

THE UNIVERSITY OF CALGARY

Self-schema as a Predictor of Exercise
Participation in Undergraduate Students

by

Paul Estabrooks

A THESIS

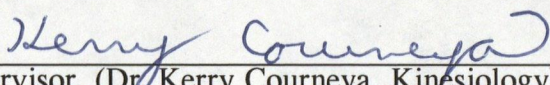
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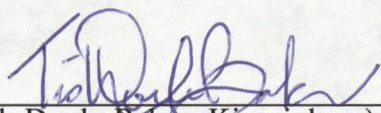
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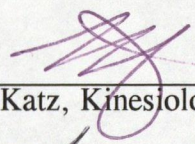
The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Self-schema as a Predictor of Exercise Participation in Undergraduate Students" submitted by Paul Estabrooks in partial fulfilment of the requirements for the degree of Master of Science.



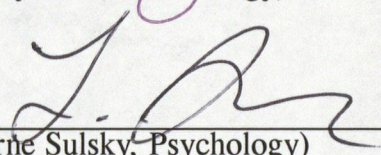
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Date

Abstract

The purpose of the study was to determine if exercise self-schema predicts exercise participation and moderates the exercise intention-behavior relationship. Participants (n=983) were University of Calgary undergraduates. Participants completed one questionnaire that included Kendzierski's (1988) self-schema measure, intention items for moderate and strenuous exercise, and exercise at university facilities. Questionnaire two, given after four weeks of monitoring exercise at university facilities, included exercise behavior items. Categorization resulted in 527 exerciser self-schematics, 106 aschematics, 52 nonexerciser self-schematics, and 298 unclassified participants. Kruskal-Wallis tests determined exercisers reported intending to and exercising more often than aschematics and nonexercisers for all measures ($p < .01$). Fischer Z transformations revealed exercise self-schema did moderate between exercise intention and exercise, however only partially supporting the hypothesis that exercisers would have higher correlations than aschematics or nonexercisers. Discussion focused on overcoming schematic assessment problems, offered explanation of results, and proposed future exercise self-schema research to be done.

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Dedication

For Lisa Anderson.

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Chapter One

Introduction

Health Benefits of Exercise

Health care professionals are continually battling to find treatments and preventions for the many poor health conditions which reduce the quality of life of those individuals affected by them. Secondly, the cost of treating these conditions continues to rise, with 910 billion dollars being spent on health care in the United States alone in 1993 (Vincenzino, 1995). Exercise is deemed as a positive behavior which may be related to reductions in physiological and psychological health conditions which negatively effect the individuals who they afflict (Bouchard, Sheppard, & Stephens, 1993). Regular exercise has been linked to a decrease in medical care usage and costs (Kaman & Patton, 1994), and has also been shown to be a positive preventive measure to many painful and often debilitating conditions, making it both cost effective and more importantly beneficial to the quality of life and well being of the general public (Bouchard, et al., 1993). Hence, the promotion of regular exercise has become an important priority for public health interventions.

The health benefits which may be acquired due to regular exercise can be divided into two categories, physiological and psychological. Physiological benefits of exercise include: reductions in, coronary heart disease, hypertension, and obesity (Bouchard et al., 1993). Exercise has been used successfully in diabetes treatment (Young, 1995) and has been shown to increased bone mass later in life (Bailey & Martin, 1994). Other physiological benefits of exercise include: protection against infectious disease, cancer (Rhind, Shek, Shinkai, & Shepard, 1994), and mortality, (Powell & Blair, 1994), and prevention of cardiovascular disease (Powell, Thompson, Caspersen, & Kendrick, 1987).

There are also a number of psychological benefits of exercise such as improvement in tension, anger, vigor, and confusion (Berger, Owen, & Mann, 1993).

Exercise has been associated with lower depression levels (Martinsen, 1990; McMahon, 1990; Stein & Motta, 1992) and improved self esteem (Sonstroem, 1988; McMahon, 1990). Exercise has also a positive effect on life stress (Brown & Siegel, 1988), enhances self concept (Stein & Motta, 1992), and reduces anxiety (Crocker & Grozelle, 1991; Petruzzello, Landers, Hatfield, Kubitz, & Salazar, 1991). Finally exercise has been related to improved quality of life for those individuals who engage in it (Powell & Blair, 1994).

Motivation Problems in Exercise

Although there are many benefits associated with regular exercise problems with initiation and maintenance persist (Stephens & Caspersen, 1993; Dishman, 1988). Stephens and Caspersen (1993) looked at the exercise rates in a number of western nations, including Canada, and found that only 10% of all adult Canadians were physically active. Physically active was defined as vigorous activities during the leisure time averaging three bouts per week at an average of 20 to 30 minutes or more per bout. Stephens and Caspersen (1993) also found that only 30% of all Canadian adults could be classified as moderately active. Moderately active was defined as less vigorous or frequent than physically active. As the older adult population in Canada is increasing in proportion within the general populace, Lee (1993) gave cause for additional concern when it was determined that the previous activity rates may decrease with age.

Dishman (1988) found that in addition to low participation rates, drop out rates of those who did initiate an exercise program were high. He found that 50% of all those individuals who begin an exercise program will drop out within the first six months. This finding seems to be consistent regardless of the demographic profile of the sample or the purpose of the exercise. Results have been similar for children, college students, middle aged, and elderly persons; and in primary prevention, secondary prevention, and worksite settings (Robison & Rogers, 1994).

Model Rationale:

It is important to determine methods that will encourage participation in exercise behavior so that the many benefits may be realized on a larger scale. However, before a health professional can intervene in order to increase an individual's exercise behavior, it is first important to understand this behavior. Understanding exercise behavior comes from one's ability to recognize determinants of exercise behavior (Dishman, 1994). Many researchers have dedicated time in an attempt to identify the determinants related to exercise behavior (Dishman, 1988; Dishman, Sallis, & Orenstein, 1985; Martin & Dubbert, 1982). Once the determinants of exercise behavior have been identified, prediction and explanation of the behavior are possible (Dishman, 1994).

One determinant of interest is the self and its role in determining one's exercise behavior (Sonstroem, 1988). The self has many dimensions which influence a wide range of behaviors (Carver & Scheier, 1985). Research on self motivation, self esteem, and self efficacy have suggested that the self has an important role in the exercise domain (Ward & Morgan, 1984; Sonstroem, 1988; Sallis, Haskell, Fortmann, Vranizan, Taylor, & Solomon, 1986). However, there remain unknown areas in the self literature, the role of one's self schema in exercise behavior has yet to be determined (Kendzierski, 1990). Self schemas are cognitive generalizations about the self, derived from past experience, that organize and guide the processing of self related information contained in the individual's social experiences (Markus, 1977). The self schema therefore combines an individual's self with a cognitive perspective, possibly allowing it to guide one's behavior (Kendzierski, 1990). Preliminary studies (Kendzierski, 1988; 1990) have been conducted which validate the existence of an exerciser self-schema (individuals who consider themselves as exercisers), nonexerciser self-schema (individuals who consider themselves as nonexercisers), and aschematic (individuals who consider themselves as neither an exerciser or nonexerciser).

The first study that utilized self-schema theory in predicting exercise behavior was done by Kendzierski (1988). This study examined whether exerciser self-schematics, nonexerciser self-schematics, and aschematics differed in their self reported exercise behavior as well as if there were any differences in their thoughts and feelings about exercising. The results of this study were quite promising as it was determined that exerciser self-schematics reported exercising more often than the other two groups. It was also determined that exerciser self-schematics did more activities for exercise and were more interested in and committed to exercising in the future. Kendzierski (1988) concluded that this study provided support for the idea that self-schemas not only affect the processing of information but also serve to guide and direct behavior.

Kendzierski (1990) next presented two studies which further explored the relationship between self-schema and exercise behavior. The aim of the first study was to replicate the findings regarding self-schema and its relationship to cognitive processing. In self-schema research in other behavioral domains it was determined that individuals who were schematic in a particular domain were able to endorse more domain specific words or phrases as self descriptive, take less time to make schema consistent judgments, recall more past specific behavioral evidence of schema related past behavior, and predict that they would be more likely to engage in similar behavior in the future. These findings were replicated in the exercise domain. From this study Kendzierski concluded that exerciser self-schematics, nonexerciser self-schematics, and aschematics exist in the same form as self-schematics in other domains.

In study two Kendzierski (1990) used a prospective design to determine the relationship between exercise self-schema status and subsequent exercise behavior in the form of exercise program adoption. The results revealed that exerciser self-schematics were more likely to report that they had adopted an exercise program than individuals without such a self-schema. Kendzierski concluded that although exerciser self-schematics reported initiating an exercise program, the extent to which they

adhered to their program is unknown, as is whether the program they had undertaken was vigorous enough to be of physiological benefit.

Following the initial two studies in exercise self-schema Kendzierski (1994) concluded that schema in the exercise domain existed and that the status of one's exercise self-schema was associated with exercise behavior. However, she concluded further that the question of how an individual's self-schema guided his/her exercise behavior, was still unanswered. Kendzierski (1994) then proposed a further construct to the self-schema theory, intention. The question she asked was, is an individual's schematic status in the exercise domain a moderator of the relationship between exercise intention and exercise behavior?

A study which investigated the relationship between exercise self-schema status, exercise intention, and exercise behavior was designed by Kendzierski (1991). The study resulted in the exerciser self-schematics showing a correlation of relatively low magnitude between intention and behavior and a lack of correlation for nonexerciser self-schematics. In regard to the first point, the modest yet significant correlation of the exerciser self-schematic's intention and behavior may have resulted from the violation of a number of conditions necessary for intention to predict behavior. It was concluded that the lack of correlation for the nonexerciser self-schematics may have been the result of two different subgroups of nonexerciser self-schematics. It was predicted that exerciser self schematics should be motivated to engage in exercise behaviors as a method of verifying their self image as exercisers. It was further predicted that aschematics would not be similarly motivated as they had no self image in the exercise domain to verify. However, Wurf and Markus (1983) have suggested that there may be two subgroups of nonexerciser self schematics, positive and negative. A positive nonexerciser self-schematic would be defined as perceiving themselves to possess a positive attribute, which would be the attribute of 'not exercising'. A negative nonexerciser self-schematic would be defined as perceiving themselves to

possess a negative attribute, which is also 'not exercising'. From this Kendzierski (1991) concluded that if there are two subgroups, one (negative nonexerciser schematics) would not be motivated to act in accordance with the nonexerciser self image, thereby leading to a lack of intention behavior consistency for the whole group of nonexerciser schematics.

As self-schemata are described as a combination of the self and cognitive processes which may direct behavior (Kendzierski, 1990), the next step taken in the exercise domain was to determine if the intentions to exercise of exerciser self-schematics were more accessible than those of aschematics (Kendzierski & Shannon, 1992). Results showed that this was indeed the case as the exerciser self-schematics responded more quickly to schema related intentions than did the aschematics. It was concluded that exerciser self-schematics had an advantage in processing schema relevant information (Kendzierski & Shannon, 1992).

Problem Statement

Although the previous findings were encouraging they also suggested a need for future research due to their common limitations. Of the three studies which document the self-schema behavior link in the exercise domain (Kendzierski, 1988; Kendzierski, 1990; Kendzierski, 1991), all relied on self report behavioral data which is not as strong as an objective measure of exercise (Dishman, 1994). One of the studies used a concurrent measure of self-schema status and exercise behavior, leaving one unsure as to the causal nature of self-schema status (Kendzierski, 1988). One study deals with only adoption of a poorly described exercise program, again leaving the reader unsure of the important link between self-schema status and exercise adherence. At least two of the studies used only an extreme group of exerciser self-schematics, possibly losing valuable information about his groups exercise (Kendzierski, 1988; 1990). Finally, Kendzierski (1991), when trying to establish a self-schema, exercise intention, exercise behavior link, violated the conditions necessary for intention to predict behavior.

Each of these three studies acknowledged these limitations and along with Kendzierski (1994) offered advice for future research. One common area of improvement that was suggested in each of the papers was to improve upon the use of self report measures of exercise by using an objective measure of exercise. It was also a common suggestion to increase the length of behavioral data collection beyond the common week long self report measure used. Larger samples of participants was suggested. Finally, Kendzierski (1991), suggests a replication of her study of the self schema status, intention, and behavior link. This replication should respect the conditions set aside by Ajzen (1985) as necessary for intention to predict behavior: 1) Intention and behavior must be measured at corresponding levels of specificity, 2) intentions should not change between the time of their measurement and the time of the behavior measure, and 3) the behavior must be under volitional control.

A further area of future research which was inferred by Kendzierski (1994) was the determination of the existence of positive and negative nonexerciser self-schemas. She suggested that there may be two types of nonexerciser schematics, "the proud couch potato" and the individuals who perceive themselves as either not possessing a positive attribute or possessing a negative one. It was suggested that a negative self-schema may be a marker for change, therefore determining if an individual has a negative nonexerciser schema could aid in developing interventions aimed at changing the self-schema of these individuals.

The purpose of the present study was threefold. First, to determine if exercise self-schema was related to both a self-report and an objective measure of exercise behavior. Second, to determine if exercise self-schema moderated the exercise intention - exercise behavior relationship. Third, to determine if nonexerciser self-schematics could be divided into positive and negative schemas. Based on previous research it was hypothesized that exerciser self-schematics would intend to and exercise more often than aschematics or nonexerciser self-schematics. It was further

hypothesized that exerciser self-schematics would have higher correlations between exercise intention and behavior than aschematics and nonexerciser schematics.

Kendzierski (1991) speculated that because of possible division within the nonexerciser self-schematic group, no correlation would be found between intention to exercise and exercise behavior. It was hypothesized that there would be a division in the nonexerciser schematics along the continuum of positive and negative. The final hypothesis was that those individuals with negative nonexerciser self-schemas would be more likely to intend to exercise and begin to exercise than those with positive nonexerciser self-schemas.

Chapter Two

Review of Literature

Introductory Comments

A CD-rom search was conducted to discover any research in the area of self schema and exercise behavior. As the self schema theory is relatively new in the exercise behavior domain only three papers were found. A manual search of these papers uncovered two unpublished studies and a number of background articles which described the generic self schema theory. Therefore, the review will begin with a theoretical overview, followed by the original work in the area of self schema, and progress to the studies which have been done in the exercise domain.

Theoretical Overview

Self schemata are knowledge structures developed to understand, integrate, or explain one's behavior in a particular domain (Markus, Crane, Bernstein, & Siladi, 1982). Self schemata include cognitive representations derived from specific events and situations involving the individual as well as more general representations derived from an individual's, and those around him/her, repeated categorization and subsequent evaluation of his/her own behavior (Markus, 1977). Self schema are constructed from information processed by the individual in the past and influence both the input and output of information related to the self (Markus, 1977). Once the self schema has been established in a particular behavioral dimension it becomes a mechanism by which the individual determines which information is attended to, how it is structured, how important it is, and what happens to it subsequently (Markus, 1977). Through this process the self schema becomes increasingly resistant to inconsistent or contradictory information, however the self schema is never completely invulnerable to contradictory information, and is therefore not invulnerable to change (Markus, 1977).

Self schema can be viewed as a reflection of the invariance people have discovered in their own social behavior (Markus, 1977). They are thought to represent

patterns of behavior and allow an individual to make inferences from scant information or to quickly streamline and interpret complex sequences of events. Self schemata are more than a depository of past information, they serve an important processing function and allow the individual to go beyond the information currently available. The result of the self schema organization is that it is a discernible pattern which may be used as a basis for future judgments, decisions, inferences, or predictions about the self (Markus, 1977).

Markus (1977) gave operational definitions of schematic and aschematic individuals. Individuals are considered schematic in regard to a particular attribute when they consider that attribute to be extremely self descriptive (or extremely nondescriptive) and they consider that attribute extremely important to their self image. Aschematic individuals in a particular domain consider the attribute only moderately descriptive (or nondescriptive) and they do not consider that attribute to be important to their self image.

Empirical Review

The first step in determining the existence of self schemata was undertaken by Markus (1977). An initial questionnaire was issued to categorize 101 female students in introductory psychology classes at a large university into three separate groups. The questionnaire consisted of the Gough-Heilbrun Adjective Check List and several semantic differential scales describing a variety of behavioral domains. The participants were also asked to rate the importance of each semantic dimension to their self description. Sixteen participants were assigned to each of the three groups labeled as independents, dependents, or aschematics. Independents were individuals who rated themselves at the between 8-11 points (on an 11 point scale) on at least two of the following three semantic differential scales, independent-dependent, individualist-conformist, and leader-follower, and who rated these dimensions as important (8-11, on an 11 point scale). Dependents were individuals who rated themselves at the opposite

end of the scale (1-4) on at least two of the three semantic differential scales and rated these dimensions as important (8-11). Finally, aschematics were individuals who rated themselves in the middle range (5-7 points) on at least two of the three semantic differential scales, fell in the lower portion of the distribution on the importance scale, and did not check themselves as either "independent" or "dependent" on the adjective check list. The first of two studies following the initial questionnaire done by Markus was interested in the impact of self schemata on the selection and processing of information about the self. Using the 48 female students Markus utilized a laboratory session which consisted of three separate cognitive tasks designed to assess the influence of self schemata about independence on the processing of information regarding the self. The three tasks were, content and latency of self-description, supplying behavioral evidence for self description, and predicting the likelihood of the behavior. The results of the first task showed that the dependents judged significantly more dependent words as self descriptive than did the independents, and conversely the independents judged significantly more independent words as self-descriptive than did dependents. Dependents were reliably faster at making "me" judgments for dependent words than independent words, congruently independents were reliably faster at making "me" judgments for independent words than for dependent ones. The aschematics did not differ in response latency for independent or dependent words. In task two the dependents gave significantly more behavioral examples for dependent words than did the Independents or aschematics, a similar pattern for independents was also significant, in both cases the aschematics fell in between the other two groups' scores. In task three the dependents assigned significantly higher likelihood to dependent behaviors than to independent behaviors. In contrast, the independents assigned significantly higher likelihood to independent behaviors than to dependent ones. The aschematics showed no difference between predicted likelihood of dependent and independent behaviors. From this study it was concluded that the consistent pattern of responses for

the independents and dependents across the diverse tasks argues for the existence of a prevailing self schema which facilitates the processing of social information.

Forty seven of the 48 participants from Markus' (1977) first experiment participated in the second experiment. The second study focuses on how self schemata may produce differences in the selection and interpretation of information about the self. Using a correlational design the subjects were given a fictitious test of suggestibility. Following the test the independent participants were given information which stated that they were not independent but rather very suggestible and good followers. The dependents were given information which suggested that they were independent and not at all suggestible. The aschematics were assigned randomly to one condition or the other. Following this procedure the participants filled out a brief questionnaire regarding their acceptance of the incongruent information and again performed task one of the initial study. The results of the acceptance questionnaire showed that individuals with schemata were less willing to accept the incongruent information which was given to them than the aschematics as self descriptive. The results of task one at time two were similar in pattern to time one. However, the latency times for the dependent and independent schematics increased from time one to time two, a change which was not found in the aschematics. The investigator concludes that the longer latencies were a result of the subject dealing with the inconsistent information that they were previously given.

From these two studies Markus (1977) made the following conclusions: 1) that self schemata do indeed facilitate the processing of information regarding the self, including judgments and decisions about the self, 2) self schemata contain easily retrievable behavioral evidence, 3) self schemata provide a basis for confident self prediction about behavior in the schemata related dimensions, and 4) make individuals resistant to information that is not consistent with their schemata. Markus (1977) also stated that future research should include the area of behavior prediction, because

differences in individuals self schemata may predict differential behavior.

Following Markus' (1977) original work in the area of self schemata using independence as the domain of interest, self schemata were substantiated in a number of other domains. The diversity of these domains include body weight, gender roles, creativity, Type A and Type B behavior patterns, clothing, and dieting (Markus, Hamill, & Sentis, 1987; Markus, Crane, Bernstein, & Siladi, 1982; Markus & Smith, 1981; Strube et al., 1986; Pines & Kuczkowski, 1987; Parisi & Kendzierski, 1991). Kendzierski (1988) first introduced the self-schema theory to the health domain in the area of exercise.

Using 220 undergraduate psychology students, Kendzierski (1988), undertook an exploratory correlational design to examine the relationship between self-schemata and action in the domain of exercise behavior. Kendzierski (1988) first developed an exercise self schema measure to identify exerciser schematics, aschematics, and nonexerciser schematics, using the methodology devised by Markus (1977). The exercise self schema measure asked participants to indicate on 11 point scales if each of three key phrases described them. The three key phrases were: "someone who exercises regularly", "someone who keeps in shape", and "physically active". These three phrases were presented with a number of other filler items such as, "friendly" and "spontaneous". The 11 point scales ranged from 1 (does not describe me) to 11 (describes me), participants also indicated on 11 point scales (1 represented not important at all, 11 represented very important) the importance of each key phrase was to the image they had of themselves, whether or not the phrase described them. Categorization of the participants into exerciser schematics, nonexerciser schematics, and aschematics was done based on the scores for the three key items on the questionnaire, again using the methodology of Markus (1977). A second questionnaire was also administered to the participants. This questionnaire included items to determine the individuals' exercise patterns, interest, commitment, and strategies to

exercise when they did not feel like exercising.

Of the 220 participants, 116 were classified as exerciser schematics, 14 as non exerciser schematics, and 19 as aschematics, the remaining 71 did not meet the criteria for inclusion in any of the three groups. Due to the large difference in sample size of the three groups a subset of 20 exerciser schematics was selected for inclusion in the analyses. The results showed that exerciser schematics exercised more often, performed a wider variety of exercise activities, and were more likely to report having exercised at least three times a week on average than aschematics or non exerciser schematics. Kendzierski concluded from these results the idea that self schemata serve to guide and direct behavior as well as affecting the processing of information about oneself and others was supported.

Kendzierski (1990) completed two studies, both of correlational design, the first replicated Markus' (1977) protocol in the exercise behavior domain. Sixty six undergraduate students participated in the first study. The purpose of this study was to determine if results of the tasks for previous standard self schemata domains could be replicated in the domain of exercise, thereby supporting the exercise self schema measure's construct validity. The study involved filling out Kendzierski's (1988) exercise self schema measure, this was followed by the three tasks designed by Markus (1977) that were discussed earlier in the review, including, content and latency of self description, behavioral evidence, and prediction of future behavior.

The results were similar to standard self schema findings. Individuals with exerciser self schema endorsed more words and phrases as self descriptive than words or phrases related to not exercising. These participants were faster at responding with schema consistent judgments and recalled more specific occurrences of past exercise behavior and fewer of nonexercise behavior. Finally, exerciser schematics predicted that they were more likely engage in pro exercise type of behavior. The author concludes that these results suggest that participants identified as being schematic in the

exercise domain process exercise related information in the same way that individuals identified as being schematic in other domains, hence these findings provide evidence of the exercise self schema measure's construct validity.

Kendzierski (1990) then proposed a study to determine whether participants with an exerciser self schema were more likely to start an exercise program than aschematic or nonexerciser schematic participants. Ninety five undergraduate students who had filled out questionnaires in the initial study and had reported that they had not yet begun an exercise program participated. Forty three students were categorized as exerciser schematics, 22 as aschematics, and 30 as nonexerciser schematics. The participants were contacted by mail in the 11th or 12th week of the semester. Each was asked to fill out an exercise behavior survey that assessed whether or not the individual had initiated an exercise program. There were a large number of participants (19.7% overall) who reported having an illness or injury which prevented them from initiating a program, therefore, two analyses were conducted, one excluding the injured or ill participants, and one including all participants. The results were similar from each analysis, a larger ratio of exerciser schematics initiated a program than did the aschematics or nonexerciser schematics, the latter two did not differ significantly. The researcher concluded that this study provided initial evidence that exercise self schema status is associated with exercise behavior.

Following the initial two studies in exercise self schemata Kendzierski (1994) concluded that schema in the exercise domain existed and that the status of one's exercise self schema was associated with exercise behavior. In order to answer the question of how an individual's self schema guided his/her exercise behavior Kendzierski (1994) then proposed a further construct to the self schema theory, intention. The question she asked was, is an individual's schematic status in the exercise domain a moderator of intention? Before reviewing Kendzierski's study in this regard it is important to review the exercise intention and exercise behavior link.

Godin (1993) reviewed published studies that applied the theory of reasoned action and the theory of planned behavior to the prediction of exercise intentions and behavior. In the realm of reasoned action research 12 studies were reviewed that reported the contribution of intention to predict behavior. Godin (1993) calculated an average of .54 to represent the strength of correlation between exercise intentions and exercise behavior. This association was found to be statistically significant in each of the 12 studies. This significance remained in eight of the same studies when other variables were added to the model being tested. Godin (1993) concluded that intention is an important variable in predicting exercise behavior.

Kendzierski (1994) suggested that having an exerciser self schema provides motivation to follow through on exercise intentions. The basic model that was proposed was that both favorable intentions to exercise as well as the necessary motivation to act upon those intentions was required to result in exercise behavior. This was based on the assumption that exerciser self schematics have favorable intentions to exercise. This assumption was supported by Kendzierski's (1988) study that found that exerciser schematics reported being both interested and committed to exercising regularly during the semester. The motivation necessary in this model was described as the schematic's need for self verification (Kendzierski, 1994). It was predicted that exerciser self schematics should be motivated to engage in exercise behaviors as a method of verifying their self image as exercisers. It was further predicted that aschematics would not be similarly motivated as they had no self image in the exercise domain to verify. It would then follow that the non exerciser self schematic would be motivated to not exercise, however, Wurf and Markus (1983) have suggested that there may be two sub groups of nonexerciser self schematics, positive and negative. Wurf (1987) further suggested that a negative self schema may be a marker of anticipated change.

As an initial test of this model, the contribution of self schema to the correlation

between exercise intention and exercise behavior was tested. Kendzierski (1991) implemented a correlation design using 438 undergraduates (exerciser self-schematics $n=333$, aschematics $n=54$, nonexerciser schematics $n=51$) enrolled in a general psychology course. At the beginning of the semester participants completed a questionnaire which included the self schema measure and five semantic differential scales used to measure subjects intentions about exercising regularly that semester. During the 11th or 12th week of the semester participants completed a second questionnaire which had the participants specify the number of days on which they had exercised in the last week and fill out the Stanford 7-Day recall of physical activity. The results showed that there was a significant correlation between the exerciser schematics exercise intentions and self reported exercise behavior ($r=.31$). Significant correlations were not found for the nonexerciser schematics ($r=.01$) or aschematics ($r=.02$), however their correlations differed significantly from the exerciser schematic's. The similar pattern was found for the Stanford 7-Day recall measure, exerciser self-schematics correlation was .21, nonexerciser self-schematic's correlation was .11, and the aschematics had a correlation of .09, however these correlations did not differ significantly from one another. The author concluded that the moderate magnitude of the correlation between exercise behavior and intention may be due to violations of the three conditions necessary to allow intention to predict behavior. Kendzierski used differing levels of measurement for the intention and behavior variables, intentions may have changed from the beginning of the semester and the end of the semester, and final examinations may have made the behavior beyond volitional control. The final conclusion was made that once these violations were taken into consideration the moderate magnitude of the correlations seemed reasonable, however a replication study under optimal conditions was suggested (Kendzierski, 1991).

Rather than doing a replication study Kendzierski and Shannon (1992) were interested in the moderating factor exercise self schema status may have on intention.

The purpose of this study was to test the hypothesis that the intentions of schematics would be more accessible than those of aschematics. Using a correlational design and 95 undergraduates identified as either exerciser schematic or aschematic by a screening study using the exercise self schema measure. Using a protocol similar to previous latency tasks participants viewed on a computer monitor a series of 30 statements regarding intentions to everyday activities. The first six statements were used as practice stimuli, the remaining 24 were given in random order and included 4 that referred to exercise intentions, the final 20 items followed the same structure using everyday nonexercise activities. By depressing either a yes or no key the participants were instructed to respond to each statement. The participant's reaction times were then recorded. It was found that the exerciser schematics responded significantly faster to the exercise items than did the aschematics, but did not differ significantly on the other items used in the test. It was concluded that the faster judgments shown by the exerciser schematics was consistent with previous research showing an advantage in processing schema relevant information.

The findings of this review of literature may be summarized in the following way: 1) self schemata do exist in a number of different dimensions, one of which is exercise, 2) self schema status has been associated with self reported exercise behavior, 3) intention is an important determinant of exercise behavior, and 4) exercise schema status may be correlated to the retrievability of exercise intentions, thereby being a moderator between the exercise intentions and exercise behavior.

Chapter Three

Methods

Participants:

The sample size was chosen based on two factors; first, a sample size calculation was done to determine the number of participants necessary for the smallest subgroup identified for analysis (negative nonexerciser self-schematics). This calculation determined that 49 participants would be necessary to detect a correlation of .35 with a power of .80 at an alpha of .05 (one tailed). The second process involved in determining the number of questionnaires to collect was to determine the average number of nonexerciser self-schematics which were found in previous research. The percentage of nonexerciser self-schematics who responded in previous research was between eight and ten percent.

An initial questionnaire was presented to 1627 undergraduate students in introductory biology, sociology, and psychology classes. The participants did not know that the researcher was from the faculty of kinesiology. One thousand three hundred and ninety seven University of Calgary undergraduate students volunteered to participate in the study resulting in an initial response rate of 86%. At four weeks follow-up 983 of the original participants completed the second questionnaire, resulting in a 60% return overall return rate. A comparison across the independent and dependent variables was done between those participants who completed both the first and second questionnaires and those who completed only the first questionnaire. A MANOVA was used for the comparison and found that there were no differences between the two groups across all questionnaire variables (Table 1). Chi square analysis were also done to determine if there were differences between these two groups in terms of gender and schema, again it was found that those who completed both questionnaires when compared to those who completed only the first

questionnaire, did not differ on either of these variables.

Insert Table 1 About Here

Of the 983 participants, 298 were not able to be classified into one of the three groups, exerciser self-schematics, aschematics, or nonexerciser self-schematics. The final number of participants included in the analysis of the self-report exercise data was 685. Finally, for the objective measure of exercise analysis, using those participants who rated the university facilities as their most likely exercise location, 358 participants were used.

Females made up 64.4 % of the participants. Mean age of the participants was 18.9 years with a standard deviation of 3 years with 86.6 percent of the participants in their first year of university. Seventy-eight percent of the participants were in general studies, 7 percent were in sciences, 6 percent were in kinesiology, 4 percent were in nursing, and the remainder were enrolled across the disciplines of social sciences, engineering, education and the arts. Table 1 gives a complete view of the participants involved in the study.

Insert Table 2 About Here

Instruments:

The participants were administered two questionnaires that contained five different sections. These sections included demographic data, exercise self-schema status, intention to exercise for the next four weeks, location of exercise, and exercise behavior.

Demographic Questionnaire. The items included on this questionnaire were the participants age, sex, student identification number, name, telephone number, faculty,

and year in university.

Exercise Self-Schema Questionnaire. This instrument had been used in prior exercise self-schema research providing similar results in exercise as had been found in self-schema research in other domains. The tool was a modified version of Markus' (1977) self-schema measure (Kendzierski, 1988). This measure required that participants indicated on an 11 point scale if each of three key phrases described them. The key phrases which were used are "exercises regularly", "keeps in shape", and "physically active". These items were included with 12 filler items to disguise the purpose of the study. Each scale ranged from 1, does not describe me, to 11, describes me. For each of the items participants also indicated on 11 point scales how important each item was "to the image you have of yourself, regardless of whether or not the trait describes you." Each of these scales ranged from 1, not at all important, to 11, very important. A third 11 point scale was added to Kendzierski's measure, for each item the participants were asked to indicate, "Regardless of whether or not the trait describes you, use the following scale to rate the trait." These scales ranged from 1, negative, to 11, positive. This addition was made to Kendzierski's measure in order to determine the existence of positive or negative self-schemas.

Participants were classified into four groups on the basis of their responses on the three descriptive and three importance scales pertaining to exercise on the Exercise Self Schema Questionnaire: (1) those who were schematic for exercising (exerciser self-schematics), (2) those who were schematic for not exercising (nonexerciser self-schematics), (3) those who were aschematic in the exercise domain (aschematics), and (4) those who did not qualify for inclusion in any of the previous three groups (Kendzierski, 1988). A participant was classified as an exerciser self-schematic if he or she rated at least two of the three exercise descriptors as extremely self descriptive (points 8-11) and rated at least two of the three exercise descriptors as attributes that were extremely important (points 8-11) to his or her self image. A participant was

classified as a nonexerciser self-schematic if he or she rated at least two of the three exercise descriptors as extremely nondescriptive (points 1-4) and rated at least two of the three exercise descriptors as attributes that were extremely important (points 8-11) to his or her self image. Finally, a participant was classified as aschematic if he or she rated at least two of the three exercise descriptors in the middle range (points 5-7) and rated at least two of the three exercise descriptors as attributes that were not extremely important to his or her self image. Those participants who did not fall into the specified range for one of the previous three groups were unclassified.

For nonexerciser self-schematics participants were considered to have a positive nonexerciser self-schema if they rated the three descriptors as negative attributes. Hence a participant would be considered a positive nonexerciser self schematic if their combined score on the three attributes was between 3 and 17. A participant was considered a negative nonexerciser self-schematic if they rated the three descriptors as positive attributes. A positive rating was given to participants who scored between 18 and 33 by combining their ratings of the three attributes. Table 1 outlines the classification of participants (Kendzierski, 1988).

Insert Table 3 About Here

Kendzierski (1988; 1990; 1994) gave no figures regarding reliability or validity of this questionnaire, however she contended that by replicating the findings of self-schema research in other domains, her measure showed strong construct validity. The measure was established using the words of 'describes me' or 'does not describe me' and 'important to my self image' or 'not important at all to my self image' giving it strong face validity due to the fact that self-schema theory is based upon the self descriptive nature of a particular domain as well as the importance of that domain to the individual.

Exercise Intention. When measuring intention and repeated behaviors such as exercise Courneya (1994) advised using a continuous open or continuous closed style instrument. Therefore a continuous open scale was used to measure both the participant's intention to exercise as well as their self reported exercise behavior. Two levels of exercise were specified for intention, moderate and vigorous, as defined by the "Godin Leisure Time Exercise Questionnaire" (Godin & Shepard, 1985). The continuous open scales that were used in this study to determine intention stated, "I intend to engage in strenuous (moderate) exercise ____ times during the next four weeks." Intention to participate in the objective exercise behavior was determined using the following continuous open scale, "I intend to exercise at the University fitness facilities _____ times during the next four weeks". These statements were included with a number of filler items referring to the participant's intention to engage in behaviors such as studying, drinking, and going to church.

Exercise Behavior. Exercise behavior was measured using both a subjective and an objective measure of exercise. The subjective measure of exercise behavior used was a continuous open scale similar to that used for intention (Courneya, 1994). This item stated, "I engaged in strenuous (moderate) exercise _____ times in the past four weeks." This statement was included with a number of filler items referring to things such as studying, drinking, and going to church.

The objective measure of exercise behavior was attendance at the University of Calgary Campus Recreation facilities. It was assumed that students at the University of Calgary would choose to use the Campus recreation facilities at the university for their exercise facility. This assumption was made because each undergraduate student at the University of Calgary was obligated to pay a fee for the use of the facilities, students had no option to opt out of this payment.

Although it was assumed that the students would exercise at the Campus Recreation facilities, as a validity check an item was added to assess the participants

preferred place of exercise. The item was worded in this way: "If you were to exercise, what location would you most likely use: Outdoors _____ At the university fitness facilities _____, at a private club _____, at a sports complex , or at home _____." This item was included with a number of filler items referring to studying, drinking, and going to church. Only students checking 'at the university facilities' were used in the analysis of the objective data. For the duration of the study the attendance of the participants at the University Fitness Facility was monitored using the University of Calgary Campus Recreation CICS mainframe computer system.

Although ethical approval was given for the collection of attendance data without the knowledge of the participants, this is a potential ethical concern. An alternative way of obtaining this data would be to ask the participants for permission to look at their attendance at the completion of the study. This would allow the researcher access to the same information and ensure the rights of the participants are not violated.

Procedure:

The initial questionnaire was given during the third week of the October following midterm examinations. It was presented to undergraduate students enrolled in six introductory classes, two in biology, two in sociology, and two in psychology. All of the participants were given class time to complete the questionnaires, however one psychology class was able to use the study as part of a write-up they were to do on research projects in which they had been involved. Although this may have given this class of students more motivation to participate it did not increase the response rate for this class over the others. A verbal description of the study was given (Appendix A). This description included a very general purpose of the study ("we are looking at the relationship between self image and various behaviors"), what the participants participation would include, and a description of the questionnaires. It was stressed that participation was voluntary and that the information gathered would have important practical uses. The participants were also assured that all data gathered would be

strictly confidential. The students were informed that all those who complete both questionnaires would have their name entered into a draw for one hundred dollars. This was done to improve the response rate to the questionnaires. Each participant signed a consent form attached to the initial questionnaire. Administration of the questionnaires took place over a one week period.

Following the application of the questionnaire the attendance of all participants at the university fitness facilities was monitored for four weeks beginning with the day after each class completed the questionnaire. This data was used as an objective measure of exercise for those individual's who responded, "at the university facilities" to the location of exercise item on the initial questionnaire. Following the four weeks of monitored attendance the second questionnaire was administered to assess the participants self reported exercise behavior and current exercise intentions.

As there were no test re-test reliability data available on the self-schema measure at the completion of the four week data collection period 100 randomly chosen participants were administered the exercise self-schema measure for a second time. This data was compared to the original measure they completed four weeks previously to determine reliability of the measure. Eighty-one of the 100 questionnaires administered were completed and returned.

Chapter Four

Results

Of the 983 participants 685 were used in the analysis of exercise intention and self report exercise, 527 (53.6%) were exerciser self-schematics, 52 (5.3%) were nonexerciser self-schematics, and 106 (10.8%) were aschematics. The remaining 298 (30.3%) participants did not belong to any of the three groups. The 358 participants used in the analysis of the objective exercise data consisted of, 298 (83.2%) exerciser self-schematics, 19 (5.3%) nonexerciser self-schematics, and 41 (11.5%) aschematics.

An initial analysis was done to determine the internal consistency and reliability of the Exercise Self-Schema Questionnaire. Both the descriptive and importance items of the questionnaire showed high internal consistency resulting in alpha scores of .92 and .89 respectively. The positive/negative rating of the items also had a high internal consistency resulting in an alpha of .90. Each key phrase showed high test\retest reliability for their descriptive nature of the participants. The first phrase "physically active" had a four week test retest reliability alpha of .92, the alpha for "exercises regularly" was .93, and the alpha for "keeps in shape" was .92. Each key item also had high test retest reliability scores for the participants rating of their importance to their self image, the scores were .82, .80, and .78 respectively. Finally, the test retest scores for the positive/negative ratings of the key items were .7, .76, and .75 respectively. A kappa index (Fleiss, 1973) was calculated to determine the reliability of the measure's categorization of the participants. The calculation resulted in a kappa index of .48. Table 2 outlines the classification of participants from the initial questionnaire compared to their classification from the second questionnaire four weeks later.

Insert Table 4 About Here

The proposed method of analysis to test the first hypothesis that exerciser self-schematics would intend to and exercise more often than aschematics or nonexerciser self-schematics, consisted of using MANOVAs followed up by discriminant function analysis. This method was proposed to determine if differences existed between the three groups within the exercise self-schema domain. Due to the large variation in sample sizes between the groups, prior to running the MANOVAs for the subjective and objective data sets, it was decided that tests for normalcy and homogeneity of variance should be conducted to determine if these assumptions had been violated. First the Kolmogorov-Smirnov Goodness of Fit test was used to test the distributions of the dependent variables across the groups. The results of this test were significant for strenuous exercise intentions ($z=6.0$, $p<.001$), moderate exercise intentions ($z=6.1$, $p<.001$), strenuous exercise ($z=5.4$, $p<.001$), and moderate exercise ($z=6.7$, $p<.001$) indicating that the distribution was not normal. Next Bartlett-box univariate homogeneity of variance tests were run on the data. These tests found that homogeneity of variance was violated for strenuous exercise intentions ($F(2, 164726)=32.21$, $p<.001$), moderate exercise intentions ($F(2, 164726)=3.73$, $p=.024$), intentions to exercise at the university fitness facilities ($F(2, 164726)=45.84$, $p<.001$), strenuous exercise ($F(2, 164726)=93.63$, $p<.001$), and exercise at the university fitness facilities ($F(2, 164726)=80.38$, $p<.001$). Moderate exercise behavior was the only dependent variable that did not violate the assumption of homogeneity of variance ($F(2, 164726)=2.45$, $p=.087$).

Due to the violations of normalcy and homogeneity of variance, the initial hypothesis was tested using Kruskal-Wallis tests. A graphical depiction of the behavior and intention results may be seen in figure 1.

Insert Figure 1 About Here

The results showed that exerciser self-schematics reported intending to exercise significantly more than nonexerciser self-schematics for both moderate ($\chi^2(578)=16.81, p<.0001$) and strenuous exercise ($\chi^2(578)=105.33, p<.0001$). Exerciser self-schematics also reported exercising, both moderately ($\chi^2(578)=11.98, p<.001$) and strenuously ($\chi^2(578)=80.54, p<.0001$), significantly more than nonexerciser self-schematics. Exerciser self-schematics reported intending to exercise significantly more than aschematics for both moderate ($\chi^2(632)=7.16, p<.0001$) and strenuous ($\chi^2(632)=167.67, p<.0001$) exercise. Exerciser self-schematics reported exercising significantly more than aschematics for both moderate ($\chi^2(632)=7.59, p<.006$) and strenuous ($\chi^2(632)=97.85, p<.0001$) exercise. Aschematics were not found to differ from nonexerciser self-schematics in exercise intention or self reported exercise behavior. See table 3 for means and standard deviations of the self report data.

Insert Table 5 About Here

A second component of the first hypothesis was that exerciser self-schematics would not only intend to exercise more than the aschematics and nonexerciser self-schematics, but that they would also exercise more often as reported by an objective measure of exercise attendance. Only participants who indicated their most likely location of exercise was the university fitness facilities were included in the analysis of the objective measure of exercise. The objective measure was participants attendance at any university fitness location. Kruskal-Wallis tests were also used to analyze this data. Again exerciser self-schematics intended to ($\chi^2(316)=8.37, p<.004$) and exercised ($\chi^2(316)=6.21, p<.009$) significantly more than the nonexerciser self-schematics. Exerciser self-schematics also intended to ($\chi^2(338)=39.90, p<.0001$) and exercised ($\chi^2(338)=15.48, p<.0001$) more often than aschematics. Aschematics and

nonexerciser self-schematics did not differ in the amount they intended to exercise or exercise behavior. See table 4 for the means and standard deviations for the objective measure of exercise and intention.

Insert Table 6 About Here

The second hypothesis to be tested was that exerciser self-schematics would have higher correlations between exercise intention and behavior than aschematics and nonexerciser schematics. To test this hypothesis Fisher Z transformations for two Pearson r 's were used. Analysis revealed that the correlation between exercise intention and self reported strenuous exercise behavior was significantly higher for exerciser self-schematics ($r = .68$, $z(578) = 3.18$, $p < .001$) as compared to nonexerciser self-schematics ($r = .34$). Aschematics ($r = .62$, $z(157) = 2.15$, $p < .05$) also had a higher correlation than nonexerciser self-schematics for self reported strenuous exercise. There was no difference of correlations between exerciser self-schematics and aschematics for self reported strenuous exercise behavior. No differences were found between the three groups for self reported moderate exercise. Fisher Z transformations for two Pearson r 's were also used to determine if there were differences between the three groups' objective exercise. The Fisher Z transformations of the objective data were calculated using first only participants who indicated that if they were to exercise it would most likely be at the university fitness facilities. Due to the small sample sizes of the groups when reduced due to most likely exercise location, and because all participants had responded to the exercise intention item for the university facility and had objective data available from the fitness facilities additional Fisher Z transformations were performed using all study participants. The transformations revealed no difference between the three groups when analyzed based on the exercise location preference. However, there was a positive trend in the data. Exerciser self-

schematics had the highest correlation ($r=.28$) between exercise intention and exercise behavior. Nonexerciser self-schematics and aschematics had correlations of .15 and .19 respectively. The additional transformations using all participants revealed that exerciser self-schematics ($r=.42$) had a significantly higher correlation ($z(868)=1.79$, $p<.05$) between exercise intention and exercise behavior than the aschematics ($r=.28$). However no further differences between groups were found (Table 5).

Insert Table 7 About Here

Finally, the third hypothesis to be tested included two components. First was to determine if a division in the nonexerciser schematics along the continuum of positive and negative existed, and second was to determine if those individuals with a negative nonexerciser self-schema would be more likely to intend to exercise and exercise more than those with a positive nonexerciser self-schema. To determine if nonexercisers could be categorized into two groups based on their positive or negative rating of the exercise attributes each individual's ratings were totaled to determine if they considered exercise to be a positive or a negative attribute. Initial descriptive statistics of the data revealed the combined mean of the key exercise phrases was 27.2 (stdev 4.5) out of a possible 33. A combined score of 18 was considered a neutral rating. Based on the mean and low standard deviation it was determined that 95% of this group rated these descriptors as positive. As a vast majority of the nonexerciser self-schematics rated exercise as a positive attribute, it did not make sense to use the proposed regression analysis.

Chapter Five

Discussion

The utility of the Self-schema theory to predict behavior, intention, and the relationship between the two was investigated in the domain of exercise. The study revealed a number of noteworthy results. A general positive relationship between exerciser self-schema, exercise behavior, and exercise intention was found. A positive relationship between exercise self-schema and an objective measure of exercise was also found. Exercise self-schema was found to moderate between exercise intention and self reported exercise behavior. Exercise self-schema was also found to moderate between intention and objective exercise behavior. Finally, it was found that there does not seem to be a division within the nonexerciser self-schematic category along the positive and negative continuum.

The discussion section of this paper is divided into eight sections. The first section necessary to discuss is the distribution of the participants across exercise self-schema. The second important area of discussion included is a section on the psychometrics of the self-schema measure. The third, forth, and fifth sections of the discussion will cover the results regarding the main hypotheses of the study. Specifically the third section will discuss the amount each exercise self-schema group intended to, and exercised. The fourth section will include discussion of the possibility of exercise self-schema being a moderator between exercise intention and exercise. The final hypothesis included in the discussion will be the possibility of a subdivision within the nonexerciser self-schematic group. Finally, the last three sections will discuss the contributions of the study, its limitations, and future directions in the area of exercise self-schema literature.

Participant Distribution

From the Exercise Self-schema Questionnaire participants were divided into

four categories based on their ratings of the three key items, "physically active", "exercises regularly", and "keeps in shape", descriptiveness and importance to their self image. Of the sample who completed the first questionnaire, about 53 % were categorized as exerciser self-schematics, about 30 % were unclassifiable, 12 % were aschematics and 5 % were nonexerciser self-schematics. Compared to previous literature these results were very similar to those of Kendzierski (1988) who had 53 % exercisers, 32 % unclassified, 8 % aschematics, and 6 % nonexercisers. These results support that undergraduate students in introductory undergraduate classes are comparable populations across exercise self-schema research.

Although it is premature to generalize the distribution of the current sample and previous samples to the general population, it does seem appropriate to discuss the distribution of the samples that have been utilized. In the present study as well as in Kendzierski (1988) the percentages of participants in each of the three groups has been very similar. The distribution was roughly 50 percent exerciser self-schematics, 10 percent aschematics, 6 percent nonexerciser self-schematics, and 30 percent unclassified. The major purpose of understanding determinants of a particular behavior such as exercise is to allow one to develop possible interventions to increase the desired behavior. In theory an intervention could be developed on the theoretical underpinnings of the Self-schema theory. Such an intervention may attempt to increase the importance of being an exerciser in the self-image of an aschematic in order to aid the latter to increase his exercise behavior. While increasing the individual's importance rating of exercise to his self image, the aschematics may be helped to identify certain behaviors that they already do, such as walking to work, as exercise. By identifying exercise behaviors the individual already does, the individual's self description of 'being an exerciser' should also increase.

However the current categorization of participants into exercise self-schema leaves approximately 30% of the undergraduate population unclassifiable suggesting

that the self-schema theory would not be of utility for designing interventions for this group of people. There are two possible explanations for this outcome.

The first explanation is that there is a problem with the underlying theory. Currently the self-schema theory describes only three categories of individuals, who through experience and cognitions have developed the appropriate schema. Once again these categories include those who consider themselves as exercisers, those who consider themselves as nonexercisers, and finally those who consider themselves to be neither. Perhaps individuals who are not categorized may be in a transition period between one of the three categories. Based on the current measure of exercise self-schema almost all of the unclassified participants fell into three distinct groups. The first group were unclassified because they scored high on their descriptive rating of the exercise terms and low to moderate on their importance rating of the key terms. The second group of unclassified participants scored moderate on their descriptive rating and high on their importance rating of the key terms. The final group of unclassified participants scored low on their descriptive rating and low to moderate on their importance rating of the key terms. These different groups could be thought of as either transition periods between schematic types or subgroups within the current exercise self-schema categories.

Before a change such as including additional categories in the exercise self-schema domain it seems more likely that the problem of the unclassified participants is simply due to the current assessment tool. Purely by the design of the Exercise Self-schema Questionnaire, participants are excluded if they scored high on their descriptive rating of the exercise terms and low to moderate on their importance rating of the key terms, they scored moderate on their descriptive rating and high on their importance rating, or scored low on their descriptive rating and low to moderate on their importance rating of the key terms. This means that if the unclassified participants are either misclassified or are subgroups within the exercise self-schema groups. Due to

this fact the possible transition periods discussed above become purely an artifact of the measurement tool.

With such a large number of unclassified participants it is necessary to determine where these participants fit into the self-schema theory. Scoring configurations which left a participant unclassified were described above. Based on the unclassified participants responses, it is concluded that these participants are varying levels of exercise aschematics. An unclassified participant who described himself as being an exerciser, but then rated being an exerciser as only moderately or not at all important to their self-image, should be considered an aschematic individual simply because he did not live up to the requirement of being a schematic individual. The same can be said for the participant who rated exercise as extremely nondescriptive, but also thought of exercise as being only moderately or not at all important to his self image. These individuals may eventually become exerciser or nonexerciser self-schematics, respectively, but until then should be considered aschematic. Clearly if a complete look at the utility of the self-schema theory in exercise prediction and intervention development is to be realized, future research should concentrate on either modifying the current exercise self-schema categorization procedure to include all participants, or develop a classification tool which is sensitive enough to categorize all participants.

Psychometrics

In order to be confident about the findings of this study it was first necessary to determine the reliability and internal validity of the Exercise Self-Schema Questionnaire. High alpha scores were associated with descriptive, importance, and positive/negative items, .92 for the three descriptive items, .89 for the three importances items, and .90 for the positive and negative items. Given these results the researcher can be more confident in regards to the internal consistency of this measure. Four week reliability tests were also high for the specific items within the test

averaging alpha scores of .92 for the descriptive items, .8 for the importance items, and .74 for the positive/negative items. However although the items test retest scores were good the kappa index for the categorization of the groups was moderate at .48.

This kappa index score when combined with its standard error resulted in a significantly large z ($z=6.67$) leading to the conclusion that the observed degree of agreement represents true reliability (Fleiss, 1973). However, the measures kappa of .48 is well below the .75 Fleiss documents as indicating strong agreement. The raw data used in calculating the kappa index also gives some insight into the problems with the current measure. Ninety percent of those participants who were classified as exerciser self-schematics at time one were also classified as exerciser self-schematics at time two. Only 63 percent of aschematics at time one were still categorized as aschematics at time two, only 20 percent of nonexerciser self-schematics, and finally only 40 percent of the unclassified students were unclassified at time two. This data indicates that the measurement tool may be very unreliable when categorizing 50 percent of University of Calgary undergraduate students. It was concluded from these results that the tool used to discriminate exercise self-schema was internally consistent, but the stability of the tool's categorization of the participants is questionable.

Self-schema, Intention, and Exercise

The first hypothesis of the current paper was that exerciser self-schematics would intend to exercise, as well as, exercise more often than nonexerciser self-schematics or aschematics. As hypothesized and found in previous research, exerciser self-schematics would intend to exercise more often than aschematics and nonexerciser self-schematics. This hypothesis was also supported by the results of this study. Intention may be thought of as one information processing tool which guides one's behavior under the general cognitive structure, an individual's self-schema. Hence it can be concluded that exercise self-schema may be derived from past experience as stated initially by Markus (1977), but ultimately also guides future behavior as shown

by this study and was suggested in others (Kendzierski, 1988;1990;1991). As such this data lends support to the contention that behavior is guided not only by previous experience but also through the cognitive "road map" of an individual's self-schema.

The second component of the initial hypothesis was that exerciser self-schematics would exercise more than aschematics and nonexerciser self-schematics. This hypothesis was also supported as exerciser self-schematics reported exercising more than both the aschematics and the nonexerciser self-schematics (Kendzierski, 1988;1990). It was also replicated that there was no difference between aschematics and exerciser self-schematics in the reported exercise behavior (Kendzierski, 1988;1990). The finding was consistent across both moderate and strenuous exercise. Based on these findings and those of previous research one can confidently say that exercise self-schema does predict self reported exercise.

One of the major limitations that this study was designed to overcome was the traditional use of self report measures of exercise. The importance of using an objective measure of exercise has been outlined by a number of researchers (Dishman, 1994; Kendzierski, 1988;1990;1994). By utilizing the attendance records from the university fitness facilities, it was found that exerciser self-schematics exercised more than both of the other two groups. Again, aschematics and nonexerciser self-schematics did not differ. Hence, exercise self-schema is also a valid predictor of objective exercise. This finding validates Kendzierski's (1988;1990) earlier research in the area of exercise which relied on self report measures. Specifically, the present study showed that an exerciser self-schema does lead to increased exercise, a conclusion that could not be made by Kendzierski (1988). It also provided evidence that self schema is a predictor of future exercise participation rather than just a predictor of adoption of an exercise program as was found by Kendzierski (1990).

Self-schema as a Moderator of Exercise Intention and Exercise Behavior

The next hypothesis tested was that the correlations between intention to

exercise and exercise behavior would be higher for exerciser self-schematics than for the other two groups tested. Prior to discussing the results of the analysis it is necessary to indicate the method that was used to determine the moderating effects of exercise self-schema on exercise intention and behavior. There are two methods to test for a moderation effect (Baron & Kenny, 1986). The first, which has been used in previous exercise self-schema literature, is the use of a correlational test. To compare the results of this study to the findings of previous a correlational test was also used, however there are limitations associated with this method of analysis. The first is that it assumes equal variance at each level of the moderator (Kenny & Baron, 1986). In the current study this was not the case as the variance for intention was not homogenous for each of the schematic types, this would result in a lower moderating effect for the group with less variance, in this case the exerciser self-schematics. The second problem with correlational tests for moderation is if the amount of measurement error in intention varies as an effect of schematic type, then the correlations between intention and exercise will differ spuriously (Baron & Kenny, 1986). Future research may focus on this problem and use regression coefficients which are not effected by these two factors.

Based on the analysis used the hypothesis that exercise self-schema would moderate the exercise intention-behavior relationship was partially supported. For strenuous exercise as the exerciser self-schematics had a significantly higher correlation between intention and self reported strenuous exercise than nonexerciser self-schematics. However no difference was found between the aschematics and exerciser self-schematics or nonexerciser self-schematics. It would be expected based on the theoretical underpinnings of the relationship between self-schema and intention that exerciser self-schematics should have a higher correlation between exercise and intention than the aschematics *and* nonexerciser self-schematics (Kendzierski, 1994). It is understandable that the exerciser self-schematic's intentions should be more

accessible through memory and by being cued through stimulation by schema relevant cues. The example used by Kendzierski (1994), describes an individual who witnesses someone riding a bike. An exerciser self-schematic sees this scene, processes this action as exercise, thereby bringing to memory other exercise related stimuli, included the individual's intention to exercise. Having intention brought to mind the individual is now more likely to act on this intention because he/she is remembering the intention. However, an aschematic and nonexerciser, may interpret and process what has been seen as a mode of transportation and not exercise, thereby not cuing any memory or thought of exercise. From the current study this hypothesis was only partially supported by showing the difference between exerciser self-schematics and nonexerciser self-schematics when using a self report measure of strenuous exercise.

In a similar study focusing on diet self-schema Kendzierski (in press), found similar results for the aschematic group as compared to the dieter self-schema group. Meaning the correlations between good eating intentions and good eating were the same for these two groups. Kendzierski also found that this similarity between the correlations of the two groups was sustained until barriers arose to continue the good eating behavior (vacation). At this point both groups correlation dropped significantly. After the vacation the dieter self-schematic's correlation returned to the high level, however the aschematics correlation did not. It may be concluded that aschematics may have equal correlations to schematics but once the strength of the intention is tested aschematics will go through a drop in correlation from which they will likely not recover. Purely by design the current study tried to eliminate many barriers of exercise participation. The questionnaires were administered following midterm examinations and three weeks prior to the first final exam, for the initial and final questionnaires respectively. By doing so the a major barrier of exercise for students, needing to study for examinations was, eliminated. Hence the aschematics may not have been faced with the need to stop exercising.

One must then answer the question if in this study exerciser self-schematics had a higher correlation between intention and exercise than nonexerciser self-schematics, why did it not have the same expected superiority to the aschematics in the current study? A possible explanation for the lack of difference between the correlations of exerciser self-schematics and aschematics may lie within the methodology of this study. The similarity in correlations between these two groups could be due to the magnitude of the individual groups intentions and then behavior. Aschematics intended to exercise less than the exerciser self-schematics, they also reported exercising less. A possible inflation of the true correlational relationship between exercise intention and exercise behavior may have occurred because many of the aschematics did not intend to exercise at all or very little. In contrast very few exerciser self-schematics did not intend to exercise. Therefore, every aschematic who intended to exercise zero times over four weeks and then did not exercise over the four weeks would have a perfect correlation of $r=1$, bumping up the "actual" correlation of the group so that it did not differ from the exerciser self-schematics intention.

Nonexerciser self-schematics did have a significantly lower correlation than both of the exerciser self-schematics and the aschematics. It is a curious finding that the nonexerciser self-schematics did not seem to demonstrate the same 'inflated' correlation as the aschematics when using the self report measure for strenuous exercise. Although the correlation is significantly lower for the nonexerciser self-schematics, it is reasonable to assume that this group's correlation is also inflated. However, of those nonexerciser self-schematics who did intend to exercise at least one time or more over the four week period, fewer of those individuals fulfilled their intentions than the aschematics who intended to exercise at least one time or more over the four weeks. The reason for this finding may be based on the fact that nonexerciser self-schematics readily admit that being an exerciser is extremely nondescriptive of their self image. Due to this nondescriptive nature of exercise, nonexerciser self-schematics when

encountering obstacles, real or perceived, may not have the motivation to overcome such obstacles. An example would be if a nonexerciser self-schematic had intended on going for a run on a summer afternoon and the weather took a change for the worse. The individual looks at the clouds in the sky and thinks to himself, "I don't think I'll run today, it may rain, and after all, I really am not an exerciser anyway.". It was concluded that further study looking at the relationship between exercise self-schema, intention, and behavior is necessary.

The moderating effect of self-schema on moderate intensity exercise was not found for this group. There were no differences between the three groups correlations of intention or moderate exercise behavior. The reason no differences were found between the three groups was that both the exerciser self-schematics ($r = .4$) and the aschematics ($r = .26$) correlations between moderate exercise intention and moderate exercise behavior dropped substantial from their respective correlations for strenuous exercise. The drop for the exerciser self-schematics may be because at the average age of 19 years old, they may not perceive moderate intensity exercise as the same behavior as strenuous intensity behavior. In other words moderate intensity exercise may be regarded by these exerciser self-schematics as a completely different behavior to what they consider exercise. By that token, exerciser self-schematics should not be motivated to engage in moderate intensity exercise to verify their self image, hence these intentions may not be as readily available as their intentions for what they perceive to be exercise.

The reason the aschematics' correlation dropped may be due to their evaluation of the probability of doing one exercise behavior over another. A possible explanation is that the aschematics when weighing the possibility of exercising moderately or strenuously, predicted that they would be more likely to engage in moderate intensity exercise. This assumption is supported by the difference in average number of times intended to exercise strenuously (3.6) as compared to the number of times intended to

exercise moderately (8.4) for the aschematic group. Clearly far less aschematics intended to exercise zero times moderately than intended to exercise zero times strenuously. Therefore the aschematics correlation between for moderate intensity intention and exercise represents more accurately the lower correlation hypothesized by Kendzierski (1991).

The hypothesis that stated the correlations between exercise intention and exercise behavior would be higher for exerciser self-schematics than for the other two groups was also presented for the relationship between exercise self-schema, intention, and objective behavior. The first set of analyses only included those participants who indicated that the university fitness facilities would be their most likely location of exercise. Exerciser self-schematics had a correlation of .28 compared to correlations of .19 and .15 for aschematics and nonexerciser self-schematics respectively. Although the trend appears to support the hypothesis no significant differences were found between the three groups tested. This lack of support was thought to be due to the small sample sizes of the aschematics ($n=41$) and nonexerciser self-schematics ($n=19$), as compared to the large sample of exerciser self-schematics ($n=298$).

To overcome this problem a second analysis was run which included all participants who completed the intention to exercise at the university facilities item. By using all participants who completed the intention to exercise at the university fitness facilities item there was no loss to the follow-up questionnaire. This resulted in substantially larger sample sizes for aschematics ($n=155$), nonexerciser self-schematics ($n=76$), and exerciser self-schematics ($n=715$). It must be noted that by including all of the participants, also included are many more participants who did not intend to exercise at the fitness facilities. The inclusion of the latter group does effect the data to show an inflated estimation of the correlation between exercise intention and exercise behavior, however this inflation of correlations was quite consistent across the three groups. The analysis revealed a significant difference between exerciser self-

schematics ($r=.42$) and aschematics ($r=.28$). No difference was found between exerciser self-schematics and nonexerciser self-schematics ($r=.31$), and no difference was found between aschematics and nonexerciser self-schematics. The hypothesis that exerciser self-schematics would have higher correlations, than aschematics and nonexerciser self-schematics, between exercise intention and exercise behavior was partially supported by the current study.

The reason exerciser self-schematics act on their intentions to exercise significantly more than aschematics could lie within Kendzierski's (1994) model that predicts a link between exercise self-schema and the exercise intention-behavior relationship. This link could be based on three separate factors (Kendzierski, 1994). First is the individual's intention to exercise, second is the individual's motivation to act on their intentions, and third is the accessibility of these intentions to the individual. This study has confirmed the first factor, exerciser self-schematics definitely intended to exercise more than either of the other two groups. The presence of the second factor may be determined by first looking at the theory development of Markus (1977), who relates that an individual's self schema is derived from experience which is focused on the aspects of the self that an individual regards as important. Therefore a schema is developed only for aspects of oneself which he/she views as important. With this in mind Kendzierski (1994) suggests that an exerciser self-schematic should be motivated to participate in behavior which will verify this important component of his/her self image. The third factor regarding the accessibility of intentions was confirmed by Kendzierski and Shannon (1992). They found that intentions to exercise were more readily accessed by exerciser self-schematics as compared to aschematics. It was concluded that an individual's exercise self-schema does in fact provide a link between intention and exercise behavior for exerciser self-schematics over aschematics, by increasing intention to exercise, giving motivation to act upon these intentions, and by making these intentions more readily available in memory.

The hypothesis that exerciser self-schematics would have higher correlations between intention to exercise and exercise behavior than nonexerciser self-schematics was not supported, however the trend was evident. A possible explanation for the lack of difference between the two groups again may be the difference in sample sizes between the groups. Although the author feels the difference in sample sizes is the most likely cause for the lack of difference found between these two groups, an alternate explanation may be that nonexerciser self-schematics are in a transitory state. As will be discussed in more detail in the following section, nonexerciser self-schematics considered the three exercise phrases to be positive attributes. Kendzierski (1991) had speculated that the reason nonexerciser self-schematics had no correlation between exercise and intention to exercise was because there was a subdivision within that group. Her contention was that those nonexerciser self-schematics who regarded exercise as a positive attribute would be motivated to attempt to change their behavior, and intend to exercise. Ninety five percent of all nonexerciser self-schematics who participated in this study fall into this category, which could be termed negative nonexerciser self-schematics (Kendzierski, 1991). Although these individuals by definition consider 'being a nonexerciser' as important to their self image, one must ask, does this mean that these individuals are motivated not to exercise? This may not entirely be the case, as is reflected by the lack of difference between the correlations of nonexerciser self-schematics and those of exerciser self-schematics. It may be that although these individuals consider themselves to be nonexercisers, that the importance of this to their self-image, coupled with their positive rating of exercise as an attribute, may reflect their desire to change.

A final aspect of the intention-behavior data that needs to be addressed is the overestimation of intention to exercise at the university fitness facilities as compared to the actual exercise at those locations. This overestimation was present in each of the three groups. It is possible that the participants in the study may have exercised

more at the facilities than was reported by the objective measure. This could have occurred if participants considered outside on campus as part of the university fitness facilities. If this was the case exercise session which included running or jogging on campus may have been included in the intention measure but would not be included in the attendance data because the campus mainframe was not used to identify the participants card. This may have resulted in the discrepancy between intention and exercise. In the future research should continue the use of objective measures of exercise, but caution should be taken to ensure the accuracy of these measures.

The Nonexerciser Self-schema Division

The final hypothesis of the current study was that there was a division within the nonexerciser self schematics along a continuum of positive and negative. This hypothesis was based on the finding of Kendzierski (1991) that there was no correlation between intention and exercise behavior for nonexerciser self-schematics, a finding which was not replicated by this study. Kendzierski (1991) speculated that the lack of correlation was because there was a division within this category. The groups she thought may exist include a positive nonexerciser self-schematic and a negative nonexerciser self-schematic. The positive nonexerciser could be described as a "proud coach potato" who does not exercise, is proud of that fact, and categorizes exercise as a negative behavior. The negative nonexerciser could be described as an individual who does not exercise but categorizes exercise as a positive behavior, this situation was hypothesized to be a marker for change.

The results of the current study do not support the contention that there are two subgroups of nonexerciser self-schematics. There are two findings of the present study that suggest that there may not be two subgroups. First, the present study found that there was a significant correlation between exercise intention and exercise behavior for nonexerciser self-schematics. This finding undermines the foundation of Kendzierski's argument, which is based on a lack of correlation between these two variables for

nonexerciser self-schematics. Second, 95 percent of all nonexerciser self-schematics categorized exercise as a positive attribute based on the scale they were presented. It was concluded that within the nonexerciser self-schematic category, if there is a marker for change, it is not based upon the positive or negative rating of exercise as outlined in the current study.

Contributions

The current study overcame a number of the limitations that were present in previous research. The current study was the first prospective study that looked at actual attendance at a fitness facility. By doing so it adds to the previous research which had looked at only concurrent exercise or adoption of an exercise program. By using a prospective design it became possible to see the predictive ability of the self-schema theory in repeated exercise behavior rather than just the possibility that the individual may begin a program. Hence the present study increased the knowledge base regarding exercise adherence.

By using attendance data from the university fitness facilities this study was the first to show that exercise self-schema was related to an objective measure of exercise. The inclusion of an objective measure of exercise seems critical in the area of self-schema research as it is possible that those individuals who possess exerciser self-schemas may be more vulnerable to overestimations of their exercise behavior. The possible overestimation may be the result of these individuals' reporting more exercise so that they may verify their self image as an exerciser.

When measuring the relationship between intention to exercise and exercise behavior, previous research violated the conditions necessary for intention to predict behavior. These conditions are: 1) Intention and behavior must be measured at corresponding levels of specificity, 2) intentions should not change between the time of their measurement and the time of the behavior measure, and 3) the behavior must be under volitional control (Ajzen, 1985). The present study attempted to overcome this

limitation using a number of strategies. In order to ensure that the first condition was not violated exercise intention and behavior were measured at the same levels of specificity as outlined by Courneya (1994). The continuous open scale that was used for intention was the same phrase as was used for the behavior item, the only difference between the two was that the intention item was in future tense as compared to past tense which was used for the behavior item. Intention related to the following four weeks and after the four weeks had past the behavior item assess the same four weeks as the intention item. By using both the same phrases and identifying the same four weeks for response, the same level of specificity was ensured for the two items.

Although it must be assumed that the second condition necessary for the prediction of behavior by intention was not violated, the present study took steps to strengthen this assumption. The previous research looking at the moderating effect of self-schema between exercise intention and exercise, felt that since students were used as participants, correlations could be lower because of final examination or midterm schedules which were not controlled (Kendzierski, 1991). To overcome this problem the present study was timed such that the distribution of the initial questionnaire took place following midterms. The second questionnaire was administered three weeks prior to the commencement of final examinations. By ensuring that the students did not have a major examination it was assumed that the second condition was not violated. It was also assumed that students exercise would be under volitional control, as they would not be forced into any last minute studying for examinations. Hence the third condition is assumed not to be violated.

The results of this study support the notion that the above violations have not been violated. The correlations between intention and self reported strenuous exercise from the current study were .68, .62, and .34 for exerciser, aschematics, and nonexerciser self schematics respectively. The correlation for the entire sample combined was .67, which falls within the range of correlation reported by recent

research using undergraduate samples. Ajzen and Driver (1992) found a correlation of .72 between intention to jog and jogging. Madden and colleagues (1992) found a correlation between intention to exercise and regular exercise of .56. The higher correlations found in this study are more similar in magnitude than Kendzierski's (1991) findings when compared to other research that has correlated exercise intention to exercise behavior (Godin, 1993) supporting the assumption that the current study has not violated the conditions necessary for intention to predict behavior as outlined by Ajzen (1985).

A common future direction of previous research was to increase the length of data collection past the typical one week used. The current study collected exercise data for a four week period. By collecting data over a longer period of time the validity and generalizability of the findings are strengthened. This study showed that exerciser self-schematics sustain increased exercise participation over both the aschematic and nonexerciser self-schematics over a four week period.

Another contribution of this study involves the determination of the existence of positive and negative nonexerciser self-schematics. This determination was based on the premise developed by Wurf and Markus (1983) that there may be individuals who view themselves as not possessing a positive attribute or as possessing a negative attribute (negative nonexerciser self-schematics). It was further thought by Wurf (1987) that this type of schema would be a marker for change. The present study does not support this hypothesis in the exercise domain. As almost all of the nonexerciser self-schematics considered themselves not to possess the positive attribute of being an exerciser they would all be considered negative nonexerciser self-schematics.

The final contribution of the present study was the analysis of the reliability and validity of the exercise self-schema measure. The low kappa index (.48) associated with this measure accompanied by the large amount of participants which are left unclassified, leads to the conclusion that a superior measurement tool is necessary.

Future research needs to focus on developing a tool which is reliable, valid, and is able to categorize all participants.

In summary the present study has added substantially to the available knowledge regarding self-schema and exercise. By replicating the findings of previous research a stronger case has been made for the predictive ability of an individual's self schema in the exercise domain. The use of an objective measure of exercise showed for the first time that exercise self-schema is predictive of actual exercise. The present study found no support for the existence of two subdivisions of nonexerciser self-schematics based upon the individuals positive or negative rating of the attribute as measured by the positive\negative scale. Finally, a need to improve upon the current measurement tool for categorization into exercise schematic types was uncovered.

Limitations

There are a number of limitations in the present study that suggest caution when interpreting the findings. First, although steps were taken to ensure large sample sizes, the sample size of nonexerciser self-schematics used for analysis of the objective data was only 19 individuals. By prescreening self-schema type and utilizing a different objective measure of exercise future research should try to overcome this problem. This could be accomplished using an initial questionnaire which not only categorized the participant into schematic type, but also assessed which participants would be likely to use the facility where attendance could be monitored. Possible locations for this type of assessment and categorization could be through a university faculty membership, community activity groups, or private fitness facilities. By doing this the sample size would not be reduced for the objective data as they were in this study.

Another limitation of this study was the nature of the objective data being used. Attendance at the university facilities gives no real indication of intensity or duration of the exercise bout. A further limitation is that participants may have exercised on campus without using their student card, or may have misinterpreted the item which

read 'university fitness facilities' to mean any exercise on campus. This misinterpretation could result in an underestimation of exercise for these participants. To overcome this limitation future research may look at a different objective measure of exercise, such as an accelerometer, which gives frequency, intensity, and duration of the exercise bout.

The four week time frame of the present study limits the understanding of how exercise self-schema and exercise are related in the long term. How exercise self-schema effects exercise patterns, including adoption and drop out of exercise cannot be determined from the data available from a four week study. Longitudinal research is necessary to determine the effect of exercise self-schema on continued exercise behavior. This research could also give insight into the stability of an individual's self-schema.

Other limitations of the study occurred in the sampling procedure. These include the voluntary nature of study and a sample of convenience consisting of undergraduate students was used. The voluntary nature of the study may have resulted in a more motivated group responding. As with all previous research in the area of exercise self-schema, using undergraduate students greatly limits the generalizability of the findings of this study as well as the findings of all previous research. Combined, the voluntary nature of the study and using a sample of convenience, greatly limit the generalizability of the results.

A further limitation is the 29% loss to follow-up. A 60% completion rate from the original participants limits the generalizability of the results. However through analysis it was determined that the participants who were lost did not differ on any of the study variables when compared to the participants who completed both questionnaires.

Finally when measuring intention a single item was used to be correlated with a single exercise item. The result is a lack of understanding regarding the strength of

each participants intention. There by leaving the author unsure of different strengths of intention that may be present.

Future Directions

Clearly there are a number of areas within the self-schema theory that warrant future investigation. It has been shown that exerciser self-schematics do intend to exercise and exercise more often than aschematics and nonexerciser self-schematics. This has been found with both subjective and objective measures of exercise. There is even partial support that exercise self-schema moderates exercise intention and exercise behavior. However, before any definitive results can be obtained regarding the utility of the self-schema theory in exercise, the problem of assessment must be addressed.

Kendzierski (1988, 1990, 1991) viewed the groups of nonexerciser self-schematics, aschematics, and exerciser self-schematics to be on a continuum. Based on this view she has used a continuous measurement tool, to categorize the three groups. Unfortunately, due to the set up of the measure, a certain groups of participants can not be categorized. Specifically all participants who rate the key exercise phrases as being highly descriptive but moderate or low on the importance of this to their self image, and those who rate exercise as being highly nondescriptive but moderate or low on importance. A proposed future study would focus on designing a measure of exercise self schema that had the ability to categorize all individuals, and had a strong two week kappa index rating. The current tool for assessment could be used as an outline for a future tool, as it does seem to have utility in classifying at least the extreme cases of each group (Kendzierski, 1990).

A second contributing problem associated with the current measure of nonexerciser self-schematics. When a participant rates two of the three descriptive items as extremely nondescriptive, he is then instructed to rate the importance of each of these items *regardless* of how he rated its descriptive nature. If this individual rates the phrases as important, does this guarantee that he is stating "I am a nonexerciser,

and being a nonexerciser is important to my self image", or is he stating "I am a nonexerciser, but exercise as an attribute is important to my self image"? To address this problem and the problem of unclassified participants, the following study is proposed.

The original categories within self-schema research consisted of schematics and aschematics (Markus, 1977). A schematic is an individual who rates a particular attribute as highly descriptive as well as being highly important to their self image. An aschematic individual may be considered at its most elementary level as someone without such a schema. In Markus' (1977) original work on the self-schema theory, her item also left participants unclassified. It is the contention of this author that the reason the current tool leaves individual's unclassified is because it is intuitively only designed to distinguish between two groups, schematics and aschematics. The third group typically thought of as schematic in an opposite direction (eg. nonexerciser self-schematics), is really only measured passively, or by default, using this measurement technique.

The proposed assessment tool would include a direct measure of nonexerciser self-schematics as well as a measure of exercise schematics. The measure would include an additional three key items for related to 'not exercising', the phrases could be "physically inactive", "does not exercise regularly", and "does not keep in shape". These items would be rated on the same 11 point scale as has been used previously. Classification of the participants would occur in the following way, exerciser self-schematics would be categorized based upon their response to the three exercise related key terms if they rated them to be highly descriptive and highly important to their self image. A high descriptive rating would be a combined score on the three descriptive items of 24 or greater. A high importance rating would be a combined score of the three importance items of 24 or greater. Nonexerciser self-schematics would be classified based upon their response to the 'not exercising' phrases if they rated them to

be highly descriptive and highly important to their self image. Finally, aschematics would be any individual who did not fall into either of the schematic categories.

Determining the validity of the revised measure could be accomplished by using the original three tasks Markus (1977) used to determine the validity of his categorization tool. Prior to the first task, participants would be administered the revised Exercise Self-schema Questionnaire and categorized as previously explained.

Once categorized the first task would be the content and latency task. This task would compare reaction times of the three groups responding to exerciser related and unrelated stimuli as being descriptive or nondescriptive. The second task would involve having the participants complete a booklet containing 16 words or phrases related to either exercise behavior sedentary behavior or unrelated to either. Participants would circle each word that described them and give reasons why they felt it did. The final task would involve the participants completing a booklet with 12 pairs of behavioral alternatives. In each alternative one choice would reflect a pro-exercise orientation the other would reflect an anti-exercise orientation. For each pair participants would assign a number from 0 to 100 for each alternative with the total of the two equaling 100. Based on Kendzierski's (1990) findings it would be hypothesized that even when including all participants exerciser self-schematics relative to nonexerciser self-schematics would: 1) endorse more words and phrases related to exercise as self descriptive, 2) take less time to endorse these judgments about the self, 3) recall more specific instances of exercising, and 4) predict that they would be more likely to engage in future exercise behavior. The same hypothesis would be made for nonexerciser self-schematics as compared to exerciser self-schematics for nonexercise related stimuli. In each case it is hypothesized that aschematics would fall between exerciser self-schematics and nonexerciser self-schematics on all variables.

Although the findings of the present study are generally positive one must recall that all research to date in this area have used undergraduate university students as the

test sample. An obvious future direction would be to replicate the findings of this study and those previous using different samples. Of particular interest would be samples that include random selection from the general populace using either a mail out survey or random digit dialing. Using an unrestricted sample initially will help to determine the normal distribution of the population across exercise self-schema. By determining the distribution of other populations across the schematic types, information can be gained regarding the utility of developing interventions for the groups in question. For example if only about five percent of the general populace is categorized as nonexerciser self-schematics (as was found in this study for undergraduate students), researchers may want to spend more time and energy developing ways to intervene for increasing exercise in exerciser self-schematics, and aschematics.

One area of caution which should be addressed when evaluating the distribution of the general populace across schematics types, is the generalizability of the key phrases from the self-schema measure to different populations. Clearly the three key items are discriminating for undergraduate students, but time and effort should be spent determining if these same three key phrases are appropriate for an older or younger group of participants. Time and ingenuity are also necessary to deal with the problem of collecting valid objective measures of exercise for a population based study.

A further area of future research arises from the present study's exerciser self-schematics exercise data. The exerciser self-schematic group data from the current study revealed that there are a number of exerciser self-schematics who did not exercise at all over the four week period. This was true of both the self report data for strenuous and moderate exercise as well as the objective data. Future research may look at determinants within the exerciser self-schema status to understand why some exerciser self-schematics exercise and others do not.

Kendzierski (1991;1994) proposed that intention and self-schema are related and this relationship has been partially supported by the current study. Most previous

research that investigated intention and its relationship to exercise has used the Theory of Planned Behavior (TOPB) as the theoretical guide (see Godin, 1993 for a review). With this in mind a future study could look at the constructs of the TOPB across the schematic types as well as within the exerciser self-schema group.

A proposed study could integrate self-schema theory into the TOPB. The proposed study could be done in conjunction with the previously described study by simply including an assessment of each participants attitude, subjective norm, and perceived behavioral control in the questionnaire used to determine exercise self-schema. This study would give insight into why some exerciser self-schematics exercise and others do not. It should also produce findings that could give additional insight into intervention design specific for each group within the exercise self-schema groups.

Although research is still needed to determine some of the above theoretical considerations, practically, research is also needed to develop interventions based on the self-schema theory. When developing an intervention one must look at the basics of the self-schema model, much like Bem's (1967) self perception theory, self-schema theory views an individual's behavior as leading to their perception of self. Self perception theory, based on attribution theory, describes how an individual's behavior leads to his development of attitude about himself and the behavior in question. Self-schema theory takes it one step further to describe how behavior not only leads to attitude (or self description) regarding the self, but also leads to the development of a cognitive structure that facilitates the increased participation in that behavior. In this case the behavior is exercise. Therefore to increase exercise behavior one needs to develop an exerciser self-schema, however to develop an exerciser self-schema one needs to exercise. The cyclical nature of the theory makes determining interventions an interesting process.

Using self-schema theory as a intervention producing theory would indicate that

to develop the exerciser self-schema, an individual would not only need to increase exercise but also increase the individual's rating of this behavior to their self image. Bem's (1967) self perception theory gives guidance on how one may increase exercise and its importance to the individual's self image, thereby ensuring the individual develops an exerciser self-schema. Self perception theory outlines the necessity to ensure that the individual first sees exercise as a personally enjoyable behavior and then making the internal rewards of exercise salient to the individual. Future studies should determine ways to increase personal enjoyment and focus on the development of internal rather than external reasons for exercise. By doing so exercise should increase due to the effect of the internal satisfaction of the individual and then be compounded by the development of an exerciser self-schema.

In conclusion, the current study has shown that an individual's exercise self-schema is predictive of their subsequent exercise behavior. It has shown that exercise self-schema and intention are related although future research may be necessary to determine the extent of the relationship. By continuing investigation into self-schema theory, exercise intention, and exercise behavior more insight will be developed regarding possible interventions based on the determinants identified.

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Table 1.

Multivariate Analysis of the Effects of Loss to Follow-up on Schema, Intention to Exercise Strenuously, Intention to Exercise Moderately, Intention to Exercise at the University Facilities, and Objective Exercise

Source of Variance	df	F ratio	Sig of F Ratio
Strenuous Intention	1,1372	0.85	NS
Moderate Intention	1,1372	0.11	NS
University Intention	1,1372	0.24	NS
Schema	1,1372	0.01	NS
Objective Exercise	1,1372	8.09	*

*p < .01

Table 2.

Participant Description

	Gender	Year in University	Faculty	Schema
Female	633			
Male	350			
First		851		
Second		91		
Third		25		
Fourth		12		
Fifth		4		
General Studies			773	
Sciences			67	
Kinesiology			46	
Nursing			42	
Social Sciences			19	
Engineering			7	
Arts			6	
Education			5	
Missing			18	
Exercisers				527
Aschematics				106
Nonexercisers				52
Unclassified				298

Table 3

Participant Classification

Condition	Descriptive	Important	Positive	Negative
Exerciser Schematics	8-11	8-11		
Aschematics	5-7	1-7		
Nonexercise Schematics	1-4	8-11	6-11	1-5

Table 4

Participant Distribution at Time One as Compared to Time Two

		Time One			
		Exerciser	Aschematic	Nonexerciser	UnclassifiedTotal
Time Two	Exerciser	37	2	0	645
	Aschematic	1	7	0	614
	Nonexerciser	0	0	1	34
	Unclassified	3	2	4	1019
	Total	41	11	5	2582

Table 5

Means and Standard Deviations for Exercise Intention and Behavior:Self Report Data

Schema	Exerciser	Aschematic	Nonexerciser	Total
Intention Strenuous	10.4 (7.0)	3.6 (3.9)	3.0 (3.9)	8.8 (6.3)
Intention Moderate	10.6 (7.8)	8.4 (6.3)	8.1 (7.8)	10.0 (7.6)
Strenuous Exercise	8.5 (7.0)	2.3 (2.8)	1.2 (1.6)	7.0 (5.9)
Moderate Exercise	8.3 (7.9)	6.9 (7.2)	5.8 (6.3)	7.9 (7.7)

Table 6

Means and Standard Deviations for Exercise Intention and
Objective Exercise Behavior

Schema	Exerciser	Aschematic	Nonexerciser	Total
Objective Intention	13.0 (5.7)	5.7 (5.9)	8.4 (7.0)	12.7 (5.8)
Objective Exercise	3.5 (5.0)	0.7 (1.6)	0.9 (1.7)	3.0 (4.4)

Table 7
Correlations Between Intention and Self Reported and Objective Exercise

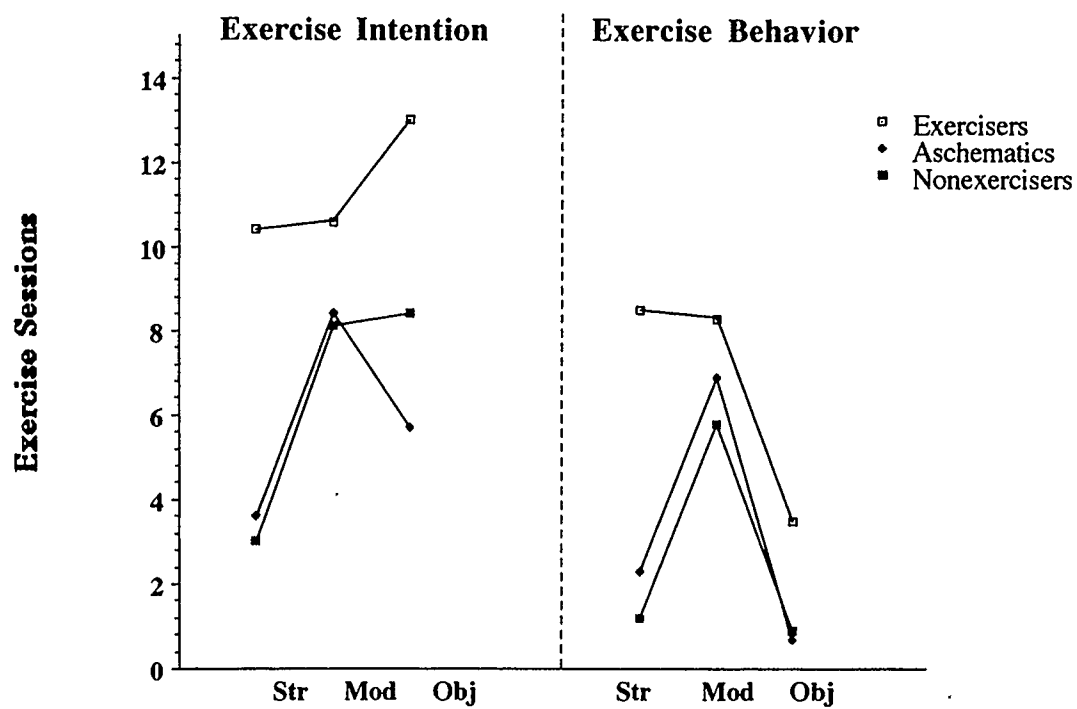
Schema	Exerciser	Aschematic	Nonexerciser	Total
Strenuous Exercise	.68 (527)	.62 (106)	.34 (52)	.67 (685)
Moderate Exercise	.40 (527)	.26 (106)	.45 (52)	.38 (685)
Objective Exercise by location	.28 (298)	.19* (41)	.15* (19)	.26 (358)
Objective Exercise Total (715)	.42	.28 (155)	.31 (76)	.39 (946)

Note: All correlations are significant at $p < .01$ except '*' which are not significant. Sample sizes are indicated in parentheses.

Figure Captions

Figure 1. Exercise intention and exercise behavior for self report and objective exercise. Str indicates strenuous exercise, Mod, indicates moderate exercise, and Obj, indicates exercise attendance at the university fitness facilities.

Figure 1. Exercise intention and exercise behavior for self report and objective exercise.



Appendix A

Verbal Consent

Hello, my name is Paul Estabrooks. I am a M.Sc. student here at the University of Calgary. I am presently engaged in preparing my thesis study and am looking for participants. I would like to give you a basic idea of the goals of the study and what your participation will entail should you choose to be involved.

The purpose of this study is to determine the cognitive functioning of self schemas. Self schemas are knowledge structures developed to understand, integrate, or explain one's behavior in a number of domains. Your participation in this study would include filling out two questionnaires. The first, which will take about ten minutes, includes demographic data, a series of questions that determine self image, and a behavioral intention question. The second questionnaire, which takes about three minutes, will be administered in four weeks time and will include an identification sheet which will require your name and student identification number as well as a measure of behavior. The information gathered from this study will be of great benefit to the area of self schema research.

Your involvement in this project is purely voluntary and you may avoid any item which makes you feel uncomfortable. The data collected will be strictly confidential, your student identification number will be used as your study identification number to ensure anonymity. This number will not be used for any purpose outside of this study.

Appendix B

Questionnaire One

The purpose of this study is to determine how self image effects intentions and behaviors. Your participation in this study is completely voluntary and in no way will effect course evaluation. You will be free to withdraw from the study at any time. Participation in this study will include filling out two questionnaires, one today and one in four weeks time. Both questionnaires will take between five and ten minutes to complete. Although your participation is voluntary all those individuals who complete both questionnaires will have their name included in a draw for \$100.00. All information that is collected will be strictly confidential and will not be used outside of this study. Your signature will be interpreted as an indication of your consent to participate.

 Name

Date

* Any concerns may be directed to Dr. M. Hawes Chair of Ethics Committee. 220-3432.

This part of the questionnaire is needed to help understand the characteristics of the people participating in the study and whether the findings might generalize to others with similar characteristics. For this reason it is very important information. It is also very important that you enter your student ID number as your first and second questionnaires will be matched using this number. However, if you feel uncomfortable answering any of the following questions, please feel free to skip them.

Name_____

Student ID Number_____

Male_____Female_____ Telephone #_____

Age_____ Year in University_____ Faculty_____

Self Schema Status Questionnaire

The following 15 items deal your self image. Each item will be followed by an 11 point scale which refers to the specific item, please read each carefully. 1 represents Does not describe me and 11 represents does describe me, so the higher the number you circle the more you feel the item describes you. Use the scale to respond how descriptive of you each item is by circling the appropriate number.

Does Not Describe me	1	2	3	4	5	6	7	8	9	10	11	Describes me
1. Spontaneous	1	2	3	4	5	6	7	8	9	10	11	
2. Driven by logic	1	2	3	4	5	6	7	8	9	10	11	
3. Physically active	1	2	3	4	5	6	7	8	9	10	11	
4. A concrete thinker	1	2	3	4	5	6	7	8	9	10	11	
5. A follower	1	2	3	4	5	6	7	8	9	10	11	
6. Creative	1	2	3	4	5	6	7	8	9	10	11	
7. Honest	1	2	3	4	5	6	7	8	9	10	11	
8. Exercises regularly	1	2	3	4	5	6	7	8	9	10	11	
9. Cautious	1	2	3	4	5	6	7	8	9	10	11	
10. Spiritual	1	2	3	4	5	6	7	8	9	10	11	
11. Adventurous	1	2	3	4	5	6	7	8	9	10	11	
12. A leader	1	2	3	4	5	6	7	8	9	10	11	
13. Friendly	1	2	3	4	5	6	7	8	9	10	11	
14. Keeps in shape	1	2	3	4	5	6	7	8	9	10	11	
15. A dreamer	1	2	3	4	5	6	7	8	9	10	11	

The next 15 items regard how important you think each trait listed is to your self image. The traits are the same as the previous page but the question is different. Regardless of whether or not the trait describes you, rate its importance to your self image using the scale given below, 1 represents not important at all to your self image and 11 represents very important to your self image. The higher the number you circle the more important you believe the trait to be to your self image.

Not Important at all 1 2 3 4 5 6 7 8 9 10 11 Very Important

1. Spontaneous	1	2	3	4	5	6	7	8	9	10	11
2. Driven by logic	1	2	3	4	5	6	7	8	9	10	11
3. Physically active	1	2	3	4	5	6	7	8	9	10	11
4. A concrete thinker	1	2	3	4	5	6	7	8	9	10	11
5. A follower	1	2	3	4	5	6	7	8	9	10	11
6. Creative	1	2	3	4	5	6	7	8	9	10	11
7. Honest	1	2	3	4	5	6	7	8	9	10	11
8. Exercises regularly	1	2	3	4	5	6	7	8	9	10	11
9. Cautious	1	2	3	4	5	6	7	8	9	10	11
10. Spiritual	1	2	3	4	5	6	7	8	9	10	11
11. Adventurous	1	2	3	4	5	6	7	8	9	10	11
12. A leader	1	2	3	4	5	6	7	8	9	10	11
13. Friendly	1	2	3	4	5	6	7	8	9	10	11
14. Keeps in shape	1	2	3	4	5	6	7	8	9	10	11
15. A dreamer	1	2	3	4	5	6	7	8	9	10	11

The same 15 items will be used again to determine either your positive or your negative ratings of the traits listed. Regardless of whether or not the trait describes you, or is important to you, use the scale given below to rate the following traits. This time 1 represents negative and 11 represents positive, so the higher the number you circle the more positive you think the trait is.

	Negative	1	2	3	4	5	6	7	8	9	10	11	Positive
1. Spontaneous		1	2	3	4	5	6	7	8	9	10	11	
2. Driven by logic		1	2	3	4	5	6	7	8	9	10	11	
3. Physically active		1	2	3	4	5	6	7	8	9	10	11	
4. A concrete thinker		1	2	3	4	5	6	7	8	9	10	11	
5. A follower		1	2	3	4	5	6	7	8	9	10	11	
6. Creative		1	2	3	4	5	6	7	8	9	10	11	
7. Honest		1	2	3	4	5	6	7	8	9	10	11	
8. Exercises regularly		1	2	3	4	5	6	7	8	9	10	11	
9. Cautious		1	2	3	4	5	6	7	8	9	10	11	
10. Spiritual		1	2	3	4	5	6	7	8	9	10	11	
11. Adventurous		1	2	3	4	5	6	7	8	9	10	11	
12. A leader		1	2	3	4	5	6	7	8	9	10	11	
13. Friendly		1	2	3	4	5	6	7	8	9	10	11	
14. Keeps in shape		1	2	3	4	5	6	7	8	9	10	11	
15. A dreamer		1	2	3	4	5	6	7	8	9	10	11	

Behavioral Intention

The following items in this questionnaire regard the behaviors you plan to do over the next four weeks. Please enter the number of times you plan on performing the behavior over the next four weeks and refer to the following definitions when completing this item.

Intention - what you plan to do.

Church - any institution attended for the purpose of worship.

Moderate drinking - Consumption of 2 to 4 alcoholic beverages in an evening.

Heavy drinking - Consumption of 5 or more alcoholic beverages in an evening.

Moderate exercise - Not exhausting, light perspiration for at least 20 minutes. (eg. fast walking, baseball, tennis).

Strenuous exercise - Heart beats rapidly, sweating for at least 20 minutes. (eg. running, jogging, weight training).

Studying - active learning for a period of at least 1 hour.

1. I intend to exercise strenuously ____ times during the next four weeks.
2. I intend to exercise moderately ____ times during the next four weeks.
3. I intend to go to church ____ times during the next four weeks.
4. I intend to pray ____ times during the next four weeks.
5. I intend to drink moderately ____ times during the next four weeks.
6. I intend to drink heavily ____ times during the next four weeks.
7. I intend to study ____ times during the next four weeks.
8. I intend to read for leisure ____ times during the next four weeks.
9. I intend to go to a movie ____ times during the next four weeks.
10. I intend to watch a video ____ times during the next four weeks.
11. I intend to exercise at the Uni fitness facilities ____ times over the next 4 weeks.
12. I intend to study at the library ____ times during the next four weeks.
13. I intend to drink heavily on campus ____ times during the next four weeks.
14. I intend to go to an artistic performance on campus ____ times during the next four weeks.

Behavioral Locations

The next four questions regard where you perform a number of different behaviors. Please respond by checking the most likely location, even if you do not perform the behavior

1. If you were to exercise, what location would you most likely use:

Outdoors____ University fitness facilities____ A private club____ A Sport
Complex____ Home____

2. If you were to pray, what location would you most likely use:

Church____ Home____ University____ Outdoors ____

3. If you were to study, what location would you most likely use:

University____ Home____ Elsewhere____

4. If you were to drink, what location would you be most likely to use:

A university bar____ Your home____ A bar away from the university____

Appendix C

Questionnaire Two

This is a follow up questionnaire to the initial questionnaire which was administered four weeks ago. Please remember that your student ID number is necessary to match your responses from this questionnaire to those of the previous one.

Student ID Number _____

Behavioral Intention

The following items in this questionnaire regard the behaviors you plan to do over the next four weeks. Please enter the number of times you plan on performing the behavior over the next four weeks and refer to the following definitions when completing these items.

Intention - what you plan to do.

Church - any institution attended for the purpose of worship.

Moderate drinking - Consumption of 2 to 4 alcoholic beverages in an evening.

Heavy drinking - Consumption of 5 or more alcoholic beverages in an evening.

Moderate exercise - Not exhausting, light perspiration for at least 20 minutes. (eg. fast walking, baseball, tennis).

Strenuous exercise - Heart beats rapidly, sweating for at least 20 minutes. (eg. running, jogging, weight training).

Studying - active learning for a period of at least 1 hour.

1. I intend to exercise strenuously ____ times during the next four weeks.
2. I intend to exercise moderately ____ times during the next four weeks.
3. I intend to go to church ____ times during the next four weeks.
4. I intend to pray ____ times during the next four weeks.
5. I intend to drink moderately ____ times during the next four weeks.
6. I intend to drink heavily ____ times during the next four weeks.
7. I intend to study ____ times during the next four weeks.
8. I intend to read for leisure ____ times during the next four weeks.

9. I intend to go to a movie ____ times during the next four weeks.
10. I intend to watch a video ____ times during the next four weeks.
11. I intend to exercise at the University fitness facilities ____ times over the next four weeks.
12. I intend to study at the library ____ times during the next four weeks.
13. I intend to drink heavily on campus ____ times during the next four weeks.
14. I intend to go to an artistic performance on campus ____ times during the next four weeks.

Behavioral Information

The second section of this questionnaire regards behavioral participation. Please refer to the previous definitions when completing this section of the questionnaire.

1. I exercised strenuously ____ times during the past four weeks.
2. I exercised moderately ____ times during the past four weeks.
3. I went to church ____ times during the past four weeks.
4. I prayed ____ times during the past four weeks.
5. I drank moderately ____ times during the past four weeks.
6. I drank heavily ____ times during the past four weeks.
7. I studied ____ times during the past four weeks.
8. I read for leisure ____ times during the past four weeks.
9. I went to a movie ____ times during the past four weeks.
10. I watched a video ____ times during the past four weeks.
11. I exercised at the University fitness facilities ____ times over the past four weeks.
12. I studied at the library ____ times during the past four weeks.
13. I drank heavily on campus ____ times during the past four weeks.
14. I went to an artistic performance on campus ____ times during the past four weeks.

Appendix C



To: P. Estabrooks

From : M. R. Hawes, Chair Faculty Ethics Panel

Date: Oct 4, 1995

Re: Submission for Ethics approval

'Self schema as a predictor of exercise participation'

All ethical concerns with respect to this study have been cleared and the project is approved. Please note that the approval is for the procedures as stated, any proposed changes to the approved procedures should be brought to the attention of the Ethics chairperson before they are incorporated into the study.

A handwritten signature in black ink, appearing to read 'Michael R. Hawes', is positioned above the printed name.

Michael R. Hawes
Chair, Departmental Ethics Panel