient identities. Only forty-nine percent of those scoring moderate on exercise identity ranked the exercise identity as among their three most salient identities relative to other commonly held identities.

Summary of Results

To summarize, several group differences were detected when high and moderate exercise identity individuals were compared in terms of their reactions to a hypothetical behavioural challenge to identity. High exercise identity individuals reported more frequent recent strenuous physical activity, greater negative affect, less positive affect, greater self-regulatory efficacy, stronger intentions to use self-regulatory strategies, intended to exercise more frequently and held these intentions more strongly than moderate identity individuals. Exercise identity and self-regulatory efficacy concurrently predicted intentions for frequency of physical activity, strength of those intentions and strength of intentions to use self-regulatory strategies. Finally, exercise identity appears to be a salient identity relative to other identities among this sample of exercisers – especially among high identity individuals. The more individuals identified with the exercise identity, the more salient that identity was relative to other common identities. Further, individuals who highly identify with being an exerciser rated the exercise identity as more salient than individuals who only moderately identified with the exercise identity.

Discussion

The findings of Study Two built upon those of Study One by using the tenets of Identity Theory and Social Cognitive Theory to provide insight as to *how and why* identity may be related to behaviour in the exercise context.

Identity Theory

When high and moderate exercise identity participants were compared in terms of their affective and cognitive reactions to a behavioural challenge to identity, the results were in support of Identity Theory. Specifically, they supported the hypotheses that concerned how identity is related to behaviour and that identity may serve as a standard for behavioural regulation.

Participants' affective reactions to the behavioural challenge to identity were consistent with Identity Theory predictions (Stets & Burke, 2003). Greater negative affecive and less positive affective responses in reaction to the behavioural challenge to identity scenario were demonstrated by participants who strongly endorsed the exercise identity as compared to those who moderately endorsed this identity. Identity Theory would postulate that high identity individuals recognized a discrepancy in the comparison between their strongly endorsed exercise identity and their perceived low levels of physical activity behaviour as described by the scenario. This discrepancy may have led them to experience higher levels of negative affect and lower levels of positive affect. By contrast, moderate identity individuals may have perceived less discrepancy between their perceived behaviour and their less strongly endorsed exercise identity. If these individuals did in fact experience a lesser degree of discrepancy, it may explain their lower levels of negative and higher levels of positive affect in response to their scenario exercise behaviour.

The results of Study Two also support Identity Theory's proposition that identities provide a standard for behavioural regulation (Gecas & Burke, 1995). High exercise identity individuals reported a pattern of social cognitions in response to the behavioural challenge to identity that suggests they *intended* to regulate their behaviour in a manner that was consistent with their exercise identity (i.e., intentions are essentially goals: Bandura 1997, 2004). In response to the behavioural challenge to identity scenario, high exercise identity participants *indented to exercise more frequently* in the busier than usual future three weeks described in the scenario, held these *intentions more strongly* and showed *stronger intentions to use self-regulatory strategies* in order to carry out this intended exercise than their moderate exercise identity counterparts. These participants also held stronger self-regulatory efficacy beliefs towards their abilities to manage their exercise in the busier than usual future three weeks. Further, exercise identity and self-regulatory efficacy were useful predictors of intentions for frequency of exercise, strength of these intentions and strength of intentions to use self-regulatory strategies. As suggested by Identity Theory, individuals who strongly endorsed the exercise identity appear to be readying to regulate their behaviour in a manner that confirms this identity (Burke, 1980; Burke & Reitzes, 1981).

Social Cognitive Theory

The findings of Study Two are also consistent with Social Cognitive Theory and suggest that self-efficacy may be important in the regulation of behaviour relative to a salient identity. Social Cognitive Theory (Bandura, 1997; Maddux & Gosselin, 2003) proposes that individuals with strong self-efficacy beliefs persist in the face of challenges and adversity in the pursuit of goals. The reactions of high identity participants to the perceived challenge may have encouraged these individuals to more strongly persist in re-aligning their behaviour with identity.

In fact, high exercise identity individuals reported higher levels of self-regulatory self-efficacy for managing exercise over the next three weeks under the same demanding conditions than did moderate identity individuals. These findings were in marked contrast to the lower self-regulatory self-efficacy beliefs of the moderate identity group. Further, these findings are consistent with social psychological theorizing about the self, which posits that the extent of identification with behaviour may influence the effort and persistence individuals devote to regulating their behaviour in a manner that is consistent with their goal identity (Baumeister & Vohs, 2003; Ryan & Deci, 2003). By extension, individuals' self-reflection may provide a relevant source of efficacy-related information that may contribute to maintaining efficacy beliefs and setting goals for future behaviours consistent with their identity. However, confirming these hypotheses requires future study.

Identity Salience

Stryker's (1980) concept of *identity salience* was used to determine how participants ranked the exercise identity relative to other commonly held identities. Exercise identity was positively related to how salient participants rated the exercise identity relative to other commonly-held identities. Further, those participants who more strongly identified with being an exerciser ranked this identity as more salient than those who only moderately identified with being an exerciser. These findings confirm that the exerciser identity is in fact important to individuals by situating its importance relative to other commonly held identities (e.g. friends/family, work, religion, politics). The relatively high salience of the exercise identity may have, in part, contributed to the strength of participants' responses.

Limitations

This study reflects preliminary research and its limitations should be acknowledged. This study utilized a two-group post test design. The limitations of this design (e.g. the absence of a pre-test) and discussion about why this design was used are given greater attention in the general discussion of this dissertation. Further, the design was concurrent in nature. For this reason, interpretation of the relationship between variables is limited. For example, the explanation for participants' differential responses to the scenario (e.g., discrepancy, etc) can only be inferred based on the present design.

Strengths

However, the current study builds on existing research that shows a relationship between exercise identity and behaviour by utilizing Identity Theory and Social Cognitive Theory to determine how individuals respond to a hypothetical behavioural challenge to identity. The findings support Burke's (1980) Identity Theory and suggest that this theory shares many similarities with Social Cognitive Theory. As such, the complementary use of these two theories to increase our understanding of how exercise identity affects exercise behaviour is advocated.

Future Directions

Future research should continue to investigate these relationships. Use of prospective designs that allow for tests of mediation may be informative. For example, high exercise identity may lead to strong social cognitions which in turn may lead to consistent exercise behaviour. In order to test for mediation, a prospective design where identity, efficacy and behaviour are measured at different time points would be necessary (e.g. Baron & Kenny, 1986). As well, future research should determine the utility of the identity construct in the context of other health

behaviours (e.g. eating, weight loss, chronic disease management). This possibility was examined in Study Three.

Study Three

Study Two findings supported tenets of Identity Theory and Social Cognitive Theory relative to identity and its relation to social cognitions, affect and exercise behaviour. The results suggested the possibility that individuals who strongly identified with being an exerciser perceived a discrepancy between their identity and behaviour when their identity was challenged. In response to a hypothetical behavioural challenge to identity, these individuals appeared to have experienced negative affect, intended to regulate behaviour in ways that re-affirmed their identity and were confident in their ability to manage their exercise behaviour. The pattern of reaction to the behavioural challenge to exercise identity suggested that participants might be responding in a manner that is consistent with their identity as an exerciser and this pattern of responses was more pronounced for high identity individuals as compared to moderate identity individuals.

Identity appears to be useful in understanding exercise behaviour. Could this construct also be useful in understanding other health behaviours? A small body of research addressing this issue has begun to accumulate. Identity as a *wellness-rejecter* has been linked to unhealthy behaviours (Storer, et al., 1997). Further, identity has been found to predict intentions to eat a low fat diet (Armitage & Conner, 1999) and to use condoms (Sheeran & Orbell, 2000). Recently, *healthy-eater schematic* individuals consumed more fibre and less total fat than did *non-healthy-eater schematic* individuals (Kendzierski & Costello, 2004). Thus, it appears that health-related identities other than exercise may be useful in understanding other health behaviours in addition to exercise. However, no research to date has investigated the relationship between healthy eating and identity and their relation to adherence-related social cognitions using compatible theories (i.e., Identity Theory and Social Cognitive Theory).

The purpose of Study Three was three-fold. The first and main objective of Study Three was to determine if a hypothetical challenge to healthy-eater identity elicited similar affective, social cognitive and behavioural reactions to those that would be consistent with Identity Theory and Social Cognitive Theory and those observed in Study Two when exercise identity was challenged. It was hypothesized that in response to a behavioural challenge to healthy-eater identity, individuals who scored high on healthy-eater identity would manifest (a) greater negative affect and less positive affect than those who scored moderate on healthy-eater identity. Further, in relation to three future weeks of the same challenging situation, high healthy-eater identity participants were hypothesized to demonstrate (b) stronger intentions and (c) self-regulatory self-efficacy for healthy eating, (d) generate more self-regulatory strategies for healthy eating, (e) demonstrate stronger intentions for using these strategies and (e) report more frequent past healthy eating behaviour, than individuals moderate in healthy-eater identity.

The second purpose of Study Two was to determine if, as in the case with exercise in Study One, identity and adherence-related social cognitions would be prospectively related to healthy eating behaviour. It was hypothesized that healthy-eater identity, self-efficacy and intentions for healthy eating would be positively related to healthy eating behaviour.

As a third objective, the salience of the healthy eater identity relative to other identities was examined. It was hypothesized that in accordance with Identity Theory, identity would be positively related to identity salience. As well, it was hypothesized that those individuals highest in healthy-eater identity would rank the healthy-eater identity as more salient relative to other commonly held identities than would their moderate identity counterparts.

Method

Participants and Design

The sample for Study Three consisted of 146 volunteers. Participants were recruited from undergraduate and graduate classes representing various departments (Kinesiology = 51.8%; Arts = 35.1%; Education = 8.8%; other = 4.4%) of two university campuses. Ninety-seven percent of the participants were students and 75% were female. Participants' ages ranged from 18 to 57 years (*M*age = 21.65 years, *SD* = 5.04).

The design of this study was similar to both Study One and Study Two but investigated the role of identity in *healthy eating* rather than *exercise*. Three research questions related to identity and healthy eating were posed. The main research question involved a two-group post-test design similar to that used in Study Two. This research question dealt with a comparison of high and moderate healthy eater identity groups on their reactions to a behavioural challenge to identity scenario. The scenario used in Study Three was similar to that used in Study Two but was modified to be relevant to the behaviour of healthy eating.

The second question concerned a secondary research question. A prospective observational design was used to investigate this question. Specifically, a prospective relationship between identity, social cognitions, and healthy eating behaviour was examined. Identity and social cognitions were time one predictors of the behaviour assessed two weeks later. The third research question concerned the relationship between healthy-eater identity and related salience.

Orientation to Measures

The three research questions involved measuring several variables; some of these measures were common to the different research questions and some were unique. Measures

common to more than one research question were healthy-eater identity, nutrition knowledge, demographic variables and perceptions of healthy eating. Other variables were unique to a particular research question. . The following summary table presents the measures used in answering all three research questions.

Table 1

Summary of Variables used in Study Three Research Questions

1. Extreme Healthy-Eater Identity Group Comparison	
Healthy-Eater Identity	Independent Variable (grouping variable)
Affect	Dependent Variable
Healthy Eating Intentions	Dependent Variable
Self-regulatory Strategies/Related Intentions	Dependent Variable
Self-Regulatory Efficacy	Dependent Variable
Past Intake of Healthy Foods	Dependent Variable
Past Intake of Foods of Low Nutritional Value	Dependent Variable
Self-Regulatory Efficacy	Dependent Variable
Nutrition Knowledge	Covariate
Perception of Healthy Eating	Used to determine which healthy eating outcomes to use as dependent variables
2. Prospective Prediction of Healthy Eating	
Healthy-Eater Identity	Independent variable
Nutrition Knowledge	Independent variable
Self-efficacy for healthy eating/limiting foods of low nutritional value	Independent variables
Intentions for healthy eating/limiting intake of foods of low nutritional value	Independent Variables
Prospective Eating Behaviour	Dependent Variables
Perception of Healthy Eating	Used to determine which healthy eating outcomes to use as dependent variables
3. Salience Analyses	
Healthy-Eater Identity	Used in correlation and Chi-square analyses
Identity Salience	Used in correlation and Chi-square analyses

Measures Used in More than One Analysis (see Appendix H)

Healthy-eater identity. The Exercise Identity Questionnaire (Anderson & Cychosz, 1994) was modified to be relevant to healthy eating. For example, the original scale items, "*I consider myself to be an exerciser"* and *"I have numerous goals related to exercise"* were changed to "*I consider myself to be a healthy-eater"* and "*I have numerous goals related to healthy eating*". Participants rated the extent to which each item applied to them using a seven-point Likert scale where 1 = *strongly disagree* and 7 = *strongly agree* (see Appendix H, section one). This measure was taken prior to exposure to the behavioural challenge to identity stimulus. A high Cronbach's alpha value (.90) was observed among the current sample which suggests that the scale is reliable (Tabachnick & Fidell, 1996).

Nutrition knowledge. This scale was designed to measure nutrition knowledge in adults. The *choosing everyday foods* subscale of the Nutrition Knowledge Questionnaire (Parmender, & Wardle, 1999) was used to assess participants' knowledge of making healthy food choices. This variable was measured in order to control for participants' nutrition knowledge in analyses (see Appendix H, section two). The scale was designed such that subscales can be used alone or in combination (Wardle, personal communication, March, 2005). The chosen subscale shows strong test-retest reliability (.87) and acceptable internal consistency (Tabachnick & Fidell, 1996) with a Cronbach's alpha = .76. Also, the scale shows construct validity; dietetic students scored consistently higher than computer science students (Parmender, & Wardle, 1999).

Demographics. Participants provided demographic information regarding their age, gender, height, weight, student status, area of study, occupation if not a student, and vegetarian/vegan status (see Appendix H, section three).

Perception of healthy eating. Healthy eating is a multi-faceted behaviour with various criteria potentially being used in its judgement. It was recognized that participants may perceive healthy eating in a variety of ways. Whether participants' current identity as a healthy-eater was related to healthy eating behaviour and its regulation was of interest in the present study. As such, it was not desirable to influence participants' perceptions of what healthy eating meant to them when they were indicating the extent to which they identified with healthy eating. What was of interest was how participants perceived healthy eating. To get a sense of this information, participants were asked to describe in one or two sentences or phrases what healthy eating means to them (see Appendix H, section four). This measure was administered prior to exposure to the hypothetical behavioural challenge to identity.

Measures Unique to the Extreme Healthy-Eater Identity Group Comparison (see Appendix I)

All measures uniquely used in the extreme healthy-eater identity group comparison research question will be described in this section. Participants were asked to read and think about a hypothetical scenario which described challenges to their regular extent of healthy eating. After reading the scenario they filled out the following measures in relation to the scenario: affect, intentions to eat a healthy diet, self-regulatory efficacy, self-regulatory strategies and intentions to use these strategies. Participants also provide information about their recent typical healthy eating behaviours. The stimulus material (hypothetical behavioural challenge to identity scenario) is described in the procedure section.

Affect. Participants' affective reactions to the behavioural challenge to healthy-eater identity were measured and totaled in the same manner as in Study Two using the Affect Scale (Weiner, 1986). However, the items were phrased relative to healthy eating rather than exercise (see Appendix I, section one). The subscales of this measure were found to be reliable in the

current sample with a Cronbach's alpha value of .87 for both the positive and negative affect subscales (Tabachnick & Fidell, 1996).

Healthy eating intentions. Participants were asked to imagine that their *busier than usual* schedule, as described in the hypothetical scenario, would continue for the next three weeks. Participants were then asked to state their intentions to eat a healthy diet daily over these next hypothetical busier than usual three weeks. Participants used a seven-point Likert scale where 1 = *definitely do not intend*; 7 = *definitely do intend*, to rate their strength of intentions (see Appendix I, section two).

Self-regulatory strategies. Participants were asked to list up to five self-regulatory strategies that they could use to try to eat a healthy diet daily over the course of the next hypothetical busier than usual three weeks described in that scenario. As well, participants were asked to rate the strength of their intention to use that/these strategy(s) over the course of those hypothetical busier than usual three weeks using a nine-point Likert scale (1 = *definitely will not use*; 9 = *definitely will use*; see Appendix I, section three).

Self-regulatory efficacy. Participants were asked to rate their confidence in engaging in seven self-regulatory strategies that may help them eat a healthy diet on a daily basis during the course of the hypothetical busier than usual three weeks described in the scenario. Participants rated their confidence on a 0-100% scale (0% = *not at all confident* and 100% = *completely confident*). This efficacy scale was designed consistent with recommendations by Bandura (1986). An example item is, "*How confident are you that you would find time daily to make a healthy lunch to bring with you to work/school"* (see Appendix I, section four). The scale had acceptable reliability in the current sample with a Cronbach's alpha value of .86 (Tabachnick & Fidell, 1996).

A measure of recalled recent healthy eating behaviour was used for the present study in order to compare typical eating habits between high and moderate healthy-eater identity groups. Healthy eating is a complex behaviour that can be conceptualized in different ways and is likely made up of many components (see Paquette, 2005 for a review). For the purpose of the current investigation, two broad healthy eating outcomes were measured: typical daily frequency of intake of healthy foods (as recommended by Canada's Food Guide for Healthy Eating) and typical frequency of intake of foods with low nutritional value (e.g. high in fat, sugar and salt).

Past intake of healthy foods. Participants were asked to report the number of servings they ate of each of the four groups making up the Canada Food Guide on a recent typical day. These categories included (1) fruit and vegetables, (2) dairy products, (3) lean meat and alternatives, and (4) whole-grains. For the latter two categories, the Canada Food Guide recommends low-fat meats and whole-grains. For this reason, we asked specifically about participants' typical daily intake of low fat meats and wholegrain products. Examples of serving sizes for each food category were provided to aid participants in determining the number of servings they had consumed (see Appendix I, section five, part A). The food categories of fruits and vegetables, and whole-grains were treated as continuous variables; their high recommended daily intake (eg. 5-10 servings) suggests that greater consumption is in line with recommendations. Because the consumption of the food groups of meats and dairy products are recommended within a specific range (e.g. 2-4 servings daily), these variables were treated as categorical variables based on whether participants did or did not meet the recommended servings. Because some of these items were continuous and some were categorical, they were not treated as an index but rather were assessed individually.

Past intake of foods of low nutritional value. In order to measure frequency of consumption of foods of low nutritional value, participants were asked how often they consumed (1) salty snacks (e.g. chips, salted nuts, Dorittos), (2) fast foods (e.g. burgers, fries), (3) high calorie drinks (e.g. pop, ice tea, sugary drinks, alcohol), (4) refined baked goods (e.g. cookies, cakes, pastries) and (5) sweets (e.g. candies and chocolate). Participants were asked to indicate how often they consumed these foods by choosing between the following five options; at least once/day, at least two times/day, five-six times per day, two to four times per week, two to four times per month, and never/rarely (see Appendix I, section five, part B). Responses for the five items were summed and averaged to yield a total index score. The items demonstrated moderate internal consistency (alpha = .68; Tabachnick & Fidell, 1996).

Measures Unique to the Prospective Prediction of Healthy-Eating (see Appendix J)

Self-efficacy for healthy eating. Participants were asked to rate their percent confidence (0% = *not at all confident*; 100% = *completely confident*) in eating the Canadian Food Guide recommended servings of *each of* fruits and vegetables, dairy products, whole-grain products and lean meats over the next two weeks as recommended by procedures consistent with assessing self-efficacy by Bandura (1986). Examples of serving sizes for each food category were provided. Items were designed to correspond with healthy eating outcome variables to be measured two weeks after the completion of this questionnaire (see Appendix J, section 1).

Self-efficacy for limiting foods of low nutritional value. Participants were asked to rate their confidence (0% = *not at all confident*; 100% = *completely confident*) in eating a minimal amount of various categories of foods of low nutritional values over the next two weeks, again according to recommendations for assessing self-efficacy (Bandura, 1986). An example of "*a minimal amount"* was provided in each case (see Appendix J, section two). The categories

corresponded with outcome measures making up the index of frequency of consumption of foods of low nutritional value measured two weeks after the completion of this measure. Items from each category were summed and averaged to create an index score. The items making up this index were reliable with a Cronbach's alpha of .83 (Tabachnick & Fidell, 1996).

Intentions for healthy eating. Participants are asked to rate the strength of their intentions to eat the recommended servings of each of the four food groups outlined by the Canada Food Guide for Healthy Eating on a typical day over the next 2 weeks. An example of a serving size was provided in each case. Participants rated the strength of their intentions using a seven-point scale (1 = definitely will not; 7 = definitely will; see Appendix J, section three).

Intentions for limiting intake of foods of low nutritional value. Participants were asked to rate the strength of their intentions to eat a minimal amount of the various categories of foods of low nutritional value (1 = definitely will not; 7 = definitely will; see Appendix J, section four). The categories corresponded with outcome measures making up the index of frequency of consumption of foods of low nutritional value measured two weeks after the completion of this measure. An example of "*a minimal amount"* was provided in each case. As an index, these items showed high reliability with a Cronbach's alpha of .88 (Tabachnick & Fidell, 1996).

Prospective eating behaviour. Healthy eating was measured in the same manner described above to measure past eating behaviour but was measured at 2 weeks after the initial assessment (see Appendix J, section five, part A and B). Again, the Cronbach's alpha for the index of frequency of consumption of foods of low nutritional value was moderate (alpha = .65) (Tabachnick & Fidell, 1996).

Measure Unique to the Identity Salience Analyses (see Appendix K)

Identity salience. Salience (or importance of an identity relative to other identities) was measured as a check on healthy-eater identity – that is healthy-eater identity should have been positively related to a high salience rating of exercise identity relative to other identities. Furthermore, assessing the salience of the healthy-eater identity provided insight into how important this identity was to participants relative to other commonly held identities. In accordance with Stryker's (1980) conceptualization of identity and other research in the area (e.g. Callero, 1985), participants were asked to rank eight identities in order of importance where 1 = *most important* and 8 = *least important*. Identities included in the list to be ranked were ethnic group/nationality, family/friend, group/organization, healthy eating, politics, religion, work/school, and physical activity/exercise. For example, if a person ranked family/friends identity as the most important identity relative to all other identities listed, they would assign a value of 1 to this identity (see Appendix K). This measure was taken prior to the presentation of the behavioural challenge to identity scenario.

Procedures

For data collection, participants were approached in university class settings by the researcher and were told about the opportunity to participate in a web-based study about factors related to healthy eating. After learning about the research ethics approved study and about the protection of their responses as anonymous, interested individuals (n = 370) provided their email addresses and were emailed a link to a confidential (password–protected) questionnaire website designed for the purposes of this study. Receipt of the study website link did not obligate participants to continue as they could withdraw at any time. Interested participants (n = 146; 40%) then logged onto the website, read instructions, and then completed an online

questionnaire. Participants were emailed two weeks after they filled out the initial questionnaire and were asked to fill out a follow-up questionnaire. Of those participants who completed the time one questionnaire, one-hundred and one (69%) responded to the follow-up questionnaire.

At time one, healthy-eater identity, perception of healthy eating, and identity salience were assessed first. Participants then read the brief hypothetical behavioural challenge to identity scenario. After reading this scenario, participants filled out measures specific to the behavioural challenge to healthy-eater identity. These measures included affect, intentions, self-regulatory strategies and strength of intention to use these strategies, and self-regulatory efficacy. These measures were all answered in response to the hypothetical behavioural challenge to identity scenario. Next participants filled out demographic information and the nutrition knowledge questionnaire. After reading a statement that explained to participants that the next set of questions were about their *actual* eating behaviour and had nothing to do with the scenario, participants reported their past eating behaviour and filled out measures of efficacy and intentions to eat a healthy diet and to eat a minimal amount of foods of low nutritional value. Two weeks later, participants filled out the follow-up questionnaire. They read a consent letter and then filled out measures of healthy eating behaviour. After submitting their web-based form, participants were provided with an online feedback form which provided a contact number should participants have any further questions.

Stimulus material

In order to assess participants' reactions to a behavioural challenge to healthy-eater identity, a scenario was presented to participants. The scenario was designed in a manner similar to the scenario used in Study Two but was modified relevant to healthy eating. The scenario engaged participants by asking them to place themselves in a situation where, due to a busier

than usual work/school schedule over the last three weeks, their ability to regulate their eating would have been extremely challenged. Further, participants were asked to imagine that this busier than usual schedule resulted in their eating over the past three weeks being much less healthy than usual. Examples of this unhealthy eating were provided. The challenge aspect of the scenario was designed to present a common element (e.g. constrained time) that encouraged participants to consider a situation where their behaviour was much different than normal. Further, the challenge aspect of the scenario was purposefully described in general and broad terms (e.g., time constrained and far busier than usual) so that all participants could relate to the scenario relative to their differing personal eating practices and time constraints typical of their lifestyle. Thus, as was the case in Study Two, participants used a self-reference to imagine their life at the point in time and circumstances described in the scenario. Essentially, the participants used themselves as internal referents (i.e. controls) when responding to the scenario (cf. Sherif & Sherif, 1969).

> **INSTRUCTIONS: Please read the following hypothetical situation carefully. The next several questions will be in reference to this situation. Please answer these questions with THIS SCENARIO in mind rather than what is true for you at the present time.**
>
> Imagine that for some reason, in the last three weeks, things at work/school have put more demands on your time such that you are **FAR BUSIER THAN USUAL (that is, over and above your typical schedule)**. These recent time demands have caused you to alter your daily eating so that it is irregular and much less healthy than would normally be the case for you. You have been eating when and where you can, at odd hours, with imbalanced meal and snacks. Over the last 3 weeks, you have really been struggling with making healthy food choices.
>
> Specifically, you have been eating a lot less fruits/vegetables, and dairy products than usual. Because of easy and quick access, you have been choosing a lot more fatty meats (e.g. bacon, burgers), baked goods (e.g. white breads, muffins, doughnuts) and junk foods (e.g. pop, cookies, chips and chocolate).

> Now think about how this situation would **BE MOST LIKELY TO MAKE YOU FEEL AND REACT**. Please answer the next set of questions in this questionnaire with these thoughts and feelings in mind.

Results

Analytical Plan

The main objective for Study Three was to determine if the findings from Studies One and Two examining the relationships between exercise identity, behaviour and the regulation of exercise behaviour could be replicated in the context of healthy eating. First, demographic variables were computed. Next, the central objective was to test the hypothesis that high and moderate healthy-eater identity groups would differ on their recent typical healthy eating behaviour and reactions to the behavioural challenge to identity in a manner consistent with predictions made by Identity Theory and Social Cognitive Theory. Specifically, a MANCOVA analysis controlling for nutrition knowledge was used to determine if, as was the case with exercise identity in Study Two, high identity participants would react to the behavioural challenge to identity with lower levels of positive affect, and higher levels of negative affect, intentions to eat a healthy diet, self-regulatory efficacy, generation of self-regulatory strategies and intention to use these strategies than moderate identity participants.

As a secondary objective, it was also hypothesized that healthy-eater identity and adherence-related social cognitions (self-efficacy and intentions) would be prospectively related to healthy eating behaviour after controlling for nutrition knowledge. To test this hypothesis, a series of multiple regression analyses were conducted.

The final set of analyses dealt with the salience of the healthy-eater identity. First, the association between identity salience and healthy-eater identity was examined. This analysis allowed for a test of the hypothesis that the stronger participants' score on identity as a healthy

eater, the more salient they should rate that identity relative to other commonly held identities. Second, a Chi-square analysis was carried out to determine if high healthy-eater identity individuals rated the healthy-eater identity as more salient than moderate healthy-eater identity individuals.

Descriptive Statistics

Descriptive statistics indicated that while participants' mean score on the healthy-eater identity scale ranged from 1.56 to 6.89, the distribution of scores was slightly skewed in the direction of stronger healthy-eater identity with a sample mean value of 4.66 (*SD* = 1.06) and a median of 4.78 on this seven-point scale. Healthy-eater identity was seen as moderately salient relative to other commonly held identities; on average, participants ranked this identity as the fourth most salient out of 8 possible identities (*M* = 4.32, *SD* = 1.47). Descriptive statistics for variables included in the main MANCOVA analysis are provided in Appendix L.

Participants' perceptions of healthy eating were used to determine which variables would be used as outcome measures of healthy eating. When participants were asked "*what does healthy eating mean for you*," participants were far more likely to single out fruit and vegetable consumption as constituting their personal healthy eating than any other food group (25% of the sample explicitly mentioned fruits and vegetables). Participants also commonly mentioned (45%) the avoidance of food of low nutritional value as part of their perceptions of healthy eating. The importance of fruit and vegetable consumption and the avoidance of foods low in nutritional value are consistent with a recent review (Paquette, 2005). This review found that fruit and vegetable consumption was most often mentioned in the public's conception of healthy eating. The limited intake of foods high in fat, sugar and salt was also an important component of the public's view of healthy eating. Based on this information, it was decided to use fruit and

vegetable consumption and intake of foods of low nutritional value as indicators of healthy eating behaviour.

Comparison of Extreme Healthy-Eater Identity Groups

In order to examine whether participants differed in terms of their recent typical healthy eating behaviour and reactions to a hypothetical behavioural challenge to identity, participants who held the more extreme views of healthy-eater identity were compared. It was reasoned that if level of healthy-eater identity is associated with greater reaction to a discrepancy between identity and behaviour, then individuals most likely to exhibit characteristic differences in these reactions would be those most extreme in their perceptions of their identity as a healthy-eater (Gyurcsik & Brawley, 2000). Nutrition knowledge was controlled to test for the possibility that participants' knowledge about *how to eat a healthy diet* may have influenced reactions to the behavioural challenge to identity. Correlations between identity and social cognitive variables used in this analysis can be found in Appendix M.

To create the extreme groups, a tertile split was used to select individuals with the highest and lowest scores on healthy-eater identity. The tertile split yielded a group with high (M = 5.78, SD = .37, n = 47) and a group with moderate (M = 3.53, SD = .76, n = 51) scores on healthy-eater identity. An independent sample t-test was conducted to confirm that the groups differed on healthy-eater identity and the difference was significant (t (1, 96) = 18.15, $p < .001$). Therefore, subsequent analyses were carried out examining variables that capture participants' reactions to the scenario.

A MANCOVA controlling for nutrition knowledge was used to compare extreme healthy-eater identity groups (high vs moderate) on affective and cognitive reactions to the scenario, and recent healthy eating and was significant (*Wilk's* λ = .58, F = (8, 88) = 7.77, $p <$

.001, observed power = 1.00). Nutrition knowledge was not a significant covariate. The means for the variables used in the analysis as a function of high and moderate healthy-eater identity groups are presented in Table One.

Univariate follow-up ANOVA analyses demonstrated that those higher in healthy-eater identity showed significantly less positive affect (F (1, 94) = 17.21, $p < .001$, $\eta^2 = .16$) and greater negative affect (F (1, 94) = 27.88, $p < .001$, $\eta^2 = .23$) in response to the challenge than those who only moderately identified with being a healthy-eater. Further, those higher on healthy-eater identity had stronger intentions (F (1, 94) = 5.45, $p < .002$, $\eta^2 = .06$) to eat a healthy diet on a daily basis during three future busy weeks as described in the scenario than did those moderate on healthy-eater identity. When compared in terms of self-regulatory efforts to manage their healthy eating over the hypothetical busy three weeks, the high identity group reported stronger self-regulatory efficacy (F (1, 94) = 9.79, $p < .002$, $\eta^2 = 10$) than their moderate identity counterparts. The two groups also differed on the number of self-regulatory skills generated (F (1, 94) = 65.61, $p < .002$, $\eta^2 = .06$) with high identity individuals generating more strategies to manage their healthy eating over the next busy three week period than moderate identity individuals. As well, the former individuals demonstrated stronger intentions to implement these strategies (F (1, 94) = 23.36, $p < .001$, $\eta^2 = .20$) than the latter individuals. The groups also differed on their levels of recent typical fruit and vegetable intake (F (1, 94) = 9.60, $p < .003$, $\eta^2 = .09$). High healthy-eater identity participants consumed more fruits and vegetables than moderate identity participants. In terms of consumption of foods of low nutritional value, the groups also differed (F (1, 94) = 11.93, $p < .001$, $\eta^2 = .11$) with the high healthy-eater identity group consuming less of these foods (see Table Two).

Table Two

Study Three Descriptive Statistics for Extreme Healthy-Eater Identity Group Comparisons

Variable	Moderate Healthy-eater Identity Group (n = 47)		High Healthy-eater Identity Group (n = 49)	
	Mean	*SD*	*Mean*	*SD*
Positive Affect**	2.93	1.13	1.89	1.53
Negative Affect**	5.59	1.88	7.47	1.54
Strength of Intention to Eat a Healthy Diet*	5.33	0.74	5.75	1.06
Self-Regulatory Efficacy*	57.50	14.25	66.25	14.08
Number of Self-Regulatory Strategies for Exercise*	2.34	1.11	2.84	0.99
Strength of Intention to use Strategies to Eat Healthfully**	7.16	1.23	8.20	0.86
Past Fruit and Vegetable Consumption*	3.95	2.53	5.29	1.76
Past Consumption of Foods of Low Nutritional Value**	2.94	0.69	2.43	0.79

Note: Past Consumption of Foods of Low Nutritional Value: 1= rarely/never, 2= 2-4 times/month, 3 = 2-4 time/wk, 4 = 1 time/day, 5 = 2 times/day, 6 = 5-6 times/day

Note: affect and intention to use strategies scales = 9-point scale; intention to eat healthy diet = 7-point scale; efficacy scale = 0-100 scale and expressed as percentage

Note: model df (8, 188)

* significant at $p < .05$. ** $p < .01$.

Predictors of Healthy Eating Behaviour

In order to test the hypothesis that healthy-eater identity, self-efficacy for healthy eating and strength of intentions for healthy eating would be predictive of healthy eating behaviour, a series of hierarchical multiple regression analyses were conducted. As discussed earlier in this section, consumption of fruit and vegetables, and foods of low nutritional value were chosen as outcome measures.

Prediction of fruit and vegetable consumption. A hierarchical multiple regression analysis was used to determine the strength of the relationship between predictor variables (healthy-eater identity, self-efficacy for eating the recommended daily servings of fruits and vegetables and related intentions) and the outcome variable of recalled typical daily fruit and vegetable consumption after controlling for nutrition knowledge. It was reasoned that individual nutrition knowledge could influence healthy eating behaviours. Controlling for this variable allowed for an assessment of the relative predictive power of identity and social cognitions independent of knowledge. To allow for this control, nutrition knowledge was entered into the first block of the prediction equation. Given previous literature suggesting that identity is a rather stable variable (Serpe, 1987), while social cognitions are thought be more situation-specific (Bandura, 1997), identity was entered in the next regression block prior to the other predictors. Self-efficacy was entered in the third regression block, followed by a fourth block with strength of intention. These social cognitions were entered in this order to be consistent with Social Cognitive Theory which suggests that self-efficacy is the strongest social cognitive predictor of behaviour (Bandura, 1986). Mulitcollinearity was not a problem amongst predictor variables

used in both regression analyses (VIF < .103, tolerance > .967) (Cohen et al., 2003) even though they were correlated (see Appendix N). Only those participants who provided follow-up data were used (n = 101).

The overall model was significant, accounting for 35% percent of the total variance in fruit and vegetable consumption (Model Adj. R^2 = .37, F (4, 96) = 14.52, p < .001). Nutrition knowledge did not contribute significantly to the accounted for variance in frequency of fruit and vegetable intake. Healthy-eater identity ($R^2\Delta$ = .11, p < .001), self-efficacy ($R^2\Delta$ = .19, p = .001) and strength of intentions ($R^2\Delta$ = .05, p <.009) contributed to the overall model (see Table Three).

Table Three

Study Three Prediction of Frequency of Fruit and Vegetable Intake Controlling for Nutrition Knowledge

	$adjR^2$	$R^2\Delta$	p of $F\Delta$	β	t	p
Step 1						
Nutrition Knowledge	.022	.032	.074	.161	1.96	.053
Step 2						
Healthy-eater Identity	.125	.111	.001	.130	1.50	.142
Step 3						
Self-Efficacy	.310	.118	.001	.178	1.30	.195
Step 4						
Intentions	.351	.047	.009	.372	2.68	.009

Note: model df (4, 96)

Prediction of frequency of consumption of foods of low nutritional value. A second hierarchical multiple regression analysis was used to examine the relationship between the predictor variables (healthy-eater identity, self-efficacy for limiting intake of foods of low nutritional value, related intentions) and the outcome variable of frequency of intake of foods of low nutritional value. Again, nutrition knowledge was controlled. The order of entry of predictor variables into the regression equation and the associated rationale was the same as in the first regression presented in this section. Mulitcollinearity was not a problem amongst predictor variables used in all regression analyses (VIF < .104, tolerance > .957) (Cohen et al., 2003) even though they were correlated (see Appendix O).

The overall model was significant, accounting for 31% of the total variance in consumption of foods of low nutritional value (Model Adj. R^2 = .28, F (4, 92) = 10.49, p < .001). Nutrition Knowledge did not account for a significant amount of the variance in frequency of intake of foods of low nutritional value. Healthy-eater identity ($R^2\Delta$ = .06, p <.013) and self-efficacy ($R^2\Delta$ = .21, p = .001) made contributions to the overall model. Strength of intentions did not explain any additional variance. Beta weights indicated that all variables included in the regression were negatively related to the outcome variable (see Table Four).

Table Four

Study Three Prediction of Frequency of Intake of Foods of low Nutritional Value Controlling for Nutrition Knowledge

	$adjR^2$	$R^2\Delta$	*p* of *F*Δ	β	*t*	*p*
Step 1						
Nutrition Knowledge	.010	.020	.016	-.103	-1.17	.247
Step 2						
Healthy-eater Identity	.063	.062	.013	-.150	-1.69	.095
Step 3						
Self-Efficacy	.267	.207	.001	-.334	-.289	.005
Step 4						
Intentions	.283	.023	.081	-.205	-1.77	.081

Note: model df (4, 92)

Healthy-eater Identity and Identity Salience

In order to test our hypothesis that the more individuals identify with being a healthy-eater, the more salient they would rank this identity relative to other identities, a Spearman's Rho correlation for ranked data was used (Linton & Gallo, 1975). The correlation between these two variables revealed a significant negative relationship ($r = - .289$, $p < .001$). This relationship indicated that as identification with the healthy-eater identity increased, the identity also became more salient relative to other identities (the identity is given a higher ranking as indicated by a smaller value).

A Chi-square analysis was used to examine the salience raking for the healthy-eater identity made by extreme healthy-eater identity groups. Two groups were created based on

participants' salience rankings of the healthy-eater identity; one group ranked this identity as among the four most salient identities (high salience) and one group ranked this identity as among the four least salient identities (low salience). Extreme healthy-eater identity groups and high and low salience groups were then examined in a Chi-square analysis. The analysis revealed a significant association between salience ranking of the healthy-eater identity and level of identification with that identity (c^2 (1, 100) = 6.17, p = .001). Specifically, fifty-nine percent of those scoring high on healthy-eater identity ranked this identity as being among their four most salient identities whereas only thirty-three percent of those scoring moderate on the healthy-eater identity ranked this identity as among their four most salient identities.

Summary of Results

Several group differences were detected when high and moderate healthy-eater identity individuals were compared in terms of their reactions to a behavioural challenge to identity. High healthy-eater identity individuals reported greater negative affect, less positive affect, stronger intentions to eat a healthy diet, greater self-regulatory efficacy, generated more self-regulatory strategies and had stronger intentions to use these strategies in order to eat a healthy diet over three hypothetical future busy weeks than moderate identity individuals, even when nutrition knowledge was controlled.

Healthy-eater identity, and self-efficacy related to healthy eating outcomes predicted both fruit and vegetable consumption and frequency of consumption of foods of low nutritional value even when nutrition knowledge was controlled. Strength of intentions related to healthy eating outcomes significantly aided in the prediction of fruit and vegetable consumption. Nutrition knowledge did not emerge as a significant predictor of either healthy eating outcome variable.

Finally, healthy-eater identity appears to be a relatively salient identity – especially

among high healthy-eater identity individuals. The more strongly those individuals identified with the healthy-eater identity, the more salient that identity was rated relative to other common identities. Further, individuals who highly identified with being a healthy-eater rated the healthy-eater identity as more salient than individuals who only moderately identified with this identity.

Discussion

The findings of Study Three build upon the two earlier studies. The results suggest that identity may be an important concept in understanding healthy eating in addition to exercise. As was the case in Study Two, the findings support the tenets of Identity Theory and Social Cognitive Theory and their compatible use. Secondly, the current findings support past research and the findings of Study One which posit the existence of a relationship between a health behaviour identity and engagement in that behaviour.

Identity Theory

The pattern of reactions of high healthy-eater identity participants to a hypothetical behavioural challenge to identity supported Identity Theory. Specifically, the findings supported hypotheses that concerned how identity may be related to behaviour and suggest that identity may be important in behavioural regulation.

Those individuals who strongly endorsed the healthy-eater identity responded with more negative and less positive affect than those who moderately endorsed the identity. Identity Theory would suggest that the former individuals may have perceived a discrepancy between their identity and their behaviour as described in the scenario (Gecas & Burke, 2003). This discrepancy may have led to the greater negative and less positive eating-related affect reported among these high identity individuals. By contrast, moderate identity individuals may have

perceived less discrepancy between their perceived behaviour and their identity. In turn, they expressed less negative affect.

The pattern of responses of high identity participants to the behavioural challenge to identity suggested that these individuals *intended* to manage their behaviour such that it was consistent with their identity as a healthy eater. In this way, identity may have served as a standard for behavioural regulation (Gecas & Burke, 2003). In response to the behavioural challenge to identity, high healthy-eater identity participants, in contrast to their moderate counterparts, showed *stronger intentions* for healthy eating during the three future challenging weeks, higher self-regulatory efficacy to manage this eating, a greater number of self-generated self-regulatory strategies and *stronger intentions* for using self-regulatory strategies to manage the challenging condition. Taken together, this response pattern supports the view posited by Identity Theory, that individuals may be motivated to regulate their behaviour in a manner that is consistent with their goal identity (Burke, 1980; Burke & Reitzes, 1981).

Social Cognitive Theory

The findings also provide support for the role of Social Cognitive Theory in understanding the identity-behaviour relationship. High identity individuals demonstrated stronger efficacy beliefs to regulate behaviour for the hypothetical next three weeks under challenging conditions. Efficacy beliefs of this group were significantly higher than those of the moderate identity group. High identity participants' reactions to the perceived challenge may have elicited persistence at confirming their identity. This idea is consistent with Social Cognitive Theory's prediction that individuals with strong efficacy beliefs would persist in the face of challenges and adversity in the pursuit of goals (Bandura 1997; Maddux & Goesselin, 2003). In fact, social psychological theorizing about the self posits that extent of identification

with a behaviour may influence the effort individuals devote to regulating their behaviour in a manner that is consistent with relevant aspects of identity (Baumeister & Vohs, 2003; Ryan & Deci 2003). However, confirming these hypotheses requires future study.

Identity and Healthy Eating Behaivours

Study Three findings support a relationship between identity as a healthy eater and healthy eating behaviour. Healthy-eater identity, self-efficacy and intentions were useful predictors of two indices of healthy eating; intake of fruits and vegetables, and limited intake of foods of low nutritional value. The present findings are consistent with a small body of past research that supports a link between identity as a healthy-eater (or healthy eating schema) and healthy eating behaviour (Armitage & Conner 1999; Kendzeirki & Costello, 2004). However, the present findings uniquely contribute support for Identity Theory, Social Cognitive Theory and a relationship between social cognitions and identity. These unique findings may provide insights into *how and why* identity leads to behaviour.

Interestingly, controlling for nutrition knowledge did not affect findings related to extreme healthy-eater identity groups' responses to a behavioural challenge to identity or the relationship between healthy-eater identity and social cognitions with future healthy eating behaviour. These findings rule out the possibility that individuals with high healthy-eater identity have greater knowledge about how to eat a healthy diet and this knowledge is in turn responsible for their strong social cognitions in response to an identity threat and prospective healthy eating behaviour. Rather, it appears that identifying with the healthy-eater identity is important in healthy eating behaviour and related regulation.

Identity Salience

Stryker's (1980) notion of salience was used to determine how participants ranked the identity of *healthy-eater* relative to other commonly held identities. A positive relationship between healthy-eater identity and salience of this same identity was found. Further, those participants who more strongly identified with being a healthy-eater ranked this identity as more salient than those who only moderately identified with being a healthy-eater. The relatively high importance of the healthy-eater identity among individuals who highly endorse this identity is consistent with their efforts to regulate their behaviour in this domain.

Conceptual and Methodological Challenges

Measuring both healthy-eater identity and actual healthy eating behaviour presented conceptual and methodological challenges. Healthy eating can be conceptualized in many ways. For example, healthy eating may be conceptualized as following Canada's Food Guide or alternatively, as constraining eating to a goal of a certain number of daily calories, or avoiding/limiting certain categories of foods. For the present study, personal conceptualizations of healthy eating were examined. More specifically, how participants personally interpreted and identified healthy eating, and how this in turn, affected their healthy eating behaviour and self-regulation was of interest. For this reason, perceptions of healthy eating from the view point of health professionals or agencies were not of interest. From a self and identity perspective, having participants reflect on their individually-held definitions of healthy eating is more conceptually consistent with the psychological notion of "self"-identity than a consensus definition of healthy eating provided by health promotion experts.

The healthy eating outcome measures chosen as dependent variables (fruit and vegetable and foods of low nutritional value intake) were consistent with how both study participants and

the general public conceived of healthy eating. This is illustrated by examination of current sample participants' perceptions of healthy eating and those of different population segments and different cultures as reported by Paquette (2005). Feedback from these groups suggests that healthy eating perceptions are based upon selected food choice. For example, in the Paquette review (2005), fruits and vegetables were consistently perceived as part of healthy eating. Natural foods and the fat, sugar, and salt content of foods were also important aspects of perceptions of healthy eating. However, less agreement in meaning was observed across samples for the ideas of balance, moderation and variety in eating. In light of the variation in perceptions of healthy eating, it was decided to investigate personal views of healthy eating as part of the foundation of the "healthy-eater" identity.

For the present study, healthy eating dependent variables were measured using a one-time recall measure of healthy eating. It would be interesting to determine if the more extensive and sensitive measures of healthy eating in the research literature (e.g. nutrition interviews, three-day food recall) would assist future identity-behaviour research. Would future research benefit from using more sensitive and extensive measures of healthy eating?

Strengths and Limitations

This study represents a promising preliminary attempt to investigate the healthy-eater identity – healthy eating relationship in the context of Identity Theory and Social Cognitive Theory. A theory driven, prospective and manipulation design was employed to build upon the findings of Studies One and Two which pertained to exercise behaviour. The current study allowed for the finding of Studies One and Two to be explored in the context of healthy eating. However, limitations should be acknowledged. Study Three employed a two-group post test

design and therefore shares some of the limitations inherent to this design such as the absence of a pre-test (see General Discussion for an elaboration).

The current study suggests that identity is also a useful construct in understanding healthy eating. Findings support the compatible predictions drawn from Identity Theory and Social Cognitive Theory as well as a relationship between identity and healthy eating. Future research should continue to investigate the role of identity in relation to healthy eating and other health behaviours (e.g., exercise). For example, do individuals develop identities relevant to other successful lifestyle changes (e.g. weight-loss, quitting smoking)? Do this development and the nature of identity differ if the motivation for change is risk reduction or health promotion? Are such change-related identities associated with successful change in the behaviours necessary to achieve reduced risk or enhanced health? As well, do people hold identities that have the potential to detract from health or increase risk of disease (i.e., smoker, drinker, sun-tanner) and do these identities help explain their consistent risk behaviours? What are the social cognitions and affective responses associated with such behaviours? Are such identities and related affect, cognitions and behaviour counterproductive when individuals with such identities are exposed to lifestyle-change interventions? Clearly, the opportunities for future research addressing identity, related agency, and health behaviour are plentiful.

General Discussion

According to Leary and Price-Tangney (2003), the self provides the individual with the capacity for self-reflection. This capacity is thought to allow individuals to experience, and have perceptions, thoughts and feelings about themselves as well as make deliberate efforts to regulate their behaviour. This capacity for self-reflection and self-regulation makes the self relevant to understanding health behaviour (Contrada & Ashmore, 1999. This is especially true given the ongoing regulation required for adherence in the case of many health behaviours (Maddux, 1997). The purpose of this dissertation was to use two complementary self-related theoretical perspectives, Identity Theory and Social Cognitive Theory, to further the understanding of adherence to health behaviour and related behavioural regulation. *Identity* (e.g. Anderson et al., 1998; Petosa et al., 2003; Storer et al., 1997) and *self-efficacy* (Maddux et al., 1995) are two self-related constructs housed within their respective theoretical perspectives that have been useful in understanding health behaviour. While previous research has used both constructs to understand health behaviour, the main theoretical influence has been through Social Cognitive Theory. The predictions offered by Identity Theory have not been fully utilized.

Identity Theory

By asking the question "*who am I*" Identity Theory provides a standard for behavioural regulation. According to Identity Theory, identities (e.g. identity as an exerciser) are associated with socially and individually acknowledged expectations (e.g. engages in regular physical activity). When individuals endorse a particular identity (e.g. self as an exerciser), they are thought to be motivated to adhere to these expectations and in turn, seek to behave in a manner that is consistent with this identity (e.g. engage in regular physical activity). When individuals detect a discrepancy between their identity and related behaviour (e.g. exercise identity; no

physical activity for three weeks), they should experience negative affect and will seek to re-affirm their identity by aligning their identity-related behaviour with the expectations associated with the identity (e.g. engage in regular physical activity; Stryker & Burke, 2000).

Social Cognitive Theory

The proposed relationship between identity and behaviour, as outlined by Identity Theory, clearly has implications for affective and cognitive variables. However, Identity Theory does not provide a formal means of measuring these variables. Social Cognitive Theory may be useful in providing a framework for measuring affective and cognitive aspects associated with behavioural regulation. Further, self-efficacy beliefs which ask, "*what can I do,*" can affect behavioural regulation in many ways: goal choice, effort expenditure, persistence in the face of challenges, and emotional responses to progress (Maddux, 1993; Maddux & Gosselin, 2003). Therefore, self-efficacy beliefs may influence the amount of effort and persistence individuals put towards their identity-directed behavioural goals.

Collectively, the results of the three studies of this dissertation suggest that Identity Theory and Social Cognitive Theory are complementary and compatible perspectives from which to investigate the relationship between identity, health behaviour and the social cognitive responses to attempts to self-regulate. As outlined above, both theories make methodological and conceptual contributions to the measurement and understanding of reactions to a behavioural challenge to identity. Moreover, the findings offer support for a link between identity and the health behaviours of exercise and healthy eating.

Contribution to Theory

The pattern of findings in this dissertation supports the theoretical tenets of Identity Theory in relation to two health behaviours. When high identity individuals were presented with

a hypothetical behavioural challenge to their identity as an exerciser or healthy-eater, they demonstrated a pattern of responses that was consistent with predictions outlined by Identity Theory. Specifically, high identity individuals responded with greater negative affect and less positive affect than their moderate identity counterparts. Further, high exercise and healthy-eater identity individuals responded to the behavioural challenge to identity with greater intentions and self-regulatory efficacy and stronger intentions to use self-regulatory strategies to manage these future behaviours. Collectively, the pattern of findings suggest that individuals are responding to a behavioural challenge to identity in a manner that is consistent with the propositions of Burke's (1980) Identity Theory, which considers the internal dynamics involved in the identity-behaviour relationship. It is important to note that the choice of an identity measure is perhaps only one of a number of possible ways to measure identity. However, this choice of measure was consistent with the assessment of identity in past research (e.g. Anderson & Cychosz, 1994).

Stryker (1980) introduced to Identity Theory the concept of identity salience – or the importance of an identity relative to other identities. The more salient an identity relative to other competing identities, the more likely that behaviour will be enacted in a manner that is consistent with that identity (Stryker and Burke, 2000). The present findings suggest that the degree of identification with behaviour is related to the salience of that identity. In Studies Two and Three, the exercise and healthy-eater identities were positively related to degree of identification with that health behaviour. Also, high exercise and healthy-eater identity individuals ranked these health identities as more salient than did their moderate identity counterparts. These findings confirm that the health behaviour identities under study are in fact important to individuals by situating their importance relative to other commonly held identities (e.g. friends/family, work,

religion, politics). The relative importance of these identities to high identity individuals may be related to the effort these individuals devote to regulating their behaviour.

The collective findings of this dissertation also support Social Cognitive Theory. In all three studies, high identity participants demonstrated stronger self-efficacy beliefs than moderate identity participants. In both Studies Two and Three, high identity participants responded to a behavioural challenge to identity with stronger self-regulatory efficacy for regulating their behaviour than moderate identity participants. Social Cognitive Theory would suggest that these strong efficacy beliefs would lead to greater effort expenditure and persistence in the pursuit of goals, even in the face of challenges (Bandura, 1986; 1987; Maddux, 2003). A reasonable hypothesis based upon the two theories is that these strong efficacy beliefs may have been in part responsible for high identity individuals' persistence to confirm their identity even in the face of a challenge. This speculation suggests that efficacy would have a mediational role between identity and behaviour. It is important to note that while efficacy may be described as having a mediational role between identity and behaviour, this relationship was not tested in this thesis. Rather, the present findings provide initial support for a relationship between identity and efficacy and between identity and behaviour. Further, efficacy responses appear to be stronger for those scoring high on identity as compared to those scoring moderate on identity. Later in the future directions section, an examination of this mediational hypothesis (Baron & Kenny, 1986) is mentioned.

In the present dissertation, the complementary use of Identity Theory and Social Cognitive Theory was beneficial. Through the measurement of identity, Identity Theory provided a means of measuring the extent to which individuals endorsed a particular identity – which may have served as a standard for behavioural regulation. Further, Identity Theory

suggests that identity has implications for affect and cognitions that are important in the regulation of behaviour (Stets & Burke, 2003; Stryker & Burke, 2000). In the present dissertation, Social Cognitive Theory provided a framework for measuring these aspects of behavioural regulation. Measuring these affective and cognitive reactions proved beneficial. A high sense of identity with either health behaviour was associated with affective and cognitive reactions that may have aided these individuals in behavioural regulation.

The complementary nature of these two theories in the present dissertation is not surprising when one considers the many assumptions about individuals that these two theories share. Both theories see individuals as active in determining their goal-directed behaviour (Bandura, 1997; Stets & Burke, 2003). Yet both theories recognize the important contribution of social forces in shaping behaviour (Bandura, 1997; Stets & Burke, 2003). The use of these two theoretical perspectives not only provided useful measurement and explanatory benefits, but also served as an example of how theories from differing traditions can be seen as complementary rather than competing (Brawley, 1993; Leary & Price-Tangney, 2003; Stryker & Burke, 2000).

Relationships between Identity, Health Behaviour and Behavioural Strategies

The findings of this dissertation suggest a relationship between identity and the two health behaviours investigated. Studies One and Three show that identifying with being an exerciser or healthy-eater is prospectively related to engagement in exercise or healthy eating. Relationships between identity and these behaviours were characterized by small to medium effect sizes (range = .06 - .22; Cohen, 1992). The findings are in line with past research, which also supports a link between identity and behaviour in the context of exercise (e.g. Anderson et al., 1995; Anderson, et al., 1998). While few other studies to date have investigated the relationship between identity and healthy eating, the present findings seem to agree with

Armitage and Conner, (1999) and schema research by Kendierski and Costello (2004), which support a relationship between self-definition and healthy eating.

Further, the collective findings speak to the possibility that identity may encourage people to regulate their behaviour by providing a standard for behavioural regulation. In Study One, high identity maintenance runners showed stronger levels of *self-regulatory efficacy beliefs* than their moderate identity counterparts. Further, in Studies Two and Three, high identity individuals had *stronger intentions* for engaging in health behaviour and using self-regulatory strategies to manage their health behaviour during three challenging weeks. These individuals also had *more confidence* in their ability to self-regulate their health behaviour than those who moderately identified with these health behaviours. In the case of healthy eating, high healthy-eater identity individuals were able to *generate more self-regulatory strategies* than the moderate identity individuals. Taken together, these findings suggest that highly identifying with health behaviour may be a marker for the possession of skills and abilities necessary for planning behavioural engagement.

Contributions and Strengths

Taken together, these results provide an initial investigation of the relationship between identity and two health behaviours. Further, the current dissertation used tenets offered by Identity Theory and Social Cognitive Theory to guide research. Collectively, the findings suggest that identification with exercise or healthy eating is not only related to behavioural engagement in these domains, but may also be related to affective and cognitive responses important in the regulation of these behaviours. These findings have implications for the promotion of health behaviour change and maintenance. It appears that identification with health behaviour may be

an important marker for behavioural engagement, motivation and self-regulatory confidence in those skills necessary to lead to ongoing health behaviour maintenance.

Limitations

It must be recognized that these studies are preliminary and should be interpreted in light of some limitations. While efforts were made to employ prospective and manipulation research designs (i.e. Studies One and Three used prospective designs; Studies Two and Three used a two-group post-test design), in the case of the two-group post-test designs, without a pre-test, it is difficult to be certain if reactions to the hypothetical scenario were due to the effects of the challenge. However, when considering the possibility of a pre-test, the over-riding consideration was that even if a pre-test were given, participants would be responding to the immediate and individual contextual situation in which exercise or healthy eating occurs for them and not to a common baseline control (as would be necessary in a true experimental design). This would be problematic because the immediate and individual contextual situation in which exercise or healthy eating occurs is not identical for all participants. For example, some exercisers may lead an unhurried life with a great deal of free time to utilize for exercise while others may have extremely full lives that offer little time for adjustment to exercise patterns. Because participants' current schedules (to which pre-test measures would have necessarily referred) vary in their extent of busyness, this pre-test measure may not have allowed for an appropriate common comparison with the post-test (which referred to a *busier than usual* schedule). To allow for a partial control that was common to all participants, the decision was made to present the scenario in a manner that required participants to interpret the situation relative to what they perceived as a *normal* schedule and behaviour *for them*. In this way, individuals' typical recent behaviour served as their own control in a manner recommended by Sherif and Sherif (1969).

It is important to emphasize that the main question of this dissertation was not *if* or *by how much* affect and cognitions changed in response to the behavioural challenge to identity, but *whether high and moderate identity groups differed* in response to the behavioural challenge to identity. The two-group post-test design allowed for investigation into this research question. Future research could ask participants to describe their current context in order to consider if initial context was a moderator variable for observed effects. Alternatively, high and moderate identity participants could be exposed to a common experimental condition devised to avoid behavioural challenge to identity. Exposure to this "neutral" condition could then be followed by exposure to a condition very challenging for or limiting to behaviour consistent with identity. The present research results offer sufficient information to suggest that testing such a controlled design would be a useful follow-up to counter criticism directed at the limitations of the two-group post-test design.

A second limitation of this study is that for both exercise identity and healthy-eater identity measures, there was a low range of variability in measures resulting in positively skewed data. This truncated use of the identity measures may have been due to the sampling and use of volunteer populations. In the case of exercise identity, participants were recruited from exercise contexts and, not surprisingly, expressed some level of exercise identity. In the case of healthy-eater identity, efforts were made to sample from a variety of undergraduate departments; however the range of scores was still slightly skewed towards a high healthy-eater identity. Future research could seek to improve generalizability and range of identity scores through broader sampling. Alternatively it should be noted that regardless of the truncated range used by participants on these identity measures, differences on affect, cognitions and behaviour were still detected when high and moderate identity groups were compared.

Practical Implications and Future Directions

The findings of these preliminary investigations into the link between identity, health behaviour and self-regulation of that behaviour have implications for health behaviour and raise other research questions. Given that identity prospectively predicts exercise and healthy eating behaviour, and serves as a marker for adherence-related affective and cognitive variables, determining how to strengthen identity may prove useful in promoting behavioural adherence. Research should determine if changeable factors are associated with the strengthening of health related identities. For example, does exercising in a group environment facilitate identity development (Hogg, 2003)? Further, does public expression of the identity (e.g. participation in a race, wearing exercise clothes) strengthen identity (Leary & Price-Tangney, 2003)? Once changeable factors associated with identity development are identified, these factors should be manipulated to determine if such manipulation changes identity and if such change influences behaviour.

Other research questions arise from the findings of the present thesis. While exposing participants to realistic hypothetical behavioural challenge to identity offered support for theory, a useful and ecologically valid next step would be to challenge identity in real life situations.

As well, future research should continue to study how identity may facilitate or detract from an individual's attempts at health behaviour change. In particular, the psychological processes that occur in those change attempts might be examined. For example, does self-regulatory efficacy mediate the relationship between identity with a health behaviour and behavioural engagement? Prospective designs with substantial power could be used to determine the precise nature of these relationships. Further, if identity is associated with adherence to health behaviours, future research should test interventions that target identity with a health behaviour

from the point of view of a) readiness for change (i.e., moderate identity might be less responsive to intervention) and b) efforts to strengthen identity and correspondent behaviour.

In conclusion, the results of the studies in this dissertation suggest that identity may be an important marker for both behavioural engagement and affective and cognitive reactions that are conducive to effective self-regulation of health behaviour. Further, the dissertation results suggest that there is a theoretical usefulness in examining the identity construct along with social-cognitive conceptualizations in the context of two health behaviours.

The overall general contribution of the dissertation is that it represents one attempt to heed Contrada and Ashmore's (1999) encouragement that researchers should explore the multiple facets of self and health. Indeed, examination of exercise and healthy eating using the broad conceptualization of self and identity provided opportunity to consider two compatible theoretical perspectives to conduct the "exploration" suggested by Contrada and Ashmore (1999). Identity theory and Social-Cognitive Theory are clearly implicated in Leary and Price Tagney's (2003) introduction to the *Handbook of Self and Identity*. They note that the self has been identified as the "psychological apparatus that allows individuals to think consciously about themselves" (Leary & Price Tangney, 2003). This self-reflexive core of the self is thought to enable individuals to (1) experience (2) perceive, think, and feel about themselves, as well as (3) regulate themselves. These assumptions are critically important because they are essential to successful intervention and the goal of self-management of health-related behaviour.

Appendices

APPENDIX A - Study One Questionnaire Package

Section 1: DEMOGRAPHICS

Age: _____ Gender: M / F

Height (feet / inches): _____ Weight (pounds): _____ Occupation: _____

For how many years have you been running consistently? _____

Section 2: RUNNER IDENTITY

Using the following scale, rate the extent to which the statements below apply to you:

1 2 3 4 5 6 7
strongly disagree **strongly agree**

1. I consider myself a runner. **1 2 3 4 5 6 7** **strongly disagree** **strongly agree**
2. I have many goals related to running. **1 2 3 4 5 6 7** **strongly disagree** **strongly agree**
3. Most of my friends are runners. **1 2 3 4 5 6 7** **strongly disagree** **strongly agree**
4. Running is the most important part of my life. **1 2 3 4 5 6 7** **strongly disagree** **strongly agree**
5. I spend more time thinking about running than anything else. **1 2 3 4 5 6 7** **strongly disagree** **strongly agree**
6. I need to participate in running to feel good about myself. **1 2 3 4 5 6 7** **strongly disagree** **strongly agree**

7. Other people see me mainly as a runner. **1 2 3 4 5 6 7** **strongly disagree strongly agree**
8. I feel bad about myself when I do poorly in running. **1 2 3 4 5 6 7** **strongly disagree strongly agree**
9. Running is the only important thing in my life. **1 2 3 4 5 6 7** **strongly disagree strongly agree**
10. I would be very depressed if I were injured and could not run. **1 2 3 4 5 6 7** **strongly disagree strongly agree**

Section 3: SCHEDULING SELF-EFFICACY

Please answer the following questions about scheduling time for **your personal runs on your own and with the running group** by using this confidence scale (0 – 100%). Please circle your percent confidence for each item below.

1. **Re-arrange your time schedule in order to run regularly no matter what** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
2. **Make up times when you miss your regular running session.** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
3. **Overcome obstacles that prevent you from running regularly.** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**

4. **Organize time and responsibilities around your *personal* running sessions**

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all Confident **Completely Confident**

5. **Organize time and responsibilities around the running *group* sessions.**

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all Confident **Completely Confident**

6. **Make running regularly high on your priority list**

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all Confident **Completely Confident**

7. **Take time out so that nothing interferes with your regular running time.**

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all Confident **Completely Confident**

8. **Plan in advance to run regularly**

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all Confident **Completely Confident**

9. **Attend the running group sessions twice per week.**

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all Confident **Completely Confident**

10. **Make sure you do not miss more than one running group session**

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all Confident **Completely Confident**

Section 4: BARRIERS SELF-EFFICACY

Below is a list of obstacles that may keep you from **running** on your own or with the group. Please indicate your **confidence to overcome each obstacle** using this confidence scale (0 – 100%). Please circle your percent confidence for each item below.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all confident Completely confident

1. You feel too **tired.** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
2. There is **bad weather**. 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
3. You experience **an injury.** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
4. You experience **muscle soreness**. 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
5. You have **work commitments.** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
6. You have **personal commitments** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**

7. You feel **embarrassed about your appearance** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
8. You feel **unfit.** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
9. You are in a **bad mood.** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
10. You feel you don't have the **time**. 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**

Section 5: TASK SELF-EFFICACY

For the following questions, please rate how confident you are that you could **run at a moderately fast pace without stopping** using this confidence scale (0 – 100%). Please circle your percent confidence for each item below.

1. For **30 minutes** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
2. For **1 hour** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
3. For **1 hour and 30 minutes** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**

4. For **2 hours** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
5. For **2 hours and 30 minutes** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
6. For **3 hours** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**
7. For **3 hours and 30 minutes** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% **Not at all Confident** **Completely Confident**

Section 6: SCRIPT FOR PHONE ADMINISTERED RUNNING/VIGOROUS PHYSICAL ACTIVITY RECALL.

RESEARCHER: *"Hello, My name is Shaelyn Strachan. I am calling from the University of Waterloo regarding the running study that you participated in about a month ago. I am calling to ask you about your running and other exercise behaviour over the past week. Today is Monday, so thinking back to last Tuesday, did you go for a run?"* IF YES *"How long was that run in time? Did you do any other vigorous physical activity (e.g. that got your heart rate elevated, such as vigorous swimming and vigorous long distance bicycling)? If so, for how long*

in time did you do this activity" The researcher went through each day of the week and asked the participants the same questions.

APPENDIX B – Study One Descriptive Statistics

Variable	*Mean*	*SD*
Years of Regular Running	8.69	8.69
Weekly Frequency of Running	3.28	1.42
Mean Duration of Running per Session (min.)	56.05	14.77
Barriers Self -Efficacy	75.99	12.58
Scheduling Self-Efficacy	80.66	15.01
Task Self-Efficacy	54.52	23.82

Note: Efficacy measures: 0-100% Scale; Runner Identity: 1-7 scale

APPENDIX C – Study One Correlation Matrix for Variables Included Analyses

	1	2	3	4	5
Runner Identity	-				
Scheduling Self-Efficacy	.384**	-			
Barriers Self-Efficacy	.312*	.591**	-		
Task Self-Efficacy	.348**	.117	.292*	-	
Frequency of Running	.415**	.396**	.466**	.408**	-
Duration of Running	.346**	.376**	.355**	.439**	.835**

* significant at $p < .05$. ** $p < .01$.

APPENDIX D – Study One Analyses Controlling for Years of Running Experience

In order to determine if runner identity and social cognitions are able to prospectively predict exercise behavioural outcomes once number of years of running experience have been controlled, analyses presented in Study One were carried out controlling for this variable.

Running Frequency

A predictive model was tested where number of years of running experience was entered into the regression equation in a first block, followed by runner identity and both scheduling and barriers efficacy in a second and third block respectively. This model accounted for 37% of the variance in running frequency (*Model adjusted* R^2 = .34, F (4, 61) = 9.25, p < .001). Years of running experience accounted for a significant portion of the variance ($R^2\Delta$ = .18, p > .001). Runner identity ($R^2\Delta$ = .09, p < .007) and the two forms of self-regulatory efficacy ($R^2\Delta$ = .11) made significant contributions to the model after years of running experience was controlled.

Running Duration

A hierarchical regression analysis was carried out to determine if runner identity and task self-efficacy were significant predictors of running duration after controlling for past years of running experience. After entering past running experience, runner identity and task self-efficacy were entered into the regression equation in their own separate blocks. The overall model was significant and accounted for 31% of the variance in duration of running (*Model adjusted* R^2 = .28, F (3, 63) = 9.49, p < .001). Number of years of past experience with running accounted for 7% of the variance ($R^2\Delta$ = .07, p < .032) in running duration. Runner identity ($R^2\Delta$ = .24, p < .001) and task self-efficacy ($R^2\Delta$ = .07, p < .013) significantly accounted for additional variance after years of running experience was controlled.

Social Cognitive and Behavioural Characteristics of Identity Controlling for Running Experience

Participants' social-cognitions and behaviour was compared as a function of their levels of identity controlling for years of running experience. In order to examine whether maintenance participants perceived different amounts of efficacy, participants who held the more extreme views of identity were considered. To create the extreme groups, a tertile split was used to select individuals in either the higher (M = 5.06, SD = 3.10, n = 22, range = 4.6-5.1) or lower (M = 3.01, SD = .487, n = 22, range = 2.0-3.0) tertile of identity. An independent sample t-test was conducted to confirm that the groups differed on identity and this was significant (t (42) = 16.45, p < 0001). Subsequent analysis of the social cognitive characteristics of the truly different identity groups were carried out.

A MANCOVA comparing extreme identity groups (high vs moderate) on social cognitive and behavioural variables including years of running experience as a covariate was significant (*Wilk's Lamda* = .68, F (5, 36) = 3.42, p < .013). Number of years of running experience was not a significant covariate. Univariate follow-up ANOVA analyses demonstrated that those higher in identity showed significantly higher scores on task self-efficacy (F (1, 40) = 8.24, p < .007), scheduling self-efficacy (F (1, 40) = 4.16, p < .048) and ran more frequently (F (1, 40) = 8.71, p < .005) and for longer durations (F (1, 40) = 14.28, p < .001) than did those who scored in the moderate identity group .

APPENDIX E – Study Two Questionnaire Package

Section 1: EXERCISE IDENTITY:

INSTRUCTIONS: PLEASE READ CAREFULLY: Use the scale provided to rate extent to which each item applies to you.

1. I consider myself an exerciser

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE

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

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE

3. I have numerous goals related to exercising

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE

4. Physical exercise is a central factor to my self concept

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE

5. I need to exercise to feel good about myself

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE

6. Others see me as someone who exercises regularly

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE

7. For me, being an exerciser means more than just exercising

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE

8. I would feel a real loss if I were forced to give up exercising

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE

9. Exercising is something I think about often

STRONGLY DISAGREE 1 2 3 4 5 6 7 STRONGLY AGREE

Section 2: IDENTITY SALIENCE

INSTRUCTIONS: PLEASE READ CAREFULLY:

People hold many identities or roles. Below is a list of identities or roles that are often part of an individual's sense of who they are. Please read and consider the list of 7 identities below and then rank the identities in terms of order of importance for you. For example, the most important identity to you will be assigned #1 while the least important identity to you will be assigned #7.

Identity/Role	Ranking
ethnic group/nationality	
family/friends	
organization/group	
physical activity/exercise	
politics	
religion	
work/school	

Section 3: PAST EXERCISE BEHAVIOUR

Considering a typical **7-day period** (a week), how many times **on average** do you do the following kinds of exercise for **30 minutes or more** during your **free time** (write the appropriate number of times per week on each line)?

Times per week

STRENUOUS EXERCISE (your heart beats rapidly): _____

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

MODERATE EXERCISE (not exhausting): _____

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

MILD EXERCISE (minimal effort): _____

(e.g., yoga, archery, fishing, bowling, horseshoes, golf, snow-mobiling, easy walking)

Section 4: DEMOGRAPHICS

IMPORTANT: THIS INFORMATION IS STRICTLY FOR THE PURPOSE OF DESCRIBING PEOPLE IN GENERAL AND FOR RECORD KEEPING. THIS INFORMATION WILL BE KEPT PRIVATE.

Age ____

Gender Male ____ Female _____

Below is a list of physical activities that exercisers may engage in. Please select below the **one** category of activity the most describes your physical activities.

Type of Activity	**Describes you**
Running	
Walking	
Cycling	
Swimming	
Gym - weights	
Aerobics	
Sports	
Other	
Cross training (a mixture of some of the above activities)	

Section 5: AFFECT

INSTRUCTIONS: Please think about the situation above, where a busier than usual schedule has led to you being much less active than you normally would be. Please think about how being much less successful at being physically active than usual would make you feel and indicate this using the scale below:

1. Happy about being much less active than usual 1 2 3 4 5 6 7 8 9 **Don't feel at all** **Feel very much**
2. Ashamed about being much less active than usual 1 2 3 4 5 6 7 8 9 **Don't feel at all** **Feel very much**
3. Pleased about being much less active than usual 1 2 3 4 5 6 7 8 9 **Don't feel at all** **Feel very much**
4. Depressed about being much less active than usual 1 2 3 4 5 6 7 8 9 **Don't feel at all** **Feel very much**
5. Guilty about being much less active than usual.

1 2 3 4 5 6 7 8 9 **Don't feel at all** **Feel very much**	
6. Proud about being much less active than usual 1 2 3 4 5 6 7 8 9 **Don't feel at all** **Feel very much**	
7. Upset about being much less active than usual. 1 2 3 4 5 6 7 8 9 **Don't feel at all** **Feel very much**	
8. Disappointed about being much less active than usual. 1 2 3 4 5 6 7 8 9 **Don't feel at all** **Feel very much**	

Section 6: EXERCISE INTENTIONS

INSTRUCTIONS: Please recall the situation described earlier where due to a busier than usual schedule, you have been much less physically active than you usually are.

When you look at your schedule in the next little while, you see that your schedule is going to continue to be busy for about 3 weeks. That is, you will **CONTINUE TO BE MUCH BUSIER THAN YOU USUALLY ARE FOR THE NEXT 3 WEEKS.** Please keep this in mind when answering the remainder of the questions.

Please indicate in the blank space below the **number of days per week** that you would **intend** to exercise at least 30 minutes or more over the next three weeks. Try to be as accurate as possible in your intentions.

1. I would intend to exercise _____ times per week over the course of the next three weeks in the situation described above
2.

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

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

Section 7: SELF-REGULATORY STRATEGIES

INSTRUCTIONS: Recall the situation described earlier where you have been busier than usual for 3 weeks and *will continue to be busier than usual for the next 3 weeks*. With your schedule being far busier than usual, please describe below, some of the specific strategies you would use to try to engage in your intended physical activity. After listing your strategy(ies), please rate the strength of your intention to use that strategy over the next 3 weeks using the provided scale. **Please be specific in describing your strategy(ies).**

NOTE: Describe as many or as few strategies as you think you would really use.

List your strategy here:

Please indicate the strength of your intention to use this strategy over the next 3 weeks

1 2 3 4 5 6 7 8 9

Definitely will not use **Definitely will use**

List your strategy here:

Please indicate the strength of your intention to use this strategy over the next 3 weeks

1 2 3 4 5 6 7 8 9

Definitely will not use **Definitely will use**

List your strategy here:

Please indicate the strength of your intention to use this strategy over the next 3 weeks

1 2 3 4 5 6 7 8 9

Definitely will not use **Definitely will use**

Section 8: SELF-REGULATORY EFFICACY

INSTRUCTIONS: Recall the situation described earlier where you have been busier than usual for 3 weeks and *will continue to be busier than usual for the next 3 weeks*. The following items are about scheduling time for physical activity **in the situation described above** where you will be busier than you usually are over the next 3 weeks**.** Please try to imagine yourself in the described situation and **state honestly** your confidence in carrying out the following (0-100%).

1. How confident are you that you would wake up extra early to get in your intended physical activity before work/school begins.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all confident Completely confident

2. How confident are you that you would find time after work/school in the evening to get in your intended physical activity?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not at all confident Completely confident

3. How confident are you that you would find time in the little bit of free time that you have to get in your intended physically activity?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident Completely confident confident
4. How confident are you that you would make exercise a priority over other time demands outside of your work/school commitments to get in your intended physical activity? **0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%** Not at all confident Completely confident confident
5. How confident are you that you would schedule in time for your intended physical activity and then not let anything interfere with those plans? **0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%** Not at all confident Completely confident confident
6. How confident are you that you can remain flexible and creative in finding opportunities to be physically active in your busy schedule? **0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%** **Not at all confident Completely confident** **confident**
7. How confident are you that you can work physical activity into your daily activities? **0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%** **Not at all confident Completely confident** **confident**

APPENDIX F – Study Two Descriptive Statistics

Variable	Mean	SD
Weekly Frequency of Strenuous Physical Activity	3.39	2.02
Positive Affect	1.83	1.19
Negative Affect	6.50	1.83
Intentions to Exercise (Frequency per week)	3.24	1.55
Strength of Intentions to Exercise	7.37	1.61
Number of Self-Regulatory Strategies for Exercise	2.24	0.78
Strength of Intention to use Strategies for Exercise	7.51	1.32
Self-Regulatory Efficacy	66.08	17.26

Note: Intention and affect; 1-9 scale; Self-Regulatory Efficacy; 0-100% Scale and is expressed as a percent

APPENDIX G – Study 2 Correlation Matrix for Variables Included in Analyses

	1	2	3	4	5	6	7	8
Exercise Identity	-							
Positive Affect	-.234**	-						
Negative Affect	.265**	-.119	-					
Intentions for Frequency	.381**	-.199*	.086	-				
Strength of Intentions for Frequency	.268**	-.177*	.157*	.233**	-			
Self-Regulatory Strategies[a]	.102	-.007	-.073	-.007	-.028	-		
Intention to use Strategies	.324**	-.124	.117	.281**	.378**	-.039	-	
Self-Regulatory Efficacy	.452**	.210**	.081	.433**	.493**	.109	.542**	-
Past Exercise Behaviour	.464*	-.250*	.210**	.500**	.189**	.025	.149	.395**

[a] Self-regulatory strategies expressed in terms of the number of strategies generated

* significant at $p < .05$. ** $p < .01$.

APPENDIX H – Study Three Measures Used in More than One Analysis/Design

Section 1: HEALTHY-EATER IDENTITY

INSTRUCTIONS: PLEASE READ CAREFULLY: Use the scale provided to rate the extent to which each item applies to you.

I consider myself to be a healthy-eater. STRONGLY DISAGREE STRONGLY AGREE 1 2 3 4 5 6 7
When I describe myself to others, I usually mention my efforts to practice healthy eating. STRONGLY DISAGREE STRONGLY AGREE 1 2 3 4 5 6 7
I have numerous goals related to healthy eating. STRONGLY DISAGREE STRONGLY AGREE 1 2 3 4 5 6 7
Being a healthy-eater is a central factor to my self concept STRONGLY DISAGREE STRONGLY AGREE 1 2 3 4 5 6 7
I need to eat a healthy diet to feel good about myself STRONGLY DISAGREE STRONGLY AGREE 1 2 3 4 5 6 7
Others see me as someone who practices healthy eating. STRONGLY DISAGREE STRONGLY AGREE 1 2 3 4 5 6 7
For me, being a healthy eating is something I work on daily. STRONGLY DISAGREE STRONGLY AGREE 1 2 3 4 5 6 7
I would feel a real loss if I were unable to eat healthy on a daily basis (e.g. for financial or access reasons) STRONGLY DISAGREE STRONGLY AGREE 1 2 3 4 5 6 7
Healthy eating is something I think about daily. STRONGLY DISAGREE STRONGLY AGREE 1 2 3 4 5 6 7

Section 2 : NUTRITION KNOWLEDGE

INSTRUCTIONS: Please answer what is being asked and not whether you like or dislike that food!

For example, suppose you are asked "If a person wanted to cut down on fat, which cheese would be best to eat"

cheddar cheese	
camembert	
cream cheese	
cottage chesse	

If you didn't like cottage cheese, but knew it was the right answer, you would still choose cottage chesse

1. Which would be the best choice for a low fat, high fibre snack (choose one).

Diet strawberry yogurt	
raisins	
granola bar	
whole wheat crackers and cheddar cheese	

2. Which would be the best choice for a low fat, high fibre light meal? (choose one).

grilled chicken	
cheese on whole wheat bread	
beans on whole wheat bread	
Quiche	

3. Which kind of sandwich do you think is healthier? (choose one).

two *thick* slices of bread with a *thin* slice of cheddar cheese filling	

two *thin* slices of bread with a *thick* slice of cheddar cheese filling	

4. Many people eat spaghetti Bolognese (pasta with a tomato and meat sauce). Which do you think is healthier? (choose one).

a *large* amount of pasta with a *little* sauce on top	
a *small* amount of pasta with a *lot* of sauce on top	

5. If a person wanted to reduce the amount of fat in their diet, which would be the best choice? (choose one).

steak, grilled	
sausages, grilled	
turkey, grilled	
pork chop, grilled	

6. If a person wanted to reduce the amount of fat in their diet, but didn't want to give up French fries, which one would be the best choice? (choose one)

thick cut French fries	
thin cut French fries	
crinkle cut French fries	

7. If a person felt like something sweet, but was trying to cut down on sugar, which would be the best choice? (choose one).

honey on toast	
a cereal snack bar	
plain digestive biscuit	
Banana with plain yogurt	

8. Which of these would be the healthiest dessert? (choose one).

baked apple	
strawberry yogurt	
whole wheat crackers and cheddar cheese	
carrot cake with cream cheese topping	

9. If a person wanted to reduce the amount of salt in their diet, which would be a good choice? (choose one).

A pre made frozen dinner	
Ham with pineapple	
Mushroom omelette	
Stir fry vegetables with soy sauce	

Section 3: DEMOGRAPHICS

Please provide the following information:

What is your age? _____ What is your gender? M____ F_____

Are you a student Y ____ N____ What is your height? _____

If a student, what is your area of study? _____

If no, list your occupation _____ Are you a vegetarian? Y ___ N___

What is your current weight? _____ Are you a vegan? Y ___ N ___

Section 4: PERCEPTIONS OF HEALTHY EATING

Please use the space below to describe in one or two sentences or phrases what healthy eating means for you. Please be specific and use examples

_____

_____

_____

APPENDIX I: Study Three Measures used in Extreme Healthy-Eater Identity Group Comparisons

Section 1: AFFECT

INSTRUCTIONS: Please think about the situation above, where a busier than usual schedule has led you to **eat much less healthfully** than you usually would. Please think about how being much less successful at eating as healthfully as usual would make you feel and indicate this using the scale below:

a. Happy about my eating over the past week									
	1	2	3	4	5	6	7	8	9
Don't feel at all									**Feel very much**
b. Ashamed about my eating over the past week									
	1	2	3	4	5	6	7	8	9
Don't feel at all									**Feel very much**
c. Pleased about my eating over the past week									
	1	2	3	4	5	6	7	8	9
Don't feel at all									**Feel very much**
d. Depressed about my eating over the past week									
	1	2	3	4	5	6	7	8	9
Don't feel at all									**Feel very much**
e. Guilty about my eating over the past week.									
	1	2	3	4	5	6	7	8	9
Don't feel at all									**Feel very much**
f. Proud of my eating over the past week									
	1	2	3	4	5	6	7	8	9
Don't feel at all									**Feel very much**
g. Upset about my eating over the past week.									
	1	2	3	4	5	6	7	8	9
Don't feel at all									**Feel very much**
h. Disappointed in my eating over the past week.									
	1	2	3	4	5	6	7	8	9
Don't feel at all									**Feel very much**

Section 2: HEALTHY EATING INTENTIONS

When you look at your schedule over the next 3 weeks, you see that your schedule is going to **CONTINUE TO BE MUCH BUSIER THAN YOU USUALLY ARE FOR THE NEXT 3 WEEKS.** Please keep this in mind when answering the remainder of the questions.

INSTRUCTIONS: Please use the scale below to rate the extent to which the statement below would apply to you if you were in the scenario described above.

I would intent to eat a healthy diet on a daily basis over the next 3 weeks.

1 2 3 4 5 6 7

Definitely do not intend intend — Definitely intend

Section 3: SELF-REGULATORY STRATEGIES

INSTRUCTIONS: In the next 3 weeks, with your far busier than usual schedule, please describe below, some of the specific strategies you would use to try to eat a healthy diet (that is, what strategies would you put in place). After listing your strategy(ies), please rate the strength of your intention to use that strategy over the next 3 weeks using the provided scale. **Please be specific in describing your strategy(ies).**

NOTE: Describe as many or as few strategies as you think you would really use.

List your strategy here: Please indicate the strength of your intention to use this strategy over the next 3 weeks **1 2 3 4 5 6 7 8 9** **Definitely will not use** **Definitely will use**
List your strategy here: Please indicate the strength of your intention to use this strategy over the next 3 weeks **1 2 3 4 5 6 7 8 9** **Definitely will not use** **Definitely will use**
List your strategy here: **1 2 3 4 5 6 7 8 9** **Definitely will not use** **Definitely will use**
List your strategy here: **1 2 3 4 5 6 7 8 9**

Definitely will not use	**Definitely will use**

List your strategy here:

1 2 3 4 5 6 7 8 9

Definitely will not use **Definitely will use**

Section 4: SELF-REGULATORY EFFICACY

INSTRUCTIONS: The following questions are about using strategies to ensure that you eat healthfully **in the situation described above** where you will be busier than you usually are over the next 3 weeks**.** Please try to imagine yourself in the described situation and **state honestly** your confidence in carrying out the following (0-100%).

Over the next 3 weeks, how confident are you that you would find time daily to make a healthy lunch to bring with you to work/school? **0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%** Not at all confident Completely confident
Over the next 3 weeks, how confident are you that you will find time to shop for healthy foods for the week? **0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%** Not at all confident Completely confident
Over the next 3 weeks, how confident are you that in your limited free time, you would find time to prepare healthy meals? **0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%** Not at all confident Completely confident
Over the next 3 weeks, how confident are you that you could stay focused on eating healthy even when you are being overwhelmed by the time demands of your work/school? **0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%** Not at all confident Completely confident
Over the next 3 weeks, how confident are you that you would not let the stress of your busy schedule undermine your plans to eat healthy eating? **0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%**

Not at all confident Completely confident
Over the next 3 weeks, how confident are you that you would use the weekends or evenings to prepare healthy meals to eat throughout the week? 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident Completely confident
Over the next 3 weeks, how confident are you that if you are going to eat out, you will choose healthy meals. 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident Completely confident

Section 5: PAST HEALTHY EATING BEHAIVOUR

A. Past Intake of "Healthy" Foods

On an average day over the past week, how many servings of fruits and vegetables did you eat? _____ servings per day. **Here are some examples:** 1 serving = 1 of the following: 1 medium sized piece of fruit or vegetable or equivalent (e.g. 1 apple, half a grapefruit, 1 carrot, 17 grapes) 1 cup of salad ½ glass of fruit or vegetable juice
On an average day over the past week, how many servings of milk products did you eat? _____ servings per day. **Here are some examples:** 1 serving = 1 of the following: 1 cup of milk ¾ cup yogurt 1 slice or 1piece of cheese (about the size of your 3 middle fingers together)
On an average day over the past week, how many servings of *wholegrain* products did you have per day over the past week? _____ servings per day. **Here are some examples:** 1 serving = 1 of the following: 1 wholegrain bagel 1 wholegrain bun 1 wholegrain pita, 1 slice of wholegrain bread 1 cup of wholegrain pasta ¾ cup of hot or cold cereal (e.g. porridge)
On an average day over the past week, how many servings of lean meat and alternatives did you have per day? _____ servings per day.

Here are some examples: 1 serving = 1 of the following: 1-2 eggs 2tbsp of peanut butter

¼ cup of unsalted nuts ½ cup of beans or lentils 1 piece of poultry or fish (size of a deck of cards)

1 piece of lean red meat (e.g. lean ground beef, a lean cut of meat) Canned tuna (size of a large egg)

8 slices of lean luncheon meat (e.g. turkey, chicken Tofu (size of a half bar of soap)

NOTE: fried meats (e.g. chicken nuggets and fingers, wings, bacon and sausages are not considered lean meats).

B. Past Intake of Foods of Low Nutritional Value

INSTRUCTIONS: How often do you eat/drink the following foods?

	At least once a day	at least twice a day	5-6 times a day	2-4 times a week	2-4 times a month	Rarely or Never
Salty Snacks (e.g. chips, salted nuts, Dorittos)						
Fast Food (e.g burgers, fries)						
Pop/Ice Tea and other surgary drinks, alcholol						
Refined Baked goods (e.g. cookies, cakes, and pasteries)						
Candy or chocolate bars						

APPENDIX J – Study Three Measure Unique to Prospective Analysis

Section 1: SELF-EFFICAY FOR HEALTHY EATING

INSTRUCTIONS: Consider your average day over the upcoming 2 weeks when answering the questions below. Please click on the appropriate answer.

On an average day during the next 2 weeks, how confident are you that you will eat 5-10 servings of fruits? **Example of 1 serving: 1 of: medium sized fruit or vegetable, glass of juice, cup of salad** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident — Completely confident
On an average day during the next 2 weeks, how confident are you that you will eat 5-12 servings of whole grain products?? **Example of 1 serving: 1 of: 1 wholegrain bagel, pita, bun or slice of bread, ¾ cup of hot or cold wholegrain cereal, 1 cup of wholegrain pasta** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident — Completely confident
On an average day during the next 2 weeks, you will eat 2-4 servings of milk products on an average day during the next 2 weeks? **Example of 1 serving: 1 of: 1 cup of milk, 2/3 cup of yogurt, 1 slice or 1 piece of cheese (the size of your three middle fingers together** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident — Completely confident
On an average day during the next 2 weeks, how confident are you that you will eat 2-3 servings of lean meat or alternatives? **Example of 1 serving: 1 of: 1 deck of cards sized piece of lean meat, poultry or fish, 8 slices of lean luncheon meat, 1-2 eggs, ½ cup of beans or lentils, 1 piece of tofu that is the size of a ½ a bar of soap** 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident — Completely confident

Section 2: SELF-EFFICACY FOR LIMITING INAKE OF FOODS OF LOW NUTRITIONAL VALUE

On an average day during the next 2 weeks, how confident are you that you will eat a minimal amount (e.g. 0-2 cookies) of refined carbohydrates (e.g. baked goods such as cookies, cakes, and pastries)? 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident Completely confident
On an average day over the next 2 weeks, how confident are you that you will eat a minimal amount (e.g. ¼ bag or less) of junk food (e.g. Dorittos, Chips, Cheezies) on an average day during the next 2 weeks? 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident Completely confident
On an average day over the next 2 weeks, how confident are you that you will eat a minimal amount (e.g. ½ chocolate bar or ¼ cup of candy or less) of sweets? 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident Completely confident
On an average day over the next 2 weeks, how confident are you that you will drink a minimal amount (e.g. 1 drink or less) of high calorie drinks (e.g. Pop, alcoholic beverage, coffee with sugar and cream, ice tea)? 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident Completely confident
On an average day over the next weeks, how confident are you that you will eat a minimal amount of salt (e.g salted chips, nuts)? 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident Completely confident
On an average day over the next 2 weeks, how confident are you that you will eat a minimal amount (1 time per week or less) of fast food (e.g. burgers, fries)? 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not at all confident Completely confident

Section 3: INTENTIONS TO EAT HEALTHY FOODS

INSTRUCTIONS: Please use the scale below to rate the extent to which the statement below applies to you.

On a typical day over the next 2 weeks, I intend to eat 5-10 servings of fruits and vegetables.

Example of 1 serving: 1 of: medium sized fruit or vegetable, glass of juice, cup of salad

1 2 3 4 5 6 7

Definitely will not Definitely will

On a typical day over the next 2 weeks, I intend to eat 5-12 servings of whole grain products (whole grain breads and cereals).

Example of 1 serving: 1 of: 1 wholegrain bagel, pita, bun or slice of bread, ¾ cup of hot or cold wholegrain cereal, 1 cup of wholegrain pasta

1 2 3 4 5 6 7

Definitely will not Definitely will

On an average day over the next 2 weeks, I intend to eat 2-4 servings of milk and milk products.

Example of 1 serving: 1 of: 1 wholegrain bagel, pita, bun or slice of bread, ¾ cup of hot or cold wholegrain cereal, 1 cup of wholegrain pasta

1 2 3 4 5 6 7

Definitely will not Definitely will

On a typical day over the next 2 weeks, I intend to eat 2-3 servings of meat and meat alternatives.

Example of 1 serving: 1 of: 1 deck of cards sized piece of lean meat, poultry or fish, 8 slices of lean luncheon meat, 1-2 eggs, ½ cup of beans or lentils, 1 piece of tofu that is the size of a ½ a bar of soap

1 2 3 4 5 6 7

Definitely will not Definitely will

Section 4: INTENTIONS TO LIMIT INTAKE OF FOODS OF LOW NUTRITIONAL VALUE

On an average day over the next 2 weeks, I intend to minimize the amount (e.g. 0-1) of refined carbohydrates (e.g. baked goods such as cookies, cakes and pastries.

1 2 3 4 5 6 7

Definitely will not						Definitely will
On an average day over the next 2 weeks, I intend to eat a minimal amount (e.g. ¼ bag or less) of junk food (e.g. Dorittos, Chips, Cheezies).						
1	2	3	4	5	6	7
Definitely will not						Definitely will
On an average day over the next 2 weeks, I intend to eat a minimal amount (e.g. ½ chocolate bar or ¼ cup of candy or less) of sweets.						
1	2	3	4	5	6	7
Definitely will not						Definitely will
On an average day over the next 2 weeks, I intend to drink a minimal amount (e.g. 1 drink or less) of high calorie drinks (e.g. Pop, alcoholic beverage, coffee with sugar and cream, ice tea).						
1	2	3	4	5	6	7
Definitely will not						Definitely will
On an average day over the next 2 days, I intend to eat a minimal amount of salt (e.g salted chips, nuts)						
1	2	3	4	5	6	7
Definitely will not						Definitely will
On an average day over the next 2 weeks, I intend to eat a minimal amount (1 time per week or less) of fast food (e.g. burgers, fries)?						
1	2	3	4	5	6	7
Definitely will not						Definitely will

Section 5. PROSPECTIVE HEALTHY EATING BEHAIVOUR

Part A. Past Intake of "Healthy" Foods

On an average day over the past week, how many servings of fruits and vegetables did you eat? _____ servings per day.

Here are some examples: 1 serving = 1 of the following:

1 medium sized piece of fruit or vegetable or equivalent (e.g. 1 apple, half a grapefruit, 1 carrot, 17 grapes)

1 cup of salad ½ glass of fruit or vegetable juice
On an average day over the past week, how many servings of milk products did you eat? _____ servings per day. **Here are some examples:** 1 serving = 1 of the following: 1 cup of milk ¾ cup yogurt 1 slice or 1piece of cheese (about the size of your 3 middle fingers together)
On an average day over the past week, how many servings of *wholegrain* products did you have per day over the past week? _____ servings per day. **Here are some examples:** 1 serving = 1 of the following: 1 wholegrain bagel 1 wholegrain bun 1 wholegrain pita, 1 slice of wholegrain bread 1 cup of wholegrain pasta ¾ cup of hot or cold cereal (e.g. porridge)
On an average day over the past week, how many servings of lean meat and alternatives did you have per day? _____ servings per day. **Here are some examples:** 1 serving = 1 of the following: 1-2 eggs 2tbsp of peanut butter ¼ cup of unsalted nuts ½ cup of beans or lentils 1 piece of poultry or fish (size of a deck of cards) 1 piece of lean red meat (e.g. lean ground beef, a lean cut of meat) Canned tuna (size of a large egg) 8 slices of lean luncheon meat (e.g. turkey, chicken Tofu (size of a half bar of soap) **NOTE:** fried meats (e.g. chicken nuggets and fingers, wings, bacon and sausages are not considered lean meats).

Part B: Past Intake of Foods of Low Nutritional Value

INSTRUCTIONS: How often do you eat/drink the following foods?

	At least once a day	at least twice a day	5-6 times a day	2-4 times a week	2-4 times a month	Rarely or Never
Salty Snacks (e.g. chips, salted nuts, Dorittos)						
Fast Food (e.g burgers, fries)						
Pop/Ice Tea and other						

surgary drinks, alcholol						
Refined Baked goods (e.g. cookies, cakes, and pasteries)						
Candy or chocolate bars						

APPENDIX K – Study Three Measures Unique to Salience Analysis

IDENTITY SALIENCE

INSTRUCTIONS: PLEASE READ CAREFULLY:

People hold many identities or roles. Below is a list of identities or roles that are often part of an individual's sense of who they are. Please read and consider the list of 8 identities below and then rank the identities in terms of order of importance for you. For example, the most important identity to you will be assigned #1 while the least important identity to you will be assigned #8.

Identity/Role	Ranking
ethnic group/nationality	
family/friends	
organization/group	
healthy eating	
politics	
religion	
work/school	
physical activity/exercise	

APPENDIX L – Study Three Descriptive Statistics

Variable	Mean	SD
Past Fruit and Vegetable Daily Consumption	4.46	2.08
Past Consumption of Foods of Low Nutritional Value	2.23	0.61
Positive Affect	2.42	1.52
Negative Affect	6.63	1.89
Self-Regulatory Efficacy	61.04	15.83
Number of Self-Regulatory Strategies for Exercise	2.80	1.20
Strength of Intentions to use Strategies	7.73	1.05
Strength of Intention to Eat Healthfully	5.49	0.96
Nutrition Knowledge	4.11	1.52

Note: Self-regulatory self-efficacy is expressed in percent; affect and intention for strategies: 9-point scale; intention for healthy eating; 7-point scale; nutrition knowledge score out of 9

Note: Past Consumption of Foods of Low Nutritional Value: 1= rarely/never, 2= 2-4 times/month, 3 = 2-4 time/wk, 4 = 1 time/day, 5 = 2 times/day, 6 = 5-6 times/day

APPENDIX M- Study Three Correlation Matrix for Main Variables used in the Comparison of Exercise Identity Groups

	1	2	3	4	5	6	7	8
Healthy-eater Identity	-							
Negative Affect	.428**	-						
Positive Affect	.276**	.431**	-					
Healthy Eating Intentions	.519**	.345**	.196*	-				
Self-Regulatory Efficacy	.339**	.027	-.087	.483**	-			
Number of Self-Regulatory Strategies	.156	.174*	-.004	.153	.118	-		
Intention for Strategies	.417**	.184*	-.161	.496**	.441**	.166*	-	
Nutrition Knowledge	-.020	-.072	-.188*	-.045	.007	.003	.103	-

* significant at $p < .05$. ** $p < .01$.

Appendix N – Study Three Correlation Matrix for Variables used in Regression Predicting Fruit and Vegetable Consumption

	1	2	3	4
Healthy-Eater Identity	-			
Self-Efficacy for Fruit & Vegetable Consumption	.399**	-		
Intentions for Fruit & Vegetable Consumption	.416**	.785**	-	
Nutrition Knowledge	-.020	.040	.092	-
Daily Intake of Fruits & Vegetables	.300**	.560**	.613**	.217*

* significant at $p < .05$; ** $p < .01$

Appendix O – Study Three Variables used in the Regression Analysis Predicting Intake of Foods of Low Nutritional Value

	1	2	3	4
Healthy Eater Identity	-			
Self-Efficacy for Intake of Foods of Low Nutritional Value	.176*	-		
Intentions for Intake of Foods of Low Nutritional Value	.133	.715**	-	
Nutrition Knowledge	-.020	-.002	.125	-
Intake of Foods of Low Nutritional Value	$-.243_{a*}$	$-.564_{a}$ **	$-.588_{a}$**	$-.051_{a}$

Note: * significant at $p < .05$; ** $p < .01$

$_{a}$ Spearman's Rho correlations

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