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THE ROLE OF GROUP COHESION IN THE
EXERCISE BEHAVIOUR OF OLDER ADULTS

By

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Submitted in partial fulfillment of the
Requirements for the degree of
Doctorate of Philosophy

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ABSTRACT

The general purpose of this dissertation was to examine the impact of social factors generally and group cohesion specifically on short and long term exercise participation of older exercise class participants. To achieve this general purpose four studies were completed. The purpose of Study 1 ($n=200$, $M=68$ years) was to assess older adults' perceptions of the role that social factors play in exercise behavior of class participants. Thus, using a qualitative approach, older adults were asked to identify their motives for and barriers to exercising. Study 2 ($n=75$, $M=67.7$ years) examined the predictive ability of four dimensions of cohesion to exercise participation at 1, 6, and 12 months. Study 3 ($n=33$, $M=75.1$ years) examined the effectiveness of a team building intervention (based on Study 2 results and designed to enhance class cohesion) for improving exercise adherence and return rates. Finally, the purpose of Study 4 was to initiate the development of a psychometrically sound questionnaire for the assessment of group cohesion within exercise classes for older adults.

The results of Study 1 revealed that older adults rank functional fitness, general health, and social interaction as the three most important reasons for exercising in classes. Also, illness, weather, and competing activities were perceived to be the most frequently encountered barriers to attending physical activity classes.

Study 2 showed that 3 measures of cohesion were significantly related to exercise class attendance at one month follow-up (Individual Attractions to the Group-Social, $r=.29$; Group Integration-Social, $r=.36$; and, Group Integration-Task,

$r=.26$). Only Group Integration-Task was significantly related to class attendance at 6 ($r=.25$) and 12 ($r=.25$) months follow-up.

Study 3 showed that participants in the team building condition a) attended more classes than the control ($p<.05$) and placebo ($p<.05$) conditions and b) had a higher return rate following a 10-week hiatus (93% versus 40%) than the control condition ($p<.05$).

Five projects were undertaken to achieve the purposes of Study 4--the development of a cohesion inventory for use with older adults. In overview, the 21-item Physical Activity Environment Questionnaire (PAEQ) was based upon the Carron, Widmeyer, and Brawley (1985) conceptualization of group cohesion. Data from three samples provided preliminary evidence that the PAEQ possesses high internal reliability within each scale as well as content, concurrent, factorial, and predictive validity.

KEY WORDS: Adherence, Team-building, Attractions to the Group, Group Integration, Physical Activity Environment.

ACKNOWLEDGEMENTS

I must first acknowledge my family. My father, Eugene ‘Pete’ Estabrooks, provided me with a love of physical fitness and the belief that I could do anything to which I put my mind. My mother, Peggy Estabrooks, instilled in me the patience necessary to achieve my goals and taught me how to take life a little less seriously (a lesson I am sure Dad thinks I learned far too young). Mom and Dad, thank you, I couldn’t have done this without you, and I love you. To my siblings, thank you for a) always being there when I needed advice, b) letting me know when I needed advice, and c) providing me with the best role models I could have asked for. To my nieces and nephews, thank you for being my best escape from the pressures of academia.

I would like to thank Krista Munroe and Paul Dennis. Without these two individuals my first year at Western would have been a disaster. To Anne Powell, who probably deserves a page of acknowledgements all of her own thanks for the shoulder to lean on and the smile that never fades. To my family away from home: Rob, Jen, Max, Flash, The Boy, Maria and Paul, it was great. To the Forest City Rugby Club, thanks for being friends, guinea pigs, and teammates.

I would be remiss not to acknowledge the Social Sciences and Humanities Research Council of Canada for providing me with a Doctoral Fellowship. Also, Dr. Larry Brawley, Dr. Alison Doherty, Dr. Craig Hall, and Dr. Clive Seligman, my examining committee thank you for providing me with information and revisions that improved my dissertation immensely.

Finally, and on his own page (as per his instructions), I must acknowledge the help, friendship, leadership, and supervision of Albert V. Carron. Bert went over and above his duty as a supervisor. Socially, he welcomed mw (and other students) into his home for dinners, parties, and family holidays. Academically, Bert gave me exceptional direction and showed me how a 'real writer' writes. Actually, I am a little worried about this acknowledgement section because Bert hasn't proof read it. I am proud to say that Bert never made me cry.

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Introduction

In Western society, individuals respond to the aging process with affective states ranging from delight to dread. Anecdotally, children eagerly await the transition from childhood to their teenage/adolescent years. Similarly, adolescents fondly imagine their legal drinking days. Conversely, the transition from young adulthood to middle age, and finally, to old age is characterized by apprehension and insecurity regarding physical and mental capabilities. Indeed, the aging process has long been associated with an inevitable reduction in human function. It has been documented that, in the later years of life, aging has a detrimental effect on body composition, the cardiovascular system, the respiratory system, visceral functions, and the nervous system (Shephard, 1997).

Systemic Changes Due to Aging

As a person ages, the composition of his/her body becomes proportionally less muscular and significantly more frail (Shephard, 1997). The implications of this change of body composition are a resultant loss of strength and function, an increased risk of falls, possible confinement to bed, and premature death (Poor, Jacobsen, & Melton, 1994; Vandervoort & McCommas, 1986). There is also evidence to show that aging is associated with reduced capabilities of the cardiovascular, respiratory, and visceral systems (Shephard, 1997).

Perhaps the most feared impact that aging has on the human organism is the loss of cerebral function. As age increases, short term memory decreases as does one's ability to recall information from long term memory stores (Abourezk, 1989; Benham & Heston, 1989). Increased risk of suffering from depression may

accompany old age as does an increase in reaction times to available stimuli (Charness, 1991; Craft & Landers, 1998).

From the information presented above, it is clear that aging has a deleterious impact on human function. However, there has been some speculation that this loss of function due to aging may be confounded by reductions in physical activity associated with aging (Stephens & Caspersen, 1994). For example, Shephard (1997) noted that:

The habitual physical activity of the general population diminishes with aging, and even if an older individual continues to participate in some form of sport, it is likely that training sessions become shorter and less intense than when that person was younger. Thus, any age-related decrease in muscle strength or aerobic power is usually attributable to a decrease of habitual physical activity rather than to some inherent manifestation of the aging process. (p. 59)

Indeed, there is evidence to show that regular physical activity can slow, and in some cases reverse, functional losses normally associated with aging.

General Benefits of Exercise for Older Participants

Over and above the benefits of regular physical activity in combating the general processes associated with aging, it is important to consider the impact of regular physical activity on health problems often associated with the senior years. Pescatello and DiPietro (1993) found that about 80% of the population over the age of 65 have at least one or more health problems.

In a physical sense, regular physical activity in elderly individuals has been associated with decreased risk of heart disease (Haskell et al., 1992), reduced blood

pressure, and enhanced control and protection against Type II maturity on-set diabetes (Helmrick, Ragland, Leung, & Paffenbarger, 1991). Other benefits of exercise related specifically to the elderly include decreased mortality, increased strength and functional capacity, a reduced probability of falling, and increased spinal flexion (cf. Ruuskanen & Ruoppila, 1995; Sherman, Cobb, D'Agostino, & Kannel, 1994; McMurdo & Rennie, 1993). Physical activity has also been shown to assist in the management of arthritis and chronic obstructive lung disease (Carter, Coast, & Idell, 1992; Minor, Hewett, Webel, Anderson, & Kay, 1989) .

Psychologically, the impact of regular physical activity is also impressive. For example, it has been related to reductions in anxiety and depression (e.g., Craft & Landers, 1998; Petruzzello et al., 1991). Regular physical activity has also been shown to increase positive mood states (e.g., vigor) and feeling states (e.g. Gauvin & Spence, 1998). Finally, it has been shown to improve quality of and satisfaction with life in the elderly (Mihalko & McAuley, 1996).

Problematic Initiation and Adherence Rates

It is well known that despite the benefits of regular exercise and physical activity, initiation and adherence rates have been problematic. In 1981, the Canadian Fitness and Lifestyle Research Institute (CFLRI) began monitoring the physical activity patterns of Canadians. At that time, it was observed that only 15% of women and 24% of men over 65 years of age could be considered active (i.e., an energy expenditure equivalent to walking one hour daily). In the most recent CFLRI survey, statistics show that participation is up modestly in both sexes, with 18 % of women and 33% of men over 65 years of age categorised as being active (CFLRI, 1996).

However, 31% of all women over the age of 65 are still considered completely sedentary (data are unavailable for males).

Of additional concern is the attrition rate associated with physical activity programs. A consistent finding has been a 50% drop out rate within the first 3 to 6 months of beginning a program of physical activity (Dishman, 1988).

Parenthetically, it should be noted that this is not a problem specific to the elderly.

Research has shown that this dropout rate is consistent regardless of the age or population of study (Robison & Rogers, 1994).

Group Cohesion and Physical Activity Participation

Not surprisingly, the prevention of poor health in the senior years has become an important health priority. As a consequence, various researchers have attempted to identify models and theories capable of explaining and predicting exercise adherence. One promising approach has been to focus on the role of important social factors in an exercise participant's life with a view to targeting these social factors as possible agents of change. In 1996, Carron, Hausenblas and Mack statistically summarized the literature through the use of meta-analysis. Although a number of social factors were found to be important (e.g., family, class instructors), the presence of a highly task cohesive group was found to have the greatest influence on exercise adherence (i.e., a moderate to large effect size of .62).

The literature examining the impact of group cohesion on exercise participation has been based on the conceptual model of group cohesion developed by Carron, Widmeyer, and Brawley (1985). They have defined group cohesion as "a dynamic process reflected by the tendency of a group to stick together and remain

united in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs” (Carron et al., 1998, p. 213). This definition has been conceptualized to be reflected by four dimensions: a) Individual Attractions to the Group-Task, the individual member’s perceptions of his or her personal involvement with the group task; b) Individual Attractions to the Group-Social, the individual member’s perceptions of his or her personal acceptance and social interaction with the group; c) Group Integration-Task, the individual member’s perceptions of the similarity, closeness, and bonding that exists within the group as a totality around its collective task; and, d) Group Integration-Social, the individual group member’s perceptions of the similarity, closeness, and bonding that exists within the group as a totality around social concerns (Carron et al., 1985). Within the domain of exercise and physical activity, research examining the relationships with group cohesion may be categorized into factors contributing to group cohesion and the group cohesion-adherence relationship.¹

Table 1 provides an overview of research in the exercise domain that has examined factors contributing to the development of group cohesion in an exercise setting and Table 2 provides a summary of studies concerned with the cohesion-adherence issue. Insofar as the studies in Table 2 are concerned, research has followed a logical path progressing from issues centering around description, to issues centering around prediction, to finally, issues centering around intervention/manipulation.

As Table 2 shows, Carron, Widmeyer, and Brawley (1988, Study 1) were the first to examine the effect of cohesion on adherence and withdrawal from physical

activity groups. Participants were fitness class adherers (n=120) and nonadherers. The Group Environment Questionnaire (GEQ, the questionnaire is discussed subsequently in the Methods section of Study 2) was administered to determine perceptions of four cohesion constructs. The physical activity adherers and nonadherers were correctly classified (61%) by a function that included two cohesion measures, Individual Attractions to the Group-Task and Individual Attractions to the Group-Social. It was concluded that a relationship was present between cohesion and adherence in physical activity classes (Carron et al., 1988).

Spink and Carron (1992) then examined the relationship between group cohesion and adherence (operationally defined as absenteeism and lateness) in females (n=171) participating in exercise classes. Four weeks of attendance and punctuality data were collected in Weeks 8 to 12 of a 13-week session. The GEQ was administered in Week 13. The cohesion dimensions associated with absenteeism were Individual Attractions to the Group-Task and Individual Attractions to the Group-Social, whereas Individual Attractions to the Group-Task accounted for the greatest difference between those participants who were never late and those who were late four or more times. It was concluded that these results supplied initial support for the relationship between group cohesion and the adherence of female exercise participants.

Table 1. A review of research examining factors leading to the development of group cohesion in the exercise class settings.

Author, Year	Sample	Design	Independent Variable	Results
Carron & Spink, 1995 (Study 1)	134 female participants in University aerobic classes.	Prospective. Single assessment of cohesion.	Group Size. Small < n=20 Large > n=40	Small groups had stronger perceptions of Group Integration-Task and Group Integration Social.
Carron & Spink, 1995 (Study 2)	173 female participants in aerobic classes offered in a University setting.	Prospective. Single assessment of cohesion.	Group Size. Small < n=20 Large > n=40	Although Attractions to the Group-Task, Group Integration-Task, and Group Integration Social were all higher in smaller groups, Attractions to the Group-Task was the most discriminating factor.
Carron & Spink, 1995 (Study 3)	61 female participants in aerobic classes offered in a University setting.	Prospective. Cohesion was assessed at 2 time points following the 3 rd and 8 th weeks.	Group Size. Small < n=20 Large > n=40	Group Integration-Task and Group Integration-Social were larger in smaller groups. No time effects were found.
Carron & Spink 1993	17 aerobic classes offered in a University setting.	Prospective.	Team building Experimental =8 classes. Control=9 classes.	The team-building strategy based on manipulating the group environment, structure, and processes increased Attractions to the Group-Task in the experimental condition.
Carron & Spink, 1995 (Study 4)	83 female participants in aerobic classes offered in a University setting.	Prospective.	Team building Received in small and large exercise groups.	Team building counteracted the group size/cohesion relationship.

Table 2. A review of research examining outcomes associated with a cohesive exercise class.

Author. Year	Sample	Design	Dependant Variable	Results
Carron, Widmeyer & Brawley, 1988 (Study 1)	120 exercise class adherers. 30 exercise class nonadherers. 102 elite sport adherers. 27 elite sport nonadherers.	Retrospective	Adherence	Exercise class adherers were distinguished from nonadherers by Attractions to the Group-Task and Social. Elite sport adherers were distinguished from nonadherers by Attractions to the Group-Task, Group Integration-Task, and Group Integration-Social.
Spink & Carron, 1992	171 female participants in aerobic classes offered in a university setting.	Retrospective	Adherence	Attractions to the Group-Task and Social successfully distinguished between participants who never missed classes and those who missed 6 or more classes. Attractions to the Group-Task was also associated with punctuality.
Spink & Carron, 1994 (Study 1)	37 female participants in aerobic classes offered in a university setting.	Prospective	Adherence	Attractions to the Group Task, Group Integration-Task, and Group Integration-Social all discriminated adherers from dropouts.
Spink & Carron, 1994 (Study 2)	37 female participants in aerobic classes offered in a private fitness facility.	Prospective	Adherence	Only Attractions to the Group-Social and Group Integration-Social discriminated adherers from dropouts.
Spink & Carron, 1993	17 aerobic classes offered in a university setting.	Prospective. Experimental.	Adherence	A team-building intervention successfully manipulated Attractions to the Group-Task and resulted in fewer dropouts and late arrivals than the control classes.
Brawley, Carron, & Widmeyer, 1988. (Study 2)	120 members of exercise classes offered in a university setting.	Concurrent	Group Resistance to Disruption.	Group Integration-Task was found to be a modest predictor of perceptions regarding the group's ability to resist disruption.

Carron & Spink, 1993	17 aerobic classes offered in a university setting.	Prospective. Experimental.	Satisfaction	Participants in team-building intervention classes reported being more satisfied with the exercise class than those in the control classes.
Courneya, 1995	99 members of aerobic classes offered in a university setting.	Prospective	Affect during exercise.	Attractions to the Group- Task, Attractions to the Group-Social, and Group Integration-Task were all related to positive affect during exercise.
Courneya & McAuley, 1995	62 members of aerobic classes offered in a university setting.	Prospective	Attitude	All dimensions of cohesion were significantly related to attitude. Attractions to the Group-Task was associated with the largest relationship.

Although these results were considered to be promising, each of the above studies was retrospective in nature, leaving the reader unsure as to the direction of the relationship between group cohesion and exercise adherence. For this reason, Spink and Carron (1994) conducted two prospective studies to examine the predictive ability of group cohesion on exercise adherence. The purpose of Study 1 was to determine if perceptions of group cohesion secured relatively early in an exercise program would predict subsequent participant adherence or drop out. The 37 female participants attended exercise classes offered 1 hour per day 3 days per week at a major university. The GEQ was used to assess the four dimensions of cohesion in Week 3 of a 13-week program. Adherence was operationalized as attendance during the final four weeks of the program. The results showed that Individual Attractions to the Group-Task could discriminate between adherers and dropouts. A complete function that included Individual Attractions to the Group-Task and two other cohesion measures, Group Integration-Task and Group Integration-Social,

successfully categorized 78% of the participants into adherers and drop-outs (Spink & Carron, 1994).

Study 2 was a replication of Study 1 with one exception; it was conducted at a private fitness club rather than in a university setting (Spink & Carron, 1994, Study 2). Participants (46 females) again completed the GEQ during the third week of a 13-week program and attendance again was monitored for the final 4 weeks of the program. The results showed that only two of the dimensions of group cohesion were necessary to distinguish adherers from dropouts; Individual Attractions to the Group-Social and Group Integration-Social. A function containing the 2 components successfully categorized 65% of the participants. On the basis of their two studies, Spink and Carron (1994) concluded that: a) cohesive feelings can develop early in group situations (within the first 3 weeks) and those feelings of cohesion are related to whether an individual adheres to a program; b) the type of cohesion necessary for adherence to exercise classes is dependent upon the exercise setting (e.g. a university setting versus a club setting); and, c) a team-building intervention strategy might be an effective modality for increasing individual exercise behavior.

Given the consistent findings from the descriptive studies outlined above, a program of intervention (team-building) was developed by Carron and Spink (1993) to improve cohesion within exercise classes. The intervention focused on utilizing five group dynamics principles: a) development of a feeling of distinctiveness; b) assignment of group roles; c) development of group norms; d) provision of opportunities to make sacrifices for the group; and, e) development of interaction and communication within the group (Carron & Spink, 1993).

To examine the efficacy of this team-building intervention for developing group cohesion within exercise classes Carron and Spink (1993), randomly assigned university aerobics classes to a control (n= 9) or team-building (n=8) condition. Assessments during the eighth week of a 13-week program showed that the scale, Individual Attractions to the Group-Task, was significantly greater in the team-building condition. Similarly, in a second intervention study, team building also improved perceptions of Individual Attractions to the Group-Task and was associated with fewer dropouts and late arrivals (Spink & Carron, 1993).

Brawley, Carron, and Widmeyer (1988, Study 2) also examined the relationship between perceptions of cohesion and resistance to possible disruptions in the group in an exercise setting. Participants (n= 120) indicated their perceptions of cohesion (using the GEQ) and the strength of their belief that their exercise class could withstand the negative impact of disruptive events. Using extreme groups based on perceptions of the group's resistance to disruption, Brawley and his associates found that Group Integration-Task significantly discriminated between participants with high or low perceptions of the group's resistance to disruption.

Recently, research examining the impact of group cohesion on exercise participation has examined possible mediators of the relationship. Courneya (1995) and Courneya and McAuley (1995) examined the relationship between group cohesion and affect, in the form of feeling states and attitude. For the undergraduate students tested in both studies, higher perceptions of Individual Attractions to the Group-Task, Individual Attractions to the Group-Social, and Group Integration-Task

were related to higher feeling states during exercise while a composite of group cohesion was predictive of attitude towards exercise.

In summary, on the basis of research conducted to date, it seems reasonable to conclude that individuals who hold stronger beliefs about the cohesiveness of their exercise class will attend more exercise classes, be more likely to arrive on time, be less likely to drop out, be more resistant to disruptions in the group, and be more likely to experience greater amounts of positive affect related to exercise. Although these conclusions are encouraging, a number of questions remain unanswered.

First, can the results be generalized to programs of longer duration? The effect of group cohesion on physical activity adherence has been examined in programs of short duration; the modal length of programs was 12 weeks. Further, typically, cohesion was only used to describe/predict adherence behavior for a 4-week block of time. For reasons that are discussed in greater depth in the Introduction to Study 3 of this dissertation, it is reasonable to assume that cohesion effects in exercise classes will not generalize over lengthy (i.e., 6 months, one year) periods of time.

Second, can the results be generalized to an older population? The effect of group cohesion on physical activity adherence has been studied exclusively with university aged participants. For reasons that are discussed in greater depth in the introduction to Study 1, it is not reasonable to assume that the psychological impact of social factors will be identical for university age and older adults.

Research on group or home-based exercise programs is equivocal regarding the generalizability of these findings to long-term participation and an older population. For example, in a review of physical activity interventions targeting older

adults, King and her associates (1998) warned that a group-based intervention may be effective in the short term but counter productive for long-term participation. This is based on the assumption that individuals in group based trials become dependent on the group. Hence, the inevitable cessation of the program is accompanied by cessation (or reduction) of activity.

In contrast, Brawley, Rejeski, and Lutes (in press) examined the efficacy of a group-based intervention on improving exercise adherence in older adults over a 9 month period. Sixty participants were randomly assigned to a one of three conditions--wait-list control, a standard physical activity program, or a group-mediated cognitive behavioral intervention. Although the cohesive nature of the group was not assessed, participants in the group-mediated cognitive behavioral intervention exercised more frequently than the wait-list control during 3 months of structured classes and 3 months of home based exercise. Further, the group-mediated intervention participants were still exercising more frequently than the standard physical activity program participants at 9 months.

Although the Brawley et al., (in press) group-based intervention was successful, it provided no assessment of cohesion. Therefore, the general purpose of the dissertation was to examine the impact of social factors generally and group cohesion specifically on short and long term exercise participation of elderly exercise class participants. To this end, four studies were undertaken. The purpose of Study 1 was to assess older adults' perceptions of the role that social factors play in exercise behavior. Thus, using an open-ended questionnaire, older adults identified their motives for, and barriers to, exercising. The purpose of Study 2 was to examine the

predictive utility of cohesion for exercise adherence over a relatively short (i.e., 6 months) and long term period (i.e., one year). On the basis of the results of Study 2, a team-building intervention program was developed and tested in Study 3. Finally, it became apparent throughout the course of the dissertation research that the Group Environment Questionnaire was problematic for older exercise participants. Consequently, the purpose of Study 4 was to begin to develop a psychometrically sound questionnaire for the assessment of group cohesion in exercise classes for older adults.

Following one of the appropriate dissertation formats outlined by The University of Western Ontario, each study has been prepared as a submission-ready manuscript. As such, some of the information given in the introduction of each chapter is repetitive.

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Footnotes

1. Although presented as factors contributing to group cohesion, it should be noted that these relationships are most likely reciprocal in nature.

Study 1

A Phenomenological Analysis of Motives and Barriers to Exercise

Participation of Older Adults

It has been well documented that the North American population is becoming proportionally older (United States Bureau of Census, 1995). Concomitantly, advancing age is often characterized by a loss of functional ability (Shephard, 1997). However, regular physical activity has been linked to sustained independent living due to improved functional ability (U.S. Department of Health and Human Services, 1996). Unfortunately, participation in regular physical activity declines with age (Canadian Fitness and Lifestyle Research Institute, 1996). Moreover, once individuals do begin a regular program of physical activity, 50% typically drop out—a statistic that holds regardless of demographic profile—within the first 3 to 6 months (Robison & Rogers, 1994). Given the importance of exercise for the population generally, and for older adults specifically, two important questions arise: a) what motivates older adults to engage in regular physical activity?, and, b) what barriers inhibit them from engaging in regular physical activity?

A growing body of research has examined the impact of various motives and barriers associated with exercise across the age spectrum. For example, Booth (1997) and his associates examined perceived barriers to physical activity in a sample of inactive Australians ($n=1,232$) ranging in age from 18 to 78 years. Participants were provided with lists of possible barriers and asked to state which items were personally applicable. It was determined that older Australians (>60 years) encounter different barriers to physical activity participation than do their younger counterparts.

Similarly in a recent report published by the Canadian Fitness and Lifestyle Research Institute (CFLRI, 1996), older Canadians (>65 years) were found to rank barriers to physical activity in a different order than their younger counterparts.

Although the Booth et al. (1997) and CFLRI (1996) studies are useful for providing insight into the catalysts for and detriments to exercise, both relied on lists of researcher-derived barriers from which participants, heterogeneous with respect to age, were forced to choose. There are several advantages to a more open-ended approach that focuses exclusively on participants more homogeneous in age. First, barriers do change over the age spectrum (CFLRI, 1996). Thus, researchers may not be aware of and/or include the total sample of possible barriers salient to respondents of all ages in any list provided. Second, as the Booth et al. and CFLRI studies showed, some barriers are more salient than others. An open-ended protocol in which participants draw on their own resources is most likely to produce a sample of the most salient barriers. Conversely, a structured protocol (i.e., researcher-derived list of barriers) could alert respondents to barriers that they might not consider otherwise.

A search of the literature produced only one study that examined *both* motives and barriers to exercise participation in older adults using a qualitative research protocol. With a sample of 663 elderly Finnish participants, Hirvensalo, Lampinen, and Rantanen (1998) identified health promotion and social outcomes as the most important motives for exercising. Also, the main obstacles to participation were found to be poor health and a lack of interest. How pertinent are these findings for North American older adults? Indirect evidence would suggest that the answer is probably minimal. For example the number of older adults who participate in

physical activity in Finland (almost 60%) is 100% greater than in either Canada (30%) or the United States (<30%) (Stephens & Casperson, 1994). Older adults in Finland would seem to be more strongly motivated and/or are less restricted by barriers.

Thus, the general purpose of Study 1 was to determine the motives for, and barriers to physical activity identified by older adults. In an attempt to expand upon previous research, an open-ended (qualitative) research protocol was used.

Method

Participants

The participants were volunteers ($n=200$) from 14 structured activity classes at a municipal seniors' centre. All participants who were in attendance at the classes on the day of administration completed the questionnaire. The average age was 67 years (± 7.8). A majority of participants were female (74%) and married (65%). Over 50% of the participants had completed some university, indicating a well-educated sample. The classes offered a wide range of physical activity choices, including flexibility, muscular strength, and cardiovascular activities. Four of the 14 classes were designed for participants with chronic obstructive lung disease, arthritis, or osteoporosis.

Measures

Participants completed two questionnaires. The first examined the main motives for attending the physical activity classes while the second assessed the perceived barriers to regular attendance at physical activity classes at the seniors' center. Participants also responded to demographic items designed to provide insight into the nature of the sample.

Motives for attendance. To ensure that salient motives for participation were provided, the participants were asked to “list, in order of priority, the most important reasons you have for attending exercise class”. Participants were given unlimited space on the questionnaire so that a comprehensive list could be developed.

Barriers to attendance. Participants were asked to list the most frequent barriers they encountered that would limit their participation in the exercise class. To elicit as comprehensive a list as possible, the participants were asked to “list all the possible barriers to attending your physical activity class that you have encountered in the past or can foresee encountering in the future”. Participants were given enough space to list a number of barriers.

Procedures

Participants were recruited into the study by the exercise class instructors in January at the first session of a new program of activity. Most participants were returning to the class after a brief holiday that had followed a September to December program of activity. The participants who volunteered were informed that they would be asked to complete questionnaires assessing their reasons for attending classes as well as the difficulties they encountered in regularly attending. Ethical approval for the project was obtained from the university and all participants signed a consent form. Questionnaires were administered and completed immediately or were returned at the next class.

Results

An interpretational analysis—a form of inductive analysis in which meaning units and core components emerge from the data—was conducted by the two

investigators and a research associate (Cote, Salmela, Ravia, & Russell, 1993). The open-ended responses were systematically divided into meaning units (e.g., a word, phrase, or paragraph containing one idea; Tesch, 1990). The meaning units were then labeled for classification purposes. This procedure was completed independently by each investigator and a research associate to compare and contrast labels assigned to the various meaning units. Although labels for the various categories were sometimes different (e.g. Mental Barriers vs. Psychological Barriers), an inter-rater reliability of .93 was obtained. To increase this reliability, consensus validation was used to classify the discrepant meaning units (Goetz & LeCompte, 1984). Labels with similar meanings were then organized into categories. Finally, the categories were grouped into higher order components.

Motives for Exercise

The 200 participants listed a total of 631 motives for participation. All percentages are based on the number of responses related to a category divided by the total number of responses (631). The motives for physical activity participation were grouped into 5 primary components: health motives (50%), psychological motives (31%), guidance (8%), routine (7%), and program (4%) motives (Figure 1).

An overwhelming number of meaning units illustrated the commonality of positive health outcomes (50%) as a primary motivator of physical activity participation. The functional fitness category (24%) revolved around the desire to maintain or improve balance, muscular strength, and mobility. As one participant

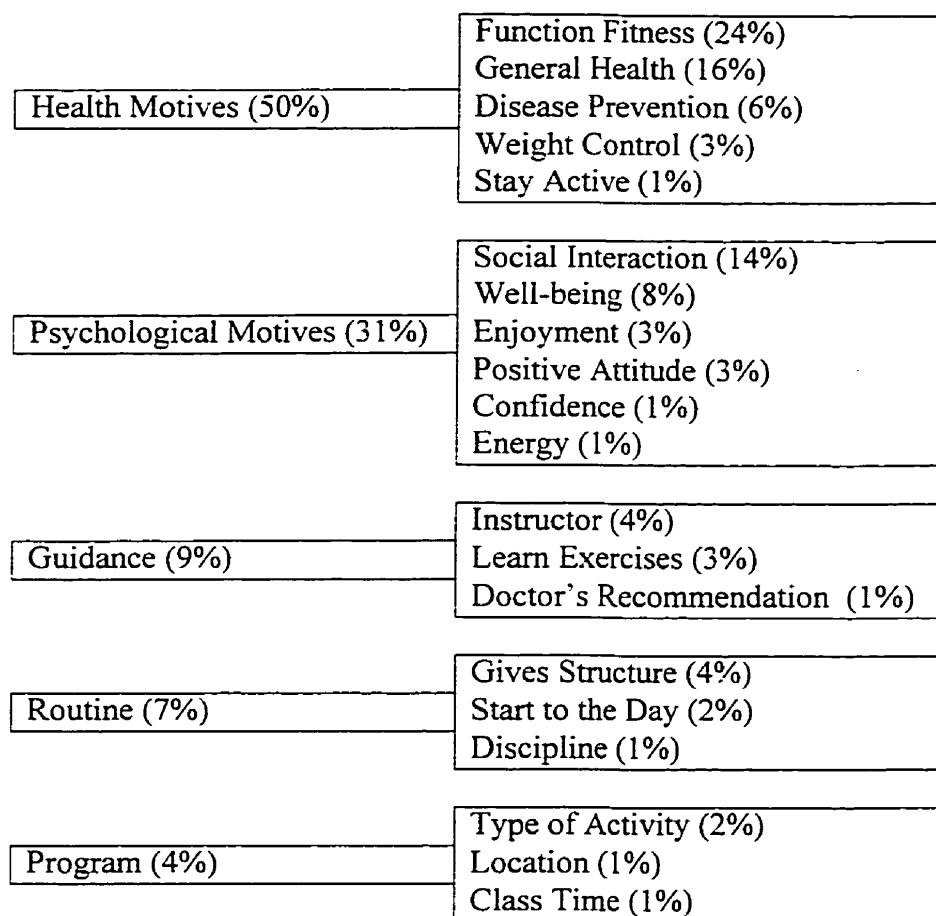


Figure 1. Motives for physical activity class participation.

stated “I exercise to improve my balance and co-ordination, and to keep as fit as possible to retain independence in later years”. Clearly the expectation that regular physical activity will ensure continued function and independence as one ages is a strong motive for participation in the elderly.

The second major category under the component of health motives, general health (16%), was comprised of more general, less specific responses e.g., “to promote general health” or “to improve my present health”. Disease prevention (6%) was the final health category introduced by the participants. This motive referred to the participants’ motivation to avoid complications of arthritis, bone loss, hypertension, and diabetes.

The second component derived from participant responses involved motives related to the exercise environment. Specifically, psychological motives (31%) are reflected in feelings of strong social ties, improved well-being, enjoyment, and a positive attitude. Social interaction (14%) was the most frequently cited psychological category and the third most frequently stated motive generally. Social interaction was typified by feelings of friendship, similarity, and bonding within the physical activity environment. Three participant statements help to illustrate the responses in this category: a) “I come to exercise to meet more like-minded people and perhaps gain new friends”, b) “I attend exercise class for communication and contact with others having common health problems”, and c) “I exercise because I enjoy the camaraderie of other participants”.

A category representing perceptions of well-being (8%) resulting from being physically active was also frequently cited as a motive for exercise. A representative participant response reflecting this category was “ I exercise to improve my well-being, it is beneficial to my body, mind, and spirit”. Also related to perceptions of well-being was participant satisfaction with quality of life.

Categories depicting enjoyment of physical activity and the resultant positive attitude from being physically active made up a combined 6% of participant responses. Simply put, one participant stated “I enjoy exercising!”. Another participant noted that, “exercising provides me with a positive mental attitude”. These quotes illustrate a fundamental motive related to the nature of the activity and its environment, that is, ‘if I like it, I will do it’.

Two of the final three major motive components were associated with the role that exercise participation can play as a forum for a) obtaining information (i.e., guidance: the provision of information), and, b) maintaining a regular daily schedule (i.e., routine). The third and final major motive component was associated with convenience of the program being offered. These three components together account for 19% of all the responses. Guidance reflected the participants' need for instruction, information, assistance, and to comply with a doctor's order. A participant's response, which illustrates this component, is "I go to exercise class because I get encouragement and assistance from the instructor, so I can get the proper instructions on how to do the exercises correctly".

As indicated above, the motive for routine reflected the participants' need for structure and regularity in their daily lives. It was clear that motivation to be involved in physical activity was a means to an end for some participants. Terms such as commitment, discipline, and a schedule were used consistently by the participants. "I exercise to keep disciplined".

Finally, program motives represented any motive directly associated with the program of activity including the class and its timing. Mention was also made of the facilities in which the program took place. An illustrative statement was "I enjoy the format and pace of the exercise class".

Barriers to Exercise

The participants listed 323 barriers to physical activity. All percentages are based on the number of responses related to the category divided by the total number of responses (323). The barriers identified by the participants fell into four primary

components: physical (35%), activity (30%), situational (26%), and psychological (9%) barriers (Figure 2).

The physical barriers component (35%) included any physical condition which prohibited participation in a physical activity classes. Illness was the primary physical barrier encountered by older exercisers (23%). A common theme in the data that is well illustrated by the following response from one of the participants was “I find it difficult to attend exercise classes when I am feeling under the weather”. A related theme to illness was barriers associated with medical treatments (5%) such as surgery and treatments associated with angina and various forms of cancer.

Barriers revolving around competing activities (16%) and travel (12%) accounted for the majority of activity barriers (30%). Competing activities were referred to generally as “other commitments” or in more specific terms. For example, a quotation which illustrates a specific activity barrier is, “I sit on a number of important committees which meet often, so I cannot help but miss exercise on meeting days”. Insofar as travel is concerned, participants indicated that travel prohibited not only attendance at exercise classes (e.g., “I cannot attend an exercise class when I am on vacation”) but also physical activity in general (e.g., “I find myself so busy when I travel that there is no time to exercise”).

The situational barriers component (26%) was almost exclusively comprised of two categories: weather (16%) and transportation (8%). As the name of the category suggests, weather barriers reflected difficulties encountered as a result of weather extremes. Participants stated that both very cold and very hot weather prevent them from participating. The transportation barriers component was

Physical Barriers (35%)	Illness (23%) Medical Treatments (5%) Disease State (4%) Fatigue (3%)
Activity Barriers (30%)	Competing Activities (16%) Travel (12%) No Time (2%)
Situational Barriers (26%)	Weather (16%) Transportation (8%) Inconvenient Class Time (2%)
Psychological Barriers (9%)	Nurturance (7%) Lazy (2%)

Figure 2. Barriers to physical activity class participation.

primarily related to the lack of a reliable mode of transportation to and from exercise classes. For example one participant stated, “Sometimes my handi-bus [a taxi service for those with disability] is either late or doesn’t show up at all; when that happens I can’t get to my exercise class”. For some respondents, barriers associated with weather and transportation occasionally interacted to obstruct participation. This is illustrated in the quote “When the weather is snowy or icy I don’t like to drive to class; sometimes I can’t get my car out if I wanted to!”.

The psychological barriers component (9%), which was primarily made up of one major category, reflected the participants’ perceptions of their responsibility to their spouse or family. The major category, nurturance (7%), was operationalized as the perception that a participant had regarding his/her responsibility to care for a family member. A quotation, which illustrates this category, is, “After spending a lot

of time with my husband, taking care of him. I don't seem to have much time for exercise".

Discussion

The purpose of Study 1 was to determine older adults' a) motives for participation in regular physical activity, and b) perceptions about and experiences with barriers to physical activity classes. Specifically, the study was designed to provide data for a general heuristic of common motives and barriers for attending or not attending physical activity classes. The present discussion focuses on four main findings of the investigation and their implications for the promotion of physical activity in older adults. First, this sample of older adults identified more motives for than barriers to participation. Second, health motives were the most frequently cited reasons for participation. Third, social interaction was a common motive for participation. Fourth, some barriers to physical activity participation identified in the present investigation stand in contrast to results obtained in studies with younger adults and studies with older adults that have a) utilized a quantitative methodology, and/or b) been undertaken in other cultures.

Insofar as the first main finding is concerned, it may not be surprising that the sample of older adults identified more motives for being physically active than barriers to activity. The participants were physically active at the time of the study. Research (e.g., Janis & Mann, 1977) using a decision-balance sheet protocol in physical activity contexts has shown that for an individual to make the decision to exercise, his/her benefits (motives for exercise) will typically outweigh the costs of participation (barriers and ill effects of exercise). Possibly if the questionnaire had

been administered to inactive older adults, rather than active ones, more barriers to exercise participation might have been cited.

A logical implication of the results (and research using a decision-balance sheet protocol) is that program developers should use an educational format to ensure that prospective participants understand all of the benefits of exercise participation (Wankel, Yardley, & Graham, 1985). For older adults, the primary educational thrust should be on the motives identified in the present study; they are the ones identified as most salient in this population. Once the educational program has been completed, a decisional-balance intervention could be implemented. In that intervention, motives for activity could be made vivid and salient and participants could also be assisted to consider possible barriers or unpleasant outcomes associated with participation. Understanding and anticipating possible barriers to participation should act as an emotional inoculation for participants. Then, when confronted with a barrier to participation, the participant would be better prepared to deal with the situation rather than be surprised by it (Wankel, Yardley, & Graham, 1985).

As indicated above, a second main finding of the investigation was that functional and/or general health reasons, in combination, accounted for almost 50% of the motives for engaging in the physical activity classes. Contrary to expectations, the results are in general agreement with the findings from the Hirvensalo et al. (1998) study of Finnish older adults--80% of their respondents listed health outcomes as their primary motive for participation. It should be noted that the participants in the present investigation were regular exercisers, hence the commonality of the responses may not generalize to inactive older adults.

No specific (functional) health motives were identified by Hirvensalo et al. (1997). In contrast, functional fitness was the most frequently cited motive by the sample. The ability to carry groceries home, to take food items from a high shelf, to care for a home and yard, and/or to walk a flight a stairs do hold a high priority for older adults. Moreover, these activities are not salient 'health' motives for younger adults. Thus, the promotion of physical activity in younger and older adults must necessarily involve different strategies. Emphasizing the likelihood of weight loss and increased muscle tone might be appropriate with younger adults. However, outlining the specific functional fitness benefits of regular physical activity would be more appropriate for older adults.

Social interaction was the third most frequently cited motive for participation in the present study. A similar ranking for social motives was reported by Hirvensalo and his associates (1998) for older Finnish exercisers (i.e., 40-50% of their participants mentioned social reasons as a motive to exercise). Once again, however, no specific social motives were identified by Hirvensalo et al. When an analysis of the specific social motives for exercise was undertaken in the present study, the results showed that participants view the physical activity class as a forum for developing friendships, enhancing feelings of similarity with other participants, and developing and maintaining feelings of bonding or camaraderie.

Group-based interventions have been used effectively with university-aged populations (e.g., Carron & Spink, 1993). The results indicate that social factors can also play an important role in motivating older adults to initiate and maintain physical

activity programs. Thus, health practitioners should consider emphasizing social outcomes in any intervention aimed at promoting physical activity in older adults.

As indicated above, some barriers to physical activity participation identified in the present sample of older adults differed from those salient for younger adults. For example, in the Canadian Fitness and Lifestyle Research Institute's study (1996b) on barriers to physical activity, a lack of time, energy, and motivation followed by high cost and a lack of facilities were determined to be the top 5 barriers for individuals aged 18-24 years. In contrast, the top five barriers identified in the present study were illness, weather conditions, competing activities, travel, and transportation. One implication of these findings is that interventions aimed at assisting older adults to partake in regular physical activity should differ from those aimed at younger adults. For example, programs for older adults might consider providing transportation. Also, of course, maintaining an appropriate temperature in the exercise environment in both winter and summer months is critical.

The barriers to physical activity participation identified in the present sample—the weather, a lack of time (competing activities), travel, and transportation—also differed from those identified in other studies focusing on older adults. One possible reason might be a difference in methodology. For example, when older adults have responded to a list of barriers set out by the researchers, they have emphasized a lack of energy and motivation, followed by illness (CFLRI, 1996b) or poor health, a lack of interest, and a preference for exercising in a non-group setting (Booth et al., 1997).

A second possible reason might be cultural in nature. Hirvensalo et al. found that the only barriers to participation cited more than 5.0 % of the time by Finnish

older adults were poor health and a lack of interest. With higher participation rates among older adults in Finland versus North America, the importance attached to barriers might be expected to be different. Thus, practitioners interested in stimulating interest in physical activity programs for older adults would be advised to determine the motives and barriers considered most salient by the participants in their situation. By doing so, more effective strategies may be used to promote the activity.

It is necessary to add a note of caution. Brawley, Martin, and Gyurcsik (1998) have described a number of limitations associated with recall assessments of barriers, two of which apply here. First, the findings of the present investigation represent only a description of barriers to exercise class participation; the data do not give an indication as to the relative degree of limitation. For example, the barrier category representing poor weather was comprised of 16% of the barrier meaning units while the category representing disease state was representative of only 4%. Clearly the respective percentage of meaning units does not reflect the degree of limitation of the respective barriers. Hence, the percentage of meaning units in a category may represent commonality, but not necessarily importance. Second, recall assessments may elicit stereotypical responses (Brawley, Martin, & Gyurcsik, 1998).

Nonetheless, the present investigation does provide a heuristic of common barriers to and motives for exercise class participation from which to pursue future research.

It is clear that older adults enrolled in a physical activity program identify distinct motivations for and obstacles to exercise participation. Future research is needed to understand how these motives and barriers can be manipulated to improve adherence in exercise programs. The results of the present investigation provide the

basis for one suggestion. Older adults are motivated by the outcomes associated with the task of regular physical activity (e.g., functional fitness). Also, the social environment within the physical activity class (e.g., opportunities for friendship) motivates older adults. Therefore, the team-building approach used successfully by Spink and Carron (1993) to enhance perceptions of task cohesion in a university-age population could be broadened to emphasize both task and social cohesion. Such an approach would allow the practitioner to focus on task outcomes such as the functional fitness and reduced chances of illness to manipulate feelings of task cohesion within an exercise class. It would also allow the practitioner to focus on social outcomes such as improved feelings of similarity and bonding within the exercise environment.

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Study 2

Group Cohesion in Older Adult Exercisers: Adherence Predictions

The importance of physical activity has been highlighted in a recent report from the Surgeon General of the United States (U.S. Department of Health and Human Services, 1996). In that report, the positive effects of physical activity chronicled included reduced risk for death, a wide cross-section of cardiovascular diseases, colon cancer, non-insulin-dependent diabetes mellitus, and obesity and an increased probability for improved quality of life. Despite the fact that “the benefits of physical activity have been extolled throughout western history ... [and] scientific evidence supporting these beliefs” (U.S. Department of Health and Human Services, 1996, p.10) has begun to accumulate, alarming participation rates are familiar to most health professionals. As few as 30% of all adult North Americans exercise at a moderate intensity on a regular basis, participation rates decrease with age, and 50% of those individuals who initiate an exercise program drop out within the first 6 months (Dishman, 1988; Lee, 1993; Stephens & Caspersen, 1994). Thus, not surprisingly, health professionals are interested in identifying correlates of exercise adherence with a view to examining the efficacy of intervention programs based on those correlates.

One correlate of adherence that appears promising is exercise class cohesiveness. Early work with university populations using retrospective (Carron, Widmeyer, & Brawley, 1988), concurrent (Spink & Carron, 1992) and prospective designs (Spink & Carron, 1994) showed that strong links exist

between individual perceptions of task and social cohesiveness and various measures of adherence behavior. On the basis of that early work, Spink and Carron (1993) also demonstrated that an intervention program using team-building strategies to enhance class cohesion would enhance adherence behavior.

On the one hand, the potential of the group for sustaining healthy behavior may be expected—group cohesion forms the basis for numerous self-help groups including Alcoholics Anonymous, Weight Watchers, Overeaters Anonymous, SmokEnders, and so on. On the other hand, it may be premature to conclude that improving group cohesion is a reliable strategy for sustaining physical activity for at least two reasons.

The first reason is associated with the efficacy of intervention programs in general. Research documenting the long-term effectiveness of a wide variety of initially successful intervention programs that have used other apparently successful intervention strategies has been characterized by evidence of lapses (i.e., acute cessation) and/or relapses (i.e., chronic cessation) in the healthy behavior (Brownell et al., 1986). For example, Brownell et al. (1986), in their analysis of intervention programs that have targeted compliance/adherence for obesity, smoking, and alcoholism, observed that “the problem of relapse remains an important challenge in the fields dealing with health-related behaviors relapse rates ...are assumed to be in the range of 50% to 90%” (pp. 765-766).

The second point is associated with the nature of exercise classes and the concomitant potential for cohesion to influence behavior over a sustained period of time. Exercise classes are more akin to minimal groups or unorganized aggregates than to true groups (cf. McGrath, 1984). That is, exercise “classes possess only a few of the characteristics generally assumed to distinguish a group from a chance collection of people” (Carron & Spink, 1995, p. 87). Also, typically, most structured exercise programs follow a schedule that consists of activity, suspension of activity, and renewal of activity (e.g., 13 weeks of programmed activity in the fall followed by a holiday break followed by a renewal of the program in January). Throughout the schedule, participants join in and drop out of classes. Consequently, any task and/or social cohesion that might develop among members of a class may be too weak to either transfer to a subsequent class with identical membership or generalize to another class with different members. Previous research provides no insight into this issue. Efforts to examine the relationship of class cohesion to adherence and/or the beneficial impact of team building on cohesion and adherence have been undertaken in short-term (i.e., 13-16 week) exercise programs (cf. Spink & Carron, 1993). Thus, the general purpose of the present investigation was to examine the role that class cohesion might play in relatively long-term adherence in older adult exercisers.

The choice of older adults as the sample was influenced by the fact that in 1990, 11.5% of all Canadians were age 65 or older; by the year 2025, this percentage is projected to double (U.S. Bureau of Census, International Data Base). This fact

coupled with the decreased strength, power, and functional ability associated with ageing (Skelton et al., 1994) has made improving health and wellness within the older adult population an important priority for researchers and practitioners alike.

Despite the positive benefits derived from physical activity, and although exercise has been shown to be safe for older adults (Lavie et al., 1992), motivation problems exist. Lee (1993) has reported that participation rates decrease with age. Also, to compound this problem, the problematic adherence rates discussed above are also present in older adults; as many as 50% of older adults who do initiate regular exercise programs drop out within the first six to twelve months (Dishman, 1988; Ecclestone, Myers, & Paterson, 1998; Robison & Rogers, 1994).

A second factor influencing the decision to use older adult participants was that previous research which has examined the relationship of group cohesion to adherence has been undertaken with university-age participants (cf. Spink & Carron, 1993). There are substantial differences between older and younger exercisers. In his discussion on determinants of exercise in individuals 65 years or older, Shephard (1994) noted that although older adults indicate that they have more time for exercise than their younger counterparts, advancing age “influences the relative importance of many barriers to exercise” (p. 354). Also of importance to the present study is the fact that “the social requirements of active leisure—joint participation with other family members, friends, or a partner—are less often available to the elderly” (Shephard, 1994, p. 355).

Therefore, the purpose of Study 2 was to examine the effectiveness of group cohesion for the prediction of extended exercise participation in older adult

exercisers. Specifically, the effectiveness of cohesion for the prediction of adherence at one month, six months, and 12 months of an ongoing exercise program (in which intermittent periods of exercise cessation were an inherent feature of the program) was examined.

Method

Participants

The participants ($n = 75$) were members of classes offered for older adults who were registered in 10 different exercise classes. The focus of the exercise classes ranged from aerobic fitness and strength training, to improved flexibility. All participants had been registered in the class for at least 4 months previously. The average age of the participants was 67.7 (± 7.7) and 61% were female. Almost 47% of the participants had completed university or college and 69% were married.

Measures

Group cohesion. Group cohesion has been defined as “a dynamic process reflected by the tendency of a group to stick together and remain united in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs” (Carron et al., 1998, p. 213). Group cohesion has been conceptualized to include four distinct dimensions distinguished on two levels (Carron et al., 1985). The first level is the individual versus group bases for cohesion. The second level is the task versus social aspects of cohesion. Based upon these two levels of distinction, Carron and his associates conceptualized four dimensions of group cohesion. First, Individual Attractions to the Group-Task reflects a group member’s personal attractions to the group’s activity. Second, Individual Attractions to the Group- Social reflects a group

member's personal attractions to the group's social atmosphere. Third, Group Integration-Task reflects the bonding of group members around the collective task. Fourth, Group Integration-Social reflects the bonding of group members around collective socialization.

Also, these four dimensions of cohesion are operationalized through an 18-item inventory, the Group Environment Questionnaire (GEQ; Carron et al., 1985) which was subsequently modified for use in the exercise domain (Carron et al., 1988). The items are scored on a 9-point scale (1= Strongly Disagree, 9= Strongly Agree) and averaged. Analyses of the data from the present sample showed Cronbach alpha values in the low to moderate range: Individual Attractions to the Group-Social, 5 items, $\alpha=.71$; Individual Attractions to the Group-Task, 4 items, $\alpha=.68$; Group Integration-Social, 4 items, $\alpha=.67$; and, Group Integration-Task, 5 items, $\alpha=.63$.

Exercise participation. Exercise participation was operationalized as exercise class attendance. Attendance was monitored during the first, sixth, and twelfth months of the program. Each class instructor recorded exercise class attendance. Because some classes met two times per week and others met three, a percentage of classes attended were used.

Procedures.

The participants were recruited during the first week of classes in a continuing exercise program following a holiday break. A complete description of the project was provided to all participants by the principal investigator and the exercise class instructors. Ethical approval for the project was obtained from the university and all participants completed consent forms. The GEQ was administered during the first

week of classes. Some participants completed the questionnaire immediately while others returned the questionnaire during the following class. Following the assessment of cohesion, attendance was monitored by the exercise class instructors during Month one, six, and twelve. Any participants who missed classes during month one, six, or twelve, due to holiday travel were excluded from participation.

Results

Table 1 depicts the descriptive statistics for the variables of interest. The results showed that in terms of class cohesion, the sample of older adult exercisers a) held high perceptions of Individual Attractions to the Group-Task ($M = 8.0$), and b); moderate perceptions of Individual Attractions to the Group-Social ($M = 5.6$), Group Integration-Social ($M = 5.6$), and Group Integration-Task ($M = 6.0$). Also, attendance showed a decrease over the 12-month study: Month 1 = 71.0%, Month 6 = 54.6%, and Month 12 = 47.6 %.

Pearson bivariate correlations were calculated (see Table 2) to determine the relationship of group cohesion to short-term (Month 1) and long-term (Months 6 & 12) exercise adherence over the exercise program. Three of the four dimensions of group cohesion were significantly ($p < .05$) related to exercise attendance during Month 1 (Individual Attractions to the Group-Social, $r = .29$; Group Integration-Social, $r = .36$; Group Integration-Task, $r = .26$). At both the 6-month and 12-month periods, Group Integration-Task was the only cohesion measure related to attendance ($r = .25$ and $.25$, respectively).

Table 1.

Descriptive statistics for Individual Attractions to the Group Task and Social, Group Integration Task and Social, and Attendance at 1,6, and 12 months follow-up.

Construct	Mean	<u>SD</u>	Skewness	Kurtosis
Individual Attractions to the Group-Social	5.6	1.7	-0.1	-0.9
Individual Attractions to the Group-Task	8.0	1.3	-1.6	2.5
Group Integration-Social	4.8	1.6	-0.3	0
Group Integration-Task	6.0	1.5	0.1	-0.5
Month 1 Attendance	70.9	23.5	-0.9	0.7
Month 6 Attendance	54.6	34.8	-0.5	-1.1
Month 12 Attendance	47.6	37.0	-0.1	-1.5

Note. Individual Attractions to the Group and Group Integration-Social and -Task were assessed on a 9-point scale; Attendance was recorded in percentage of classes attended; SD= standard deviation.

Table 2.

Pearson bivariate correlations between the dimensions of group cohesion and exercise attendance.

Construct	Month 1	Month 6	Month 12
Attractions to the Group-Social (ATG-S)	.29*	.12	.12
Attractions to the Group-Task (ATG-T)	-.05	-.15	-.01
Group Integration-Social (GI-S)	.36*	.05	.12
Group Integration-Task (GI-T)	.26*	.25*	.25*
Month 12 attendance (M12)	.35**	.75**	
Month 6 attendance (M6)	.37**		

Note. * $p < .05$; ** $p < .01$

Due to the exploratory nature of the investigation, a stepwise regression analysis was the procedure used to determine the relative explained variance of each of the dimensions of cohesion (Tabachnick & Fidell, 1996). A summary of the results obtained when attendance at Month 1, 6, and 12 served as the dependent variable is presented in Table 3. In all three regression analyses, only one measure of cohesion significantly predicted attendance. At Month 1, Group integration-social was the sole predictor ($R^2 = .13$, $F(1,72) = 10.56$, $p < .01$); at Month 6, Group integration-task was the sole predictor ($R^2 = .05$, $F(1,72) = 4.76$, $p < .05$); and, at Month 12, Group integration-task was the sole predictor ($R^2 = .05$, $F(1,72) = 4.23$, $p < .05$).

Table 3.

Stepwise regression analyses for cohesion on exercise attendance at Month 1, Month 6, and Month 12 of a 12-month program.

Variable	R ² Adjusted	Increment	F
Month 1			
Group integration-social	.12	.12	10.60**
Month 6			
Group integration-task	.05	.05	4.76*
Month 12			
Group integration-task	.05	.05	4.23*

*p<.05

**p<.01

Discussion

The general purpose of Study 2 was to examine the relationship of class cohesion to relatively long-term exercise participation in a sample of older adults. The results showed that cohesion predicted exercise attendance at 1, 6 and 12 months follow-up. The combined findings of the present investigation, and previous research in the area of group cohesion, support four generalizations regarding the role that group cohesion might play in the patterns of exercise of older adults.

First, group cohesion is associated with exercise participation over the short term. That is, when considered together, the research to date has shown that higher perceptions of cohesion are related to higher exercise adherence in university settings (Spink & Carron, 1992), at private fitness facilities (Spink & Carron, 1994), and with

both younger (Spink & Carron, 1992, 1994) and older adults (i.e., the results from the present study). The consistency of this relationship indicates that improvements in class cohesion should relate to improvements in individual attendance in a wide variety of situations.

Second, the cohesion-participation relationship also holds over a relatively long duration. That is, when considered as a collective, the research to date has shown that enhanced perceptions of cohesion are related to the intentions of female recreation (Spink, 1995, Study 1) and elite-level athletes (Spink, 1995, Study 1) to return to participate in a subsequent year as well as to the continued exercise involvement of older adults over a 6- and 12-month duration (i.e., the results of the present study). The consistency of this relationship indicates that improvements in class cohesion should relate to improvements in individual attendance in a wide variety of situations.

Third, consistent with the multidimensional nature of cohesiveness (see Carron et al., 1998), different dimensions of group cohesion have differential effects on adherence in different contexts. The present investigation revealed that short-term exercise participation was associated with Group Integration-Social, whereas, long-term participation was associated with the Group Integration-Task. The task components of cohesion are generally considered to be most salient in exercise environments (e.g., Carron & Spink, 1993; Spink & Carron, 1993). However, Spink and Carron (1994) did find that in a private fitness facility the social components of cohesion were predictive of adherence whereas the task components were not. Also, the qualitative methodology used in Dissertation Study 1 showed that older adults are

motivated to exercise primarily to improve health and secondarily to socialize. The present findings also contribute to the suggestion that older adults who have been active in an exercise class may be attracted to the social opportunities of the class and feel united in the socialization that occurs during or following exercise classes. However, over longer periods of time, the task components of cohesiveness appear most salient. Hence, as improved health is clearly task related, it may be that the social components of the group will affect short-term adherence, but the perception of the group's integration around the primary motive of improving health is important for long-term adherence.

One noteworthy finding from the results is that Individual Attractions to the Group-Task was not related to exercise class attendance. In research with university-aged participants, Individual Attractions to the Group-Task has been consistently shown to be the most reliable predictor of adherence (cf. Carron & Spink, 1993). The lack of relationship in the present study might have been due to a ceiling effect (i.e., for Individual Attractions to the Group-Task, Mean = 8.0 ± 1.3 , skewness = -1.6, and kurtosis = 2.5). In short, the responses associated with Individual Attractions to the Group-Task were relatively homogeneous and high. Also, Individual Attractions to the Group-Task may not be a discriminant predictor of exercise habits for participants who have been involved in a program for an extended period of time (the participants in the study had been registered for at least four months prior to data collection). A fruitful area of future research would be to examine the effect of Individual Attractions to the Group-Task in concert with the other dimensions of group cohesion on beginning/novice older adult exercisers.

The fourth and final generalization is that an intervention based on developing both task and social dimensions of group cohesion should be effective for improving both short-term adherence and long-term return to an exercise program. Hence, an intervention program designed to increase short and long-term adherence should focus on improving a) individual participants' perceptions of the social components of cohesion (e.g., by ensuring that there is time for socializing within and after the class), b) collective integration around social outcomes (e.g., by introducing group planning and preparation of social events), and c) the group's integration around task outcomes (e.g., by utilising group goals for attendance).

One implication of the results is that group cohesion is an effective predictor of both short and long-term adherence in older adult exercisers. Further, support was given for differential effects of the task versus social and individual versus group dimensions of group cohesion. Finally, interventions developed on the basis of the Carron and associates (1985) conceptual model of group cohesion should be effective for improving both short and long-term adherence to exercise classes designed for older adults.

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Study 3

Group Cohesion in Older Adult Exercisers: Intervention Effects

There seems to be little doubt that perceptions of class cohesion are related to exercise adherence. This relationship has been demonstrated with university-age populations (cf. Carron et al., 1988) and with older adults (i.e., Dissertation Study 2). Moreover, the results from Dissertation Study 2 showed that the cohesion-adherence relationship can be relatively long-term, extending at least 12 months after the initial perception of cohesion is assessed. Therefore, Study 3 of the dissertation was carried out to test the hypothesis that a team-building program designed to enhance social and task cohesion would prove beneficial to the exercise adherence of older adults.

One caveat associated with the conclusions from Study 2 of the dissertation influenced the choice of sample for Study 3. That is, the participants in Study 2 were relatively chronic exercisers who had been involved in the same program at the same location for a number of years. As was pointed out above, as individuals age, exercise participation diminishes and barriers to exercise increase in perceived severity (Shephard, 1994). Consequently, if older adults are to profit from the benefits of exercise, programs must be designed to motivate and retain individuals who are initially sedentary. Thus, it was considered important to determine if the behavior of previously sedentary older adults could be influenced through a team-building program.

Team-building interventions designed to enhance cohesion and exert an influence on individual adherence behavior have been used with some success previously with university-based exercise classes (Carron & Spink, 1993; Spink & Carron, 1993). However, in every instance, the effectiveness of those interventions

was determined by assessing adherence during the final 4 weeks of a 12-week program. Therefore it is difficult to determine if the effectiveness of those interventions extended beyond the conclusion of the 12-week period.

Research by Brawley, Rejeski, and Lutes (in press) may provide preliminary evidence that cohesion has a long-term effect on sustained participation. They examined the efficacy of a group-based intervention for improving exercise adherence in older adults over a 9-month period. Sixty participants were randomly assigned to a one of three conditions--wait-list control, a standard physical activity program, or a group-mediated cognitive behavioral intervention. Although the cohesive nature of the group was not assessed, participants in the group-mediated cognitive behavioral intervention exercised more frequently than the wait-list control during 3 months of structured classes and 3 months of home based exercise. Further, the group-mediated intervention participants were still exercising more frequently than the standard physical activity program participants at 9 months.

To extend previous research, one general purpose of Study 3 was to examine the effectiveness of a team-building intervention for improving exercise attendance at an introductory physical activity class designed for older adults. A second general purpose was to determine whether the benefits of an intervention introduced in one period (e.g., a six week session) to previously inactive older adults would carry over and influence return rates to a subsequent session 10 weeks later. Hence, adherence was operationalized in two ways: as attendance in a six-week program and through return rates following a 10-week hiatus during the summer period. One limitation of utilizing attendance as the sole dependent variable is the inability to describe any

functional change the participants may acquire due to their participation. For this reason, a secondary purpose of this study was to determine if increased attendance (due to group membership) would improve the functional mobility of the participants.

Method

Participants

Thirty-three older adult participants (mean age = 75.1 ± 7.6) volunteered to be involved in the study. Participants had not previously been involved in a structured exercise class. Initially, a larger sample was expected but, despite active recruiting, only 33 individuals could be persuaded to participate. The majority were female (91%) and widowed (67%). Based upon responses to a physical activity readiness questionnaire (Canadian Society for Exercise Physiology, 1994), 83% required a doctor's approval before beginning the program.

Measures

Group cohesion. Group cohesion was assessed using the Group Environment Questionnaire (GEQ) modified for use in the exercise domain (Carron, Widmeyer, & Brawley, 1988). Based upon a multidimensional conceptual model of group cohesion, the GEQ contains scales reflecting Individual Attractions to the Group-Social (5 items), Individual Attractions to the Group-Task (4 items), Group Integration-Social (4 items), and Group Integration-Task (5 items). An open-ended questionnaire was also administered at the end of the 6-week program to examine perceptions of members towards their group. The primary purpose of the open-ended questionnaire was to determine what the participants liked or did not like about the program.

Exercise participation. Each class met twice a week for a six-week period. Attendance was recorded by the exercise class instructors for each session. Exercise participation was operationalized as exercise class attendance (percentage) and as the return rate (percentage) to the program following a 10-week summer layoff.

Functional mobility. The Timed Up and Go (TUG) test was used as an indicator of functional mobility. Designed to assess an individual's ability to rise from a sitting position and complete locomotor skills, the TUG test has been shown to be an accurate and reliable test of mobility in older adults (Podsiadlo & Richardson, 1991). Each assessment was completed by a registered nurse who had been trained to administer the test. Participants began in a seated position in a standard chair with armrests. Upon the command 'Go', each participant stood, walked 3 metres at a comfortable pace, changed direction and returned to a seated position in the chair. Time was recorded in seconds. Each participant completed the TUG once prior to, and once at the conclusion, of the six-week program.

Procedures

Participants were recruited via newspaper advertisements, flyers, and word of mouth at a community centre for older adults. The recruitment material targeted older non-exercising adults soliciting their participation in a six-week program offered by the city's community outreach department. Due to the exploratory nature of the study, and the small pool of participants available, a decision was made to commence when 30 participants expressed interest in the program. Partial deception was used in the recruitment process in that the participants did not know the true purpose of the study. That is, all participants were led to believe that the content in

each of three classes was identical and that any questions asked by the researchers were for the purpose of evaluating the program.

Ethical approval for the project was obtained from the university and all participants signed an informed consent form. Participants were assigned to the team-building, placebo, or control condition. As the participants were beginning exercisers, the first week of the program focused exclusively on orientation to the exercises performed in the class, hence the team-building intervention was implemented during the second week of the program. All participants completed the GEQ during the second and sixth weeks of the program.

Experimental conditions. The team-building intervention was developed using the identical protocol outlined by Carron and Spink (1993). Also, given the results from Study 2 of the dissertation, the principal investigators and the exercise class instructors engaged in a brainstorming session to generate specific strategies to improve both task and social cohesion. Those strategies evolved from the group dynamics principles that groups become more cohesive when their distinctiveness increases, roles within the group are clear, group goals are present, and interaction and communication between group members are facilitated (Carron & Spink, 1993).

An example of one strategy used to improve Group Integration-Social was the implementation of an instructor-led interaction period during the cool-down component of each class. During this period, the instructor fostered communication between the participants to increase group socialization. An example of one strategy used to improve Group Integration-Task was the implementation of a group goal setting procedure. Class members were told to assume that 10 minutes of class

participation could be translated into one kilometre of walking. The participants then set a target distance for the class to walk as a collective for the four-week period. Thus, achieving the target distance was dependent on high participation rates by members of the group.

The placebo group was visited weekly by a research assistant who expressed interest in individual progress and completed the exercise class with the participants. This protocol ensured that the participants were consistently aware that they were being observed as part of an on-going evaluation of the program.

The control condition received the standard-care fitness program. It should be noted that in all three conditions the instructor was friendly, reassuring, helpful with skill development, and offered juice and biscuits at the end of each class.

Results

Descriptive statistics are presented in Table 1. Initially, a oneway between groups MANOVA was completed using the experimental condition as the independent variable and attendance and return rate as the dependent variables. The Wilks Lambda test was significant ($F(4,58) = 2.84, p < .05$). Follow-up univariate ANOVAs revealed that both attendance ($F(2,30) = 4.10, p < .05$) and return rate ($F(2,30) = 4.01, p < .05$) differed significantly by group. Due to the exploratory nature of the study and the small sample size, Student Newman Keuls post hoc tests were used to examine for differences among the three conditions. Post-hoc analyses showed that participants in the team-building condition attended significantly more classes than participants in the control ($p < .05$) and placebo condition ($p < .05$). Participants in the control and placebo conditions did not differ significantly in

attendance. Computation of standardized effect sizes revealed that the magnitude of the effect of the team-building intervention was large when compared to both the control ($ES=1.20$) and placebo ($ES=1.10$) groups¹.

Table 1.

Descriptive statistics for age, attendance and return rate by experimental condition.

	Mean Age (SD)	Mean Attendance (SD)	Return Rate
Control Group ($n=10$)	74.9 (10.8)	65.0 (32.1)	40.0
Placebo Group ($n=11$)	77.7 (4.1)	70.0 (20.5)	73.0
Team-building Group ($n=12$)	73.3 (6.9)	90.8 (13.8)	91.7

Note. Age is reported in years. Attendance is reported in the percent of classes attended. Return rate is reported as the percent of participants who returned to the program following a 10-week hiatus.

Participants in the team-building condition also had a significantly higher return rate following the 10-week hiatus than those in the control condition ($p<.05$). Again, the magnitude of this effect was large ($ES=1.20$). Although the magnitude of the difference between the return rates for individuals in the team-building versus those in the placebo conditions was moderate ($ES=.52$), it was not statistically significant. As was the case with initial attendance, the return rates for participants in the placebo and control conditions did not differ from one another.

Unfortunately, due to absence in the final week of the program, only 21 participants completed a second TUG test (control $n=5$, placebo $n=6$, team-building $n=10$). This loss of data (and low resulting power) made the statistical comparison across treatments problematic. However, a t-test for correlated means was computed to determine if the individuals who had attended the physical activity classes did improve their functional mobility. The results showed that the participants had reduced their TUG times (i.e. increased their functional mobility) from 12 to 10 seconds ($t(20)=31.40$, $p<.001$), reflecting the efficacy of the exercise program.

Two measures were used to examine the effectiveness of the intervention in manipulating the components of group cohesion: responses from the Group Environment Questionnaire (GEQ) and the open-ended questionnaire. Unfortunately, all GEQ scales assessed at Weeks 2 and 6 had poor internal consistency (i.e., all $<.60$); consequently, these data could not be used. However, the open-ended questionnaire did provide support for the fact that the team-building intervention was successful in developing cohesion. In both the control and placebo conditions, only one participant stated that he/she had enjoyed group-related aspects of the class. In contrast, all members of the team-building condition stated that 'the best thing' about the exercise class was the group with whom they exercised.

Discussion

The purpose of the present investigation was to examine the efficacy of a team-building intervention for improving adherence and return rates to a community physical activity program. A secondary purpose was to determine if there were functional adaptations as a result of program involvement. The results indicated that

utilizing team building as a modality to maintain exercise participation is an appropriate and efficient intervention for previously nonexercising older adults. Not only did the intervention maintain attendance and return rates, it also instilled a strong sense of unity to the participants in the team-building condition. It is unfortunate that the responses to the measurement of group cohesion were unreliable; it was not possible to determine how the intervention influenced the different dimensions of group cohesion.

The present results are consistent with King, Rejeski, and Buchner's (1998) review of physical activity interventions targeting older adults. King and her colleagues concluded that group-based interventions result in reasonably high short-term participation rates. The present investigation also provides additional support that group-based interventions are appropriate for initiated long-term participation when operationalized as participant return rates.

It is also clear that an intervention based on developing both task and social dimensions of group cohesion is effective for maintaining both short-term in-class adherence and the subsequent return to an exercise program. Unfortunately, due to the relatively small sample and the poor internal consistency for the Group Environment Questionnaire, it was not possible to determine if the intervention program improved task and/or social cohesion. However, the responses to the open-ended questionnaire do provide some support for a suggestion that participants in the team-building condition acquired a strong sense of belonging within their class. For example, one participant wrote "I like having a group to work out with, and our goals made it hard to put off"—a statement which reflects both task and a social unity.

The Group Environment Questionnaire (GEQ) has been used extensively with university aged-samples (Carron et al., 1985; Spink & Carron, 1994). However, the present results, in concert with those from Study 2 of the dissertation, draw into question the appropriateness of the GEQ for older adult populations. In Study 2, the Cronbach's alphas for three of the four scales were only borderline acceptable (e.g. for only one scale $\alpha > .70$); in the present study none of the alphas were acceptable and the GEQ could not be used.

It is unclear why the GEQ is problematic for older adults. One possible explanation might be the negative wording associated with the majority of items. Although all participants completed the GEQ in the company of a research assistant, often confusion was expressed as to whether to agree or disagree with a negative statement. A second problem may be that the items are not sufficiently specific to the exercise tasks and social outcomes associated with exercise classes for older adults. Whatever the reason, a productive area of future research could be to modify the GEQ to be more user-friendly for older adult exercise groups.

The results of the present study are bases for suggesting two avenues for future research. First, as with any exploratory study, replication is necessary. Although the team-building intervention produced promising results, the small sample size and lack of a psychometrically sound measure of cohesion are cause for caution. Second, there is a need for a measure of group cohesion in exercise classes catering to older adults. Utilizing Carron and associates' (1985) conceptual framework, future research should focus on developing a measurement tool to specifically examine group cohesion in older adults.

In summary, the findings of the present study provide additional support for the relationship between group cohesion and short and long-term adherence in older adult exercisers. Also, an intervention developed on the basis of the Carron and associates (1985) conceptual model of group cohesion is useful for improving both adherence and return rates to classes designed for older adults. Finally, when coupled with the results of Dissertation Study 2, it is apparent that there is a necessity for the development of a new measure of group cohesion specific to older adults.

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Footnote

1. Cohen (1969, 1992) has suggested that standardized effect sizes of .20, .50, and .80 represent small, medium, and large effects, respectively.

Study 4

The Physical Activity Environment Questionnaire: An Instrument for the Assessment of Cohesion in Exercise Classes for Older Adults

Cohesion is considered to be “a dynamic process that is reflected in the tendency for a group to stick together and remain united in pursuit of its instrumental objectives and/or for the satisfaction of member affective needs” (Carron, Brawley, & Widmeyer, 1998, p. 213). Historically, it has been considered by social scientists in a variety of disciplines to be the most important small group variable (Golembiewski, 1962; Lott & Lott, 1965). For example, in the psychotherapy literature, Yalom (1985) claimed that group cohesion “is a necessary precondition for effective therapy” (p. 50). As another example, in the military psychology literature, Tziner and Vardi (1983) have noted that “the nature of the relationship between the cohesiveness of a task-oriented group and its performance level is not necessarily solely a question of an academic concern ... this is demonstrated most dramatically in military units, where ineffective individual groups can be fatal to the larger organization (e.g., artillery or tank crews)” (p. 137). Finally, in the sport psychology literature, Carron, et al. (1998) highlighted the importance of cohesiveness when they observed that “the terms group and cohesion are intertwined—if a group exists, it has to be cohesive to some extent” (p. 213).

In light of the perceived importance of cohesion, it is hardly surprising that numerous attempts have been made to develop instruments that measure the degree to which the construct is present. Typically, those instruments have been as diverse as the types of groups for which they were intended including, for example, therapy

groups, family units, business teams, organizational units, sport teams and exercise classes, military crews, and social groups (Hogg, 1992; Mudrack, 1989).

Unfortunately, however, the overwhelming majority of those instruments have not been useful—an observation that has been advanced by a number of group dynamics theoreticians (e.g., Carron, Widmeyer, & Brawley, 1985; Cota, Longman, Evans, Jarvis, Dion, & Kilik, 1995; Dion & Evans, 1992; Mudrack, 1989). In fact, on the basis of his analysis of the literature, Mudrack (1989) concluded that cohesion assessment “has been dominated by confusion, inconsistency, and almost inexcusable sloppiness with regard to defining the construct” (p. 45). Similarly, Carron et al. (1985) also pointed out that “measurement problems [in cohesion research] stem from the lack of a clear conceptualization ... rarely have researchers attempted to clarify this construct before measuring it” (p. 246).

Carron and his colleagues (Brawley, Carron, & Widmeyer, 1987; Carron et al., 1985, 1998; Widmeyer, Brawley, & Carron, 1985) did attempt to rectify this shortcoming in the context of sport by proposing a conceptual model for team cohesion. Their conceptual model is based on three fundamental assumptions: a) cohesion is a group property that is reflected in and can be assessed through the perceptions of individual group members, b) members develop perceptions associated with the level of bonding within the group as well as the way the group satisfies personal needs and objectives, and c) task and social concerns represent two general foci for the perceptions that members develop about the group as a totality and the group as a forum for the satisfaction of personal needs and objectives (Carron, Brawley, & Widmeyer, 1998).

These three assumptions formed the basis for the proposal that the majority of variance in cohesiveness in sport teams can be accounted for by four constructs: a) Individual Attractions to the Group-Task, the individual member's perceptions of his or her personal involvement with the group task; b) Individual Attractions to the Group-Social, the individual member's perceptions of his or her personal acceptance and social interaction with the group; Group Integration-Task, the individual member's perceptions of the similarity, closeness, and bonding that exists within the group as a totality around its collective task; and, Group Integration-Social, the individual group member's perceptions of the similarity, closeness, and bonding that exists within the group as a totality around social concerns. In turn, the Group Environment Questionnaire (GEQ) was developed to assess these four dimensions of cohesion (Brawley, 1987; Carron et al. 1985, Widmeyer, et al., 1985).

Although the GEQ was originally developed and validated with sport teams (see Carron et al., 1998), Dion and Evans (1992) have pointed out that "the two dimensional conceptualization of cohesion ... [upon which the GEQ is based] appears promising as a conceptual and methodological approach with potentially broad applicability to different types of groups" (p. 247). In 1988, Carron, Widmeyer, and Brawley (Study 1) did modify items in the GEQ to make it more applicable to an exercise context. The exercise-specific version of the GEQ subsequently was used in a number of research investigations to examine general issues pertinent to a physical activity context. For example, one body of research has shown that individuals holding higher perceptions of class cohesiveness are less likely to drop out of an exercise class (Carron et al., 1988; Spink & Carron, 1994), are more resistant to the

disruptive influence of negative events (Brawley, Carron, & Widmeyer, 1988, Study 2), and are less likely to be absent or late (Spink and Carron; 1992). A second body of research has shown that a team-building intervention can be used in exercise classes to enhance perceptions of cohesiveness and adherence behavior (Carron & Spink; 1993; Spink & Carron, 1993). Finally, as a third example, Courneya and McAuley (Courneya, 1995; Courneya & McAuley, 1995) found that greater perceptions of exercise class cohesiveness are related to improved feeling states and a more positive attitude toward exercise.

In the research discussed above, the exercise participants were exclusively in the age range of university age students to young adults (i.e., <35 yrs). More recently, research has been undertaken by Estabrooks and Carron (1997a, 1997b, 1998) to examine the role that cohesiveness might play in the exercise involvement of older adults. In that research, however, three persistent problems have arisen which draw into question the utility of the GEQ for an older population. First, there have been problems with the psychometrics of the test. For example, for some samples, the internal consistency values for specific scales have been marginal; i.e., under .70 (e.g., Estabrooks & Carron, 1997b). For other samples (Estabrooks & Carron, 1999), the entire data set was unusable because the internal consistency values on all scales were less than .60. Second, many participants expressed dissatisfaction, confusion and/or uncertainty when they completed the questionnaire. The GEQ contains a number of negatively worded items; e.g., "This exercise group does not give me enough opportunities to improve my personal fitness". Thus, a greater perception of cohesion would be manifested in a stronger level of disagreement with the statement.

However, many older participants find a negative item either difficult to interpret or are uneasy about considering their group in a negative light.

As a consequence, the general purpose of the present investigation was to initiate the development of a conceptually and psychometrically sound measure of group cohesion for use in an exercise context with older adults—The Physical Activity Environment Questionnaire (PAEQ). The general protocol used was based on prescriptions advanced by Clark and Watson (1995) as well as the approaches taken by other test developers (e.g., Carron et al., 1985). To this end, five independent projects were undertaken. In the first, potential items--consistent with the conceptual model advanced by Carron et al. (1985, 1988)--were generated in focus groups. In Project 2, content (face) validity was established using the input of group dynamics experts. In Project 3, item trimming (i.e., reductions in the pool of items) was undertaken using standard psychometric analyses as a basis—internal consistency, item-own scale versus item-other scale correlations, and exploratory factor analysis. In the fourth project, concurrent validity was assessed by examining the relationship between responses on the PAEQ and the original Group Environment Questionnaire. Finally, in a fifth project, predictive validity of the PAEQ was evaluated.

Project 1: Item Generation

It was pointed out earlier that prior to the generation of items for any new scale, it is imperative to develop a precise conceptualization of the construct in question and its theoretical context. As has also been noted, the conceptual model of group cohesion developed by Carron et al. (1985) was used as the theoretical context

for item generation for the PAEQ. The rationale underlying the conceptual model was discussed above and has been reported in detail elsewhere (Carron et al., 1985, 1998). In overview, cohesion is viewed as a multidimensional construct which can be assessed through an individual member's perceptions of personal satisfaction with the group's task and social aspects (referred to as Individual Attractions to the Group-Task and Individual Attractions to the Group-Social, respectively) and the degree of unity in the group as a collective around common objectives and social endeavors (referred to as Group Integration-Task and Group Integration-Social, respectively).

Using the conceptual model as a basis, two protocols were adopted to generate potential items. In the first, a broad literature search of cohesion and other social influence variables was conducted and appropriate items were identified. In the second protocol, participants in focus groups were used; this served to insure that older adult participants were active agents in the process of item generation and that the item pool contained manifestations of cohesiveness that represented more than the researchers' perspective (Clark & Watson, 1995).

In a lecture format, three focus groups, each comprised of 4 female seniors (mean age=75 years), were provided with information on the nature of group cohesion based upon the conceptual model of Carron et al. (1985). All participants of the focus groups had been involved in physical activity classes for no less than two weeks but not longer than six weeks. Following the introduction of the conceptual model, an informal question and answer period was provided to clarify the distinctions among the four dimensions of group cohesion. When it became obvious that the participants had a comprehensive understanding of the construct, each focus

group was asked to develop statements to represent each dimension of cohesion. The literature search and the focus groups resulted in the generation of 55 items across the four dimensions.

Project 2: Content Clarity and Validity

To ensure that the items developed through the literature search and focus group deliberations were representative of the four dimensions of group cohesion, the list of 55 items was submitted to two experts in the field of group dynamics. Four basic criteria were used to determine content validity. First, items were reconsidered if they did not reflect the dimension of cohesion targeted. Items mislabelled or inappropriately assigned were moved into the more appropriate pool. Second, if an item was ambiguous, it was removed. Thus, for example, the statement, “I enjoy doing the exercises with my friends in the class” has both a task (the exercises) and a social (with my friends) component. Obviously various combinations of those two manifestations of cohesiveness could be present in different participants (i.e., enjoy/not enjoy class exercises as well as participating/not participating with friends in the class). Third, any item that used complex terminology or jargon and/or was written poorly was removed from the possible pool of items. Fourth, all duplicate items were removed.

The process of establishing content validity resulted in the removal of 20 items from the original pool of 55. The remaining 35 items represented the four dimensions of group cohesion relatively equitably: 10 Individual Attractions to the Group-Social items, 9 Individual Attractions to the Group-Task items, 7 Group Integration-Social items, and 9 Group Integration-Task items. The specific items

within each scale are presented in Appendix A.

Project 3: Item Trimming

Preliminary testing was undertaken in order to gain insight into some fundamental issues pertaining to potential utility of the individual items. Specifically, a test item would provide minimal or confusing insights into perceptions of cohesion if the participant responses on that item a) showed minimal or no variability or were highly skewed toward one end of the scale, b) correlated too highly with responses obtained on another scale (e.g., a Group Integration item that correlated perfectly with an Individual Attractions to the Group scale), and, c) failed to correlate well with other items developed to measure the same dimension of cohesion.

Methods

Participants. Volunteers (n=91) from 9 physical activity classes for older adults participated in the study. The format of physical activity classes included line dancing, water aerobics, and cardiovascular training. Classes met either once or twice per week. All participants who were in attendance at the classes on the day of administration completed an informed consent form and the questionnaire. The mean age of the participants was 70.8 years (± 6.7) and 90% were female.

Measures. The 35-item version of the Physical Activity Environment Questionnaire was used. Prior to completing the Individual Attractions to the Group items, each participant was instructed to assess his/her “feelings about your personal involvement with your physical activity group”. The participants were then asked to indicate their level of agreement with each of the statements. A nine-point Likert scale was used with “very strongly disagree”, “neither agree nor disagree”, and “very

strongly agree” set under the values 1, 5, and 9 respectively.

Similarly, prior to completing the Group Integration items, the participants were instructed to assess their “feelings about your physical activity group as a whole”. Again each item was rated for level of agreement using the nine-point Likert scale.

Procedures. Participants completed the questionnaire at the conclusion of a regularly scheduled session. The questionnaire took 20 minutes on average to complete. Four steps were completed with the purpose of deleting inappropriate items. Step 1 focused on examination of the descriptive statistics of individual items. Any item with a high mean ($>8/9$) and low variability was flagged for possible removal. In Step 2, any item with a problematic item-total correlation ($r < .60$) was flagged for possible removal. Any item that was flagged in both Steps 1 and 2 was removed. In Step 3, the correlation matrix was examined and any item that correlated highly with a scale other than its own was removed. Finally, an exploratory factor analysis was completed to examine the structure of the new measure (Step 4). An exploratory factor analysis was considered appropriate for an initial test of the factor structure and further item trimming of the PAEQ (Clark & Watson, 1995).

Results

Table 1 summarizes the items identified by Steps 1 to 3 of the item trimming process. A number of items were flagged for high mean/low variability (Step 1; 7 items) and low item-total correlation (Step 2; 9 items). Five items were identified in both steps and, therefore, were removed from the questionnaire. Nine items were identified as problematic due to a high item-other scale correlation. One of those nine

Table 1. Results of item trimming Steps 1-3.

Step 1. High mean and low variability.	Step 2. Item total correlation <.60	Step 3. Item correlates highly (>.6) with a scale other than its own.
1. This physical activity group gives me an opportunity to improve my physical well being. (ATG-T) 2. I enjoy my social interactions within this physical activity group. (ATG-S) 3. I like meeting the people who come to this physical activity class. (ATG-S) 4. I enjoy the feedback from the instructor in this physical activity class. (ATG-S) 5. Members of our group enjoy the type(s) of physical activities offered. (GI-T) 6. Members of our group have similar interests regarding the program of physical activity. (GI-T) 7. We enjoy each other's company in our physical activity group. (GI-S)	1. This physical activity group gives me an opportunity to improve my physical well being. (ATG-T) 2. I like the progress I make when I stick to the activities in this physical activity group. (ATG-T) 3. I like the amount of physical activity I get in this program. (ATG-T) 4. I am happy with the amount of time I spend developing my strength in this physical activity group. (ATG-T) 5. I enjoy the feedback from the instructor in this physical activity class. (ATG-S) 6. Members of our group enjoy the type(s) of physical activities offered. (GI-T) 7. Members of our group have similar interests regarding the program of physical activity. (GI-T) 8. We enjoy each others' company in our physical activity group. (GI-S) 9. We spend time socializing with each other before and after our activity session. (GI-S)	1. I like the progress I make when I stick to the activities in this physical activity group. (ATG-T, correlated with ATG-S, GI-T) 2. I enjoy the feedback from the instructor in this physical activity class. (ATG-S, correlated with ATG-T) 3. Some of my good friends are in this physical activity group. (ATG-S, correlated with GI-S) 4. I have good friends in this physical activity group. (ATG-S, correlated with GI-S, GI-T) 5. I enjoy the opportunity, within the physical activity group, to share experiences with others who are similar to me. (ATG-S, correlated with GI-S, GI-T) 6. We help each other develop new skills in our physical activity group. (GI-T, correlated with GI-S) 7. Members of our physical activity group enjoy sharing information. (GI-T, correlated with GI-S). 8. We are good friends in this physical activity group. (GI-S correlated with GI-T, ATG-S) 9. A valuable aspect of our physical activity group is our social interactions. (GI-S correlated GI-T, ATG-S)

Note: ATG-T = Individual Attractions to the Group-Task; ATG-S = Individual Attractions to the Group-Social; GI-T = Group Integration-Task; GI-S = Group Integration-Social.

items had already been flagged for removal in Steps 1 and 2. Thus, a total of 13 of the 35 items were removed leaving 7, 6, 5, and 4 items in the Individual Attractions to the Group-Task, Individual Attractions to the Group-Social, Group Integration-Task, and Group Integration-Social scales respectively.

A principal components extraction with oblimin rotation was performed on the remaining 22 items of the PAEQ using data from the sample of 91 older adults. This resulted in a cases-to-variable ratio of 4 to 1, which has traditionally been considered adequate for an exploratory analysis (Floyd & Widaman, 1995). Consistent with the conceptual model of group cohesion, four factors were extracted based upon analysis of the associated eigenvalues (>1.0) and an evaluation of a scree plot of variables. As the dimensions of group cohesion are theorized to be related and have been shown to be correlated (Courneya & McAuley, 1995; Widmeyer et al., 1985), an oblimin (oblique) rotation was used to increase the interpretability of the data. Only 1 item did not load on the theorized factor (an Individual Attractions to the Group-Task item; “I am happy with the amount of time I spend developing my strength in this physical activity group”). This item was removed from the analysis and the results of a second analysis can be found in Table 2. Appendix B contains the 21 items retained for the PAEQ.

Project 4: Concurrent Validity

A traditional form of validity that is often assessed in the preliminary stages of test construction is concurrent validity (Carron et al., 1998). Concurrent validity is reflected in the degree of correlation between the scales of a new inventory and an established inventory designed to measure similar constructs. To demonstrate

Table 2. Pattern matrix representing factor loading and associated eigenvalues for the Physical Activity Environment Questionnaire.

Item Number	Factor 1 ATG-S (eigenvalue=7.8)	Factor 2 ATG-T (eigenvalue=3.3)	Factor 3 GI-T (eigenvalue=2.1)	Factor 4 GI-S (eigenvalue=1.3)
ATG-S 1	.88	0	0	.13
ATG-S 2	.87	-.11	0	0
ATG-S 3	.81	0	-.15	-.29
ATG-S 4	.79	.19	.15	.18
ATG-S 5	.78	-.15	-.17	0
ATG-S 6	.76	.15	.12	.22
ATG-T 1	0	.88	.24	.14
ATG-T 2	0	.86	0	0
ATG-T 3	0	.84	0	0
ATG-T 4	0	.64	-.25	0
ATG-T 5	0	.53	-.45	-.21
ATG-T 6	.26	.53	-.34	-.15
GI-T 1	0	.12	-.88	0
GI-T 2	0	.18	-.78	0
GI-T 3	0	0	-.71	.27
GI-T 4	.12	0	-.67	.21
GI-T 5	.14	-.24	-.63	.22
GI-S 1	0	.11	0	.81
GI-S 2	0	0	-.10	.75
GI-S 3	0	0	-.18	.63
GI-S 4	.19	0	-.26	.52

Note: ATG-T = Individual Attractions to the Group-Task; ATG-S = Individual Attractions to the Group-Social; GI-T = Group Integration-Task; GI-S = Group Integration-Social.

concurrent validity, the new inventory should demonstrate moderate correlation with the older inventory (i.e., $r = .35-.60$). On the one hand, correlations approaching zero would support a conclusion that the two inventories were assessing independent unrelated constructs. On the other hand, excessively high correlations (i.e., $r > .75$) would support a conclusion that the new inventory was redundant.

The inventory considered to be most appropriate to test the concurrent validity of the PAEQ was the Group Environment Questionnaire (GEQ, Carron et al., 1985). However, as stated previously, the GEQ has been found to be problematic for use with older adults. Therefore, a sample of university students was used. It should be noted that because the PAEQ was developed for use with older adult samples, and the GEQ is not appropriate for older adult samples, a high correlation between the two instruments would not reflect a redundancy in inventories, but would support the validity of the PAEQ.

Method

Participants. Volunteer university undergraduate students ($n = 125$) participated in the study. The average age of the participants was 21.6 years (± 0.9) and 65% of the sample were female. Thirty percent of the participants were members of “drop-in” exercise classes, while the remainder were involved in activity programs with a fixed group. Classes ranged from 2 through 70 participants with an average of 22. Further, the average length of time participants had been involved with the exercise class was 7 months.

Measures. The PAEQ, as described in Project 3, was utilized as the new measure of group cohesion: while the GEQ adapted for an exercise context was the established measure (Carron et al., 1988, Study 1). The GEQ is an 18-item inventory which is scored on a 9-point scale (1= Strongly Disagree, 9= Strongly Agree). The 18 items tap four dimensions of group cohesion: Individual Attractions to the Group-Task (4 items), Individual Attractions to the Group- Social (5 items), Group Integration-Task (5 items) and Group Integration-Social (4 items). Following data entry, the items representing each dimension are averaged.

Procedures. The participants were informed that the study was examining the satisfaction individuals experience with their exercise classes. All participants completed an informed consent form. The participants were then asked to consider an exercise class with which they a) were currently involved, or b) had been previously involved. Both the PAEQ and GEQ were administered to the participants within a larger single questionnaire. The order in which the participants were presented with items from the GEQ and PAEQ was rotated to eliminate the effect of the order of presentation. Upon completion of the questionnaire, the participants were debriefed on the full nature of the study.

Results

Cronbach's alphas were computed for each of the dimensions of group cohesion assessed by the two cohesion inventories. For the Physical Activity Environment Questionnaire (PAEQ), all internal consistency values were high; $\alpha=.91$, $.87$, $.72$, and $.85$ for Individual Attractions to the Group-Task, Individual

Attractions to the Group-Social, Group Integration-Task, and Group Integration-Social, respectively.

For the Group Environment Questionnaire (GEQ), the comparable internal consistency values were lower but in an acceptable range for Individual Attractions to the Group-Task ($\alpha=.78$) and Social ($\alpha=.79$). Further, the internal consistency for Group Integration-Task was low but borderline acceptable ($\alpha=.66$), while for Group Integration-Social, it was unacceptable ($\alpha=.60$).

Descriptive statistics and intra- and inter-scale correlations are reported in Table 3. It is apparent from an examination of Table 3 (i.e., the values along the diagonal) that the relationships between identical dimensions of cohesion assessed using the new and older inventories were in the moderate range (i.e., correlations from .57 to .69).

It was expected that responses on the four scales of the PAEQ would be related (see Table 3 again). This was the case with most correlations in the range expected (i.e., $r = .51$ to $.53$). However, based on previous research, the correlations between Individual Attractions to the Group-Task and Group Integration-Social and Individual Attractions to the Group-Social were lower than expected ($r = .07$ and $.18$, respectively). Also, the correlation between Group Integration-Social and Individual Attractions to the Group-Social was higher than expected (i.e., $r = .70$). Whether these high and low correlations were a product of the sample (i.e., university students) or the nature of the items, is an issue which must be examined in subsequent testing with the PAEQ.

Table 3. Descriptive statistics and correlations of the variables assessed by the Physical Activity Environment Questionnaire and the Group Environment Questionnaire.

	Mean (SD)	PAEQ ATG-T	PAEQ ATG-S	PAEQ GI-T	PAEQ GI-S
<u>GEQ</u>					
ATG-T	6.8 (1.6)	.69**	.16	.34**	.08
ATG-S	5.1 (1.8)	.13	.68**	.40**	.60**
GI-T	5.3 (1.6)	.23**	.63**	.65**	.63**
GI-S	5.5 (2.4)	.05	.48**	.30**	.57**
PAEQ					
ATG-T	6.6 (1.4)	--			
ATG-S	5.7 (1.7)	.18*	--		
GI-T	6.1 (1.2)	.53**	.50**	--	
GI-S	6.1 (1.5)	.07	.70**	.51**	--

Note. * $p < .05$; ** $p < .01$; GEQ = Group Environment Questionnaire; PAEQ =

Physical Activity Environment Questionnaire; ATG-T = Individual Attractions to the

Group Task; ATG-S = Individual Attractions to the Group-Social; GI-T = Group

Integration-Task; GI-S = Group Integration-Social.

Project 5: Predictive Validity

To test for predictive validity, it is essential to empirically link the construct of interest (i.e., the dimensions of cohesion) to theoretically related variables (Carron et al., 1998). For example, by definition group cohesion should be related to adherence behavior. That is, cohesion represents the degree to which a group 'sticks' together, while adherence represents the degree to which an individual 'sticks' to a specific program. Previous research using the exercise-class version of the Group Environment Questionnaire (GEQ) has found this to be the case in samples of university-aged participants (e.g., Carron and Spink, 1995) as well as older adults (Dissertation Study 2). Thus, one purpose of Project 5 was to determine if perceptions of cohesion, assessed using the Physical Activity Environment Questionnaire would predict exercise class attendance in older adults. Given that older adults are involved in exercise programs for both instrumental (i.e., maintain health) and social (i.e., develop and maintain social relationships) reasons, it was hypothesized that both task and social dimensions of cohesion would be related to adherence.

A second variable that should be related to task cohesion in older adults participating in physical activity classes is self-efficacy. Self-efficacy is defined as an individual's belief that he or she has the capability to control events that affect his/her life and the personal ability to mobilize the motivation, cognitive resources, and courses of action needed to exercise control over behavioral demands (Bandura, 1997). Three of the principal antecedents assumed to contribute to the development

of self-efficacy are vicarious learning, verbal persuasion, and improved emotional states (Bandura, 1997).

Estabrooks and Carron (1998) proposed that task cohesiveness should be related to vicarious learning, verbal persuasion, and improved emotional states for the following reasons. Insofar as vicarious learning and cohesion are concerned, research in the group dynamics literature has shown that the behavior of individual members is influenced by other group members; and, the more cohesive the group, the greater the influence. For example, Terborg, Castore, and Dennino (1976) found that members of more cohesive groups display greater similarities in attitudes and cognitions than do members of less cohesive groups. Also, greater cohesiveness has been found to be associated with greater adherence to group norms—the standards for behavior expected of group members (Carron & Hausenblas, 1998). As Bar-Tal (1986) has noted, members learn and internalize salient group attitudes and cognitions in order to consolidate their group identity.

Enhanced emotional states also appear to be related to group cohesiveness. Baumeister and Leary (1995) pointed out that the need to belong, to affiliate with others is a fundamental human motive. They cite evidence from social psychology, developmental psychology, and counseling psychology to support the conclusion that “the formation of social bonds is associated with positive emotions” (p. 505). In sport psychology, Terry, Carron, Pink, Lane, Jones, & Hall (1999) found support for the Baumeister and Leary hypothesis in three samples of male and female athletes. Stronger perceptions of cohesiveness were positively associated with the positive mood state of vigor and negatively

associated with the negative mood states of tension, anger, and depression. Also, in the exercise psychology literature, Courneya (1995) has reported that university-age exercisers holding stronger perceptions of class cohesiveness experienced more positive affect.

Social influence through verbal persuasion also might be assumed to be greater in more cohesive exercise classes. As Bettenhausen (1991) has observed, an “essential group process is the creation of shared understandings of what information is important and what responses are appropriate” (p. 350). Group processes such as communication, coordination, and cooperation traditionally have been assumed to be enhanced by cohesiveness (e.g., Carron & Hausenblas, 1998; Pace, 1990; Saavedra, Earley, & Van Dyne, 1993). Thus, for example, in his research with problem-solving discussion groups, Pace (1990) found that communication was more effective in more cohesive groups. Also, Courneya and McAuley (1995) examined the relationships among six manifestations of social support (one of which, guidance, reflects the receipt of advice or information from others) and four manifestations of cohesion in university-aged exercise participants at three time periods over a 12-week session. The total correlation matrix was not presented but they did report average correlations between social support and cohesiveness of .20, .27, and .30 at Times 1, 2, and 3 respectively.

Thus, a second purpose of Project 5 was to determine if perceptions of task cohesiveness, assessed using the Physical Activity Environment Questionnaire (PAEQ) would predict self-efficacy in older adults. Given that self-efficacy develops

around the task (i.e., carry out the activities), it was hypothesized that only task cohesion would be related to self-efficacy.

Methods

Participants. Volunteers (n=60) from 8 physical activity classes for older adults participated in the study. The format of physical activity classes included tai chi, water aerobics, and cardiovascular training. Classes met either once or twice per week. All participants who were in attendance at the classes on the day of administration completed the questionnaire. The mean age of the participants was 68.9 years (± 6.1), 92% were female, and 50% were married.

Measures. The PAEQ as described in Project 3 was used to assess group cohesion. When the internal consistency values for the PAEQ were assessed using the responses from the 60 participants, they were found to be acceptable: Individual Attractions to the Group-Task, $\alpha=.78$ and Social, $\alpha=.94$; Group Integration-Task, $\alpha=.86$ and Social, $\alpha=.84$.

Exercise adherence was operationalized as the percentage of classes attended over an eight-week period. Attendance was monitored by the class instructors.

The operationalization of exercise self-efficacy was based upon the guidelines provided by McAuley and Mihalko (1998). Nine items were used to assess each participant's confidence in his/her ability to perform increasingly more intense physical activity. Each item represented an increasing level of difficulty and was rated on a 100-point scale. The anchors for the scale were as follows, not at all confident (0%), moderately confident (50%), and completely confident (100%). The internal consistency of the self-efficacy tool was acceptable ($\alpha=.94$).

Procedures. The participants of eight recently formed physical activity classes (together for less than 4 weeks) designed for older adults were invited to volunteer to be involved in a research project. A research assistant and the exercise class leader explained the project in a very general manner. The research assistant and class instructor then administered the questionnaire which assessed both cohesion and self-efficacy. Each participant in attendance on the day of questionnaire administration agreed to be involved. Attendance at the facility was then monitored surreptitiously for 8 weeks.

Results

Descriptive statistics show that the sample attended a large proportion of classes ($M=70\%$, $\pm 26\%$), had high perceptions of self-efficacy ($M=77\%$, $\pm 23\%$), were highly attracted to the groups' task ($M=8.5$, ± 0.6) and social ($M=7.9$, ± 1.6) components and perceived strong integration around the groups' task ($M=7.4$, ± 1.4) and social outcomes ($M=7.0$, ± 1.6). Table 4 outlines the relationships between the variables of interest.

As the results in Table 4 show, the hypothesis pertaining to cohesion and exercise class attendance was only partially supported. That is, only one measure of cohesion-- Individual attractions to the group-Task—was significantly related to attendance ($r=.29$, $p<.05$).

Also, the hypothesis pertaining to task cohesion and self-efficacy received only partial support. The correlation between Individual attractions to the group-Task and self-efficacy was $r=.49$ ($p<.01$).

Table 4. Bivariate correlations between the dimensions of group cohesion, self-efficacy, and physical activity class adherence.

	ATG-T	ATG-S	GI-T	GI-S	Self-Efficacy
Adherence	.29*	.17	.12	.11	.25*
Self-efficacy	.49**	.13	.15	.08	
GI-S	.28*	.60**	.69**		
GI-T	.33*	.54**			
ATG-S	.25*				

Note. * $p < .05$; ** $p < .01$; ATG-T = Individual Attractions to the Group Task; ATG-S = Individual Attractions to the Group-Social; GI-T = Group Integration-Task; GI-S = Group Integration-Social.

General Discussion

The general purpose of the present investigation was to initiate the development of a conceptually and psychometrically sound measure of group cohesion for use in an exercise context with older adults. Empirically, the general purpose was realized through 5 projects. In essence, the present investigation provided three general findings pointing to the construct validity of the PAEQ.

First, the PAEQ is a reliable measure that supports the factor structure of Carron and associates' conceptualization of group cohesion. Second, concurrent validity is demonstrated through the relationship between the GEQ and the PAEQ. Third, there is partial support for the predictive validity of the PAEQ.

The reliability of an instrument can be considered through its stability over time and the internal consistency of its items. Because the dimensions of class

cohesion are considered dynamic (i.e., not trait-like), the most appropriate test of reliability of the PAEQ is the calculation of each scale's internal consistency (Carron et al., 1998). Cronbach alphas were acceptable for each scale ($\alpha = .72$ through $.94$) in both the younger and older samples used in the Projects 4 and 5.

An additional point worth attention is the fact that the internal consistency of each PAEQ scale was acceptable whereas this was not the case for the GEQ scales. This raises the possibility that the PAEQ may be appropriate for younger as well as older samples of exercisers. Also, there were no appreciable difference between the means and variance of identical dimensions of cohesion as assessed by the GEQ and the PAEQ.

The internal consistency values for the PAEQ also provided some preliminary evidence that the items contained within each scale measure the same latent construct—that the factor structure is stable (Schutz, 1998). Additional support was necessary, of course, because acceptable internal consistency values across the four scales do not in and of themselves provide unequivocal support for the four factor conceptual model. For example, a 20-item inventory developed to assess an unidimensional construct could be arbitrarily subdivided into four subscales (i.e., components). Given that all 20 items were designed to assess the same (single) dimension, it would be highly probable that the alpha coefficient for each of the arbitrarily developed subscales would be high.

Additional support for the factorial validity of the PAEQ was provided from the results of the exploratory factor analysis. Four factors emerged. Each factor was

comprised wholly of items developed for a single manifestation of cohesion in exercise and physical activity settings.

The number of individuals considered necessary to compute a factor analysis is the subject of some debate. In fact, some psychometricians might consider the sample size used in Project 4 to be too small for an exploratory factor analysis (e.g., Gorsuch, 1983; Streiner, 1994). However, Guadagnoli and Velicer (1988) have found that when factor loadings are in the .80 range, as few as 50 participants are necessary to yield reliable results. Similarly, factor loadings in the range of .60 yield reliable results in samples less than 150 participants. Given the average factor loadings for Individual Attractions to the Group-Task (.71), Individual Attractions to the Group-Social (.82), Group Integration-Task (.73), and Group Integration-Social (.68), the sample size used in the present investigation was assumed to be acceptable to yield reliable results.

A second finding supporting the construct validity of the factors of the PAEQ was the concurrent validity demonstrated with the corresponding factors of the GEQ. As was highlighted earlier, the relationships between identical dimensions of cohesion assessed using the PAEQ and GEQ were in the moderate range (i.e., correlations from .57 to .69). Moreover, with only one exception, the highest correlations between the two inventories were for scales designed to measure the identical construct. Group Integration-Social (PAEQ) was highly related to Individual Attractions to the Group-Social (GEQ), Group Integration-Social (GEQ), and Group Integration-Task (GEQ).

One possible explanation for the attenuation of the correlation between the measures of Group Integration-Social could lie in the psychometric properties of the GEQ. Group Integration-Social, as assessed by the GEQ, possessed low internal consistency. Low internal consistency is known to reduce the potential magnitude of relationships between variables.

Of particular interest are the findings associated with the predictive validity of the PAEQ in older exercisers. The cohesion scale, Individual Attractions to the Group-Task, was related to exercise adherence in the older adults tested here. Using the Group Environment Questionnaire, Carron and his associates have repeatedly found that the cohesion scale, Individual Attractions to the Group-Task, is related to adherence behavior in younger samples of exercisers (Carron et al., 1988; Spink & Carron, 1992; 1993; 1994).

The positive relationship between Individual Attractions to the Group-Task and exercise self-efficacy is further evidence of predictive validity. As was outlined previously, the relationship of task cohesion to efficacy was expected from Bandura's (1986) conceptualization of the antecedents of efficacy. That is, a highly task-cohesive exercise class should afford elderly exercisers with opportunities for vicarious learning, verbal persuasion, and improved emotional states. The moderate relationship between task cohesion and self-efficacy provides some evidence that an exercise group can provide fertile ground for the development of confidence towards exercise for older adults.

A surprising finding was that no other manifestation of cohesiveness was related to adherence behavior in older adults. This finding may reflect the

multidimensional nature of cohesion. Carron et al. (1998) have stated that different dimensions of cohesion are probably salient at different times during a group's development. Thus, using the formation of an exercise class for older adults as an example, it could be hypothesized that initially an individual would be attracted to the setting for task reasons (i.e., 'I want to exercise, that group exercises, I want to go to that group'). Once in the setting, the individual might notice that there are social components to the exercise group. Consequently, attraction to the group's social components could develop and provide additional motivation for adherence. Subsequently, after an extended period of involvement with the exercise class (i.e., >6 months), the individual might feel integrated into the group for both task (i.e., fulfils a role of helper for new participants) and social (i.e., feels a sense of unity is socialization) reasons. Clearly, at each stage of participation, there may be a differential relationship between the dimensions of cohesion and adherence behavior. In the present investigation, the data were collected during the first 3 weeks of an exercise program. Consequently, only Individual Attractions to the Group-Task was a reliable correlate of exercise adherence.

It is important to note that, as well as demonstrating preliminary evidence of reliability and validity, the PAEQ also overcame the limitations characteristic of the GEQ when the perceptions of cohesion of older adults were assessed. That is, participants found the questionnaire easy to understand and complete. It is also easily administered. The provision of the PAEQ has opened doors for the examination of the role group cohesion plays in older adults.

In conclusion, the present investigation has provided some initial data to support the construct validity of the PAEQ. However, construct validity is only truly identified through a series of investigations within a well-developed research program (Nunnally, 1978). In the future, the PAEQ should be administered to a number of groups varying in size, length of attendance, and physical activity type, frequency, and duration. Validity can then be determined through confirmatory factor analysis and/or the presence of theoretically meaningful relationships.

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Summary and Future Directions

The general purpose of the dissertation was to examine the impact of social factors generally and group cohesion specifically on short and long term exercise participation of older exercise class participants. To achieve this general purpose four studies were completed. The results of Study 1 revealed that older adults identify functional fitness, general health, and social interaction as the three most common reasons for exercising in classes. Also, illness, weather, and competing activities were the most frequently encountered barriers to attending physical activity classes. Study 2 showed that the cohesion measures, Individual Attractions to the Group-Social, Group Integration-Social, and Group Integration-Task, were significantly related to exercise class attendance at one-month follow-up. Only Group Integration-Task was significantly related to class attendance at 6 and 12 months follow-up. The results of Study 3 showed that participants in a team-building condition a) attended more classes than those in the control and placebo conditions and b) had a higher return rate following a 10-week hiatus (93% versus 40%) than the control condition.

The results of Studies 1-3 allow for four generalizations. One, a common motive of older adults to participate in exercise classes is to be exposed to opportunities for the social interaction. Two, class cohesion is a significant correlate of both short and long-term exercise class participation. Three, groups composed of older adult exercisers are an appropriate forum for interventions based on developing class cohesion. Four, the Group Environment Questionnaire appears to have limitations in terms of its use with older adults.

Study 4 was comprised of five projects undertaken to develop a cohesion inventory for use with older adults—the Physical Activity Environment Questionnaire (PAEQ). In overview, the 21-item PAEQ was based upon the Carron, Widmeyer, and Brawley (1985) conceptualization of group cohesion. Data from three samples provided preliminary evidence that the PAEQ possesses high internal reliability within each scale as well as content, concurrent, factorial, and predictive validity. Thus, a fifth and final generalization emanating from this dissertation is that the Physical Activity Environment Questionnaire is an appropriate tool for the assessment of group cohesion in exercise classes for older adults.

The findings of this dissertation also lead to a number of possible avenues for future research. A natural first step is to continue refinement of the PAEQ. As stated previously, the development of the construct validity of a measurement tool is only acquired through a series of studies within a well-designed research program (Floyd & Widaman, 1995).

In Study 4 of the dissertation, an exploratory factor analysis on the PAEQ was undertaken. A confirmatory factor analysis would provide useful insight into the factorial validity of the PAEQ. Consistent with the prescriptions advanced by Carron et al. (1998), it will be necessary, therefore, to obtain data from participants from a heterogeneous cross-section of exercise classes—exercise classes, for example, that differ in size, composition of males and females, state of their development, and fundamental orientation (i.e., social versus task).

Additionally, researchers should test other conceptually logical relationships between group cohesion and other factors operational in exercise classes. For

example, previous research has associated various dimensions of group cohesion with class size (e.g. Carron & Spink, 1995). It has been hypothesized that an individual may initially be drawn to a group due to the Individual Attractions to the Group dimensions of cohesion, whereas over time an individual may be motivated to attend classes due to his/her perceptions of the Group Integration components of cohesion (Carron, Brawley, & Widmeyer, 1998). Therefore, a second possible test of predictive validity would be to examine the relevance of different group cohesion dimensions over time.

One conclusion from this dissertation is that class cohesion is related to both short and long-term exercise adherence. Given that this conclusion emanated from data obtained using the Group Environment Questionnaire, an attempt should be made to replicate these findings using the PAEQ as the measure of class cohesiveness.

Also, the results of Study 3 of this dissertation support a conclusion that a team-building intervention can influence the adherence of older exercise class participants. On the basis of previous research with younger adults (e.g., Spink & Carron, 1993), it might be assumed that the team building/adherence relationship is mediated by the cohesion variable, Individual Attractions to the Group-Task. This assumption should be tested using the PAEQ and a sample of older adults. The intervention developed for Study 3 of the dissertation had specific strategies implemented to improve social cohesion. By using the PAEQ researchers could determine what dimensions of cohesion mediate the team building/adherence relationship.

In support of a group effect on exercise adherence, McAuley and Katula (1998) recently reported a 90% adherence rate to a 6-month supervised clinical trial. They hypothesized that this high adherence rate was due to the collective efficacy of the exercise group (i.e., a shared confidence in the group's ability to adhere; Bandura, 1997):

“[We] have implemented numerous strategies, such as monthly exercise group ‘juice and muffin’ sessions, pot-luck dinners, provision of water bottles, T-shirts emblazoned with the IAA logo, and so forth. We do not know what works for sure!” (p. 141).

The strategies used by McAuley and Katula mirror those used by Carron and Spink (1993) in their team-building program designed to enhance exercise class cohesion. It is my hypothesis that if McAuley and Katula had assessed group cohesion over their clinical trial, they would know “what works for sure” (p.141) and why it was working.

In conclusion, the preceding dissertation provided insight into the relationship between class cohesion and exercise participation in older adults. It also provided an additional tool with which to assess class cohesion. Clearly, the advent of such an instrument opens the door to fruitful areas of small group research examining the psychological and behavioral outcomes of a cohesive exercise class.

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Appendix A: Initial Items for the PAEQ

Individual Attractions to the Group Task

1. I like the amount of physical activity I get in this program.
2. I am happy with the amount of time I spend developing my strength in this physical activity group.
3. This physical activity group provides me with a good opportunity to improve in areas of fitness I consider important.
4. I am happy with the intensity of the physical activity in this program.
5. I like the program of physical activities done in this group.
6. This physical activity group gives me an opportunity to improve my physical well being.
7. I enjoy new exercises done in this physical activity group.
8. This physical activity group provides me with good opportunities to improve my personal fitness.
9. I like the progress I make when I stick to the activities in this physical activity group.

Individual Attractions to the Group Social

1. Some of my good friends are in this physical activity group.
2. This physical activity group is an important social unit for me.
3. I enjoy my social interactions within this physical activity group.
4. I like meeting the people who come to this physical activity group.
5. I have good friends in this physical activity group.
6. If this program was to end, I would miss my contact with the other participants.
7. I enjoy the opportunity, within this physical activity group, to share experiences with others who are similar to me.
8. In terms of the social experiences in my life, this physical activity group is very important.
9. The social interactions I have in this physical activity group are important to me.
10. I enjoy the feedback from the instructor in this physical activity group.

Group Integration Task

1. Members of our group have similar interests regarding the program of physical activity.
2. Our group is united in its beliefs about the benefits of the physical activities offered in this program.
3. Our group is in agreement about the program of physical activities that should be offered.
4. Members of our group enjoy the type(s) of physical activities offered.
5. Members of our group are satisfied with the intensity of physical activity in this program.
6. We help each other develop new skills in our physical activity group.
7. Members of our physical activity group enjoy sharing information.
8. Members of our group enjoy helping if work needs to be done to prepare for the activity sessions.
9. We encourage each other in order to get the most out of the program.

Group Integration Social

1. We enjoy each others' company in our physical activity group.
2. Members of our physical activity group often socialize during exercise time.
3. Members of our physical activity group would likely spend time together if the program were to end.
4. We are good friends in this physical activity group.
5. A valuable aspect of our physical activity group is our social interactions.
6. Members of our group sometimes socialize together outside of activity time.
7. We spend time socializing with each other before and after our activity sessions.

Appendix B: Final Items included in the PAEQ

Individual Attractions to the Group Task

1. I like the amount of physical activity I get in this program.
2. This physical activity group provides me with a good opportunity to improve in areas of fitness I consider important.
3. I am happy with the intensity of the physical activity in this program.
4. I like the program of physical activities done in this group.
5. I enjoy new exercises done in this physical activity group.
6. This physical activity group provides me with good opportunities to improve my personal fitness.

Individual attractions to the group social

1. This physical activity group is an important social unit for me.
2. I enjoy my social interactions within this physical activity group.
3. I like meeting the people who come to this physical activity group.
4. If this program was to end, I would miss my contact with the other participants.
5. In terms of the social experiences in my life, this physical activity group is very important.
6. The social interactions I have in this physical activity group are important to me.

Group Integration Task

1. Our group is united in its beliefs about the benefits of the physical activities offered in this program.
2. Our group is in agreement about the program of physical activities that should be offered.
3. Members of our group are satisfied with the intensity of physical activity in this program.
4. Members of our group enjoy helping if work needs to be done to prepare for the activity sessions.
5. We encourage each other in order to get the most out of the program.

Group Integration Social

1. Members of our physical activity group often socialize during exercise time.
2. Members of our physical activity group would likely spend time together if the program were to end.
3. Members of our group sometimes socialize together outside of activity time.
4. We spend time socializing with each other before and after our activity sessions.

APPENDIX C

Motives and Barriers Questionnaire

In the space provided please list all the possible barriers to attending your physical activity class that you have encountered in the past or can foresee encountering in the future.

Please list in order of priority the most important reasons you have for attending exercise class.

APPENDIX D

The Group Environment Questionnaire (Note the questionnaire format has been adjusted to fit the page)

This questionnaire is designed to assess your perceptions of your fitness class. There are no right or wrong answers so please give your immediate reaction. Some questions may seem repetitive but please answer ALL questions. Your candid responses are very important to us.

Your responses will be kept in the strictest confidence (Neither your fitness leader nor anyone other than the researchers will see your responses).

PART A.

- The following questions are designed to assess your feelings about **YOUR PERSONAL INVOLVEMENT** with this exercise class.
- Using the scale above, please write down a number from 1 to 9 to indicate your level of agreement with each of the statements.

USE THIS SCALE FOR THE FOLLOWING 18 QUESTIONS:

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

- | | |
|---|-------|
| 1. I do not enjoy the social interaction occurring in this group. | _____ |
| 2. I am not happy with the amount of physical activity I get. | _____ |
| 3. I'm not going to miss the members of this exercise class when the program ends. | _____ |
| 4. I am unhappy with my group's level of commitment to exercise. | _____ |
| 5. Some of my best friends are in this exercise group. | _____ |
| 6. This exercise group does not give me enough opportunities to improve personal fitness. | _____ |
| 7. I enjoy other social events more than the social activities associated with this exercise group. | _____ |
| 8. I do not like the approach to exercise in this group. | _____ |
| 9. For me this exercise class is one of the most important social groups to which I belong. | _____ |

PART B.

- **The following questions are designed to assess your perceptions of YOUR EXERCISE GROUP AS A WHOLE.**
- **Using the scale above, please write down a number from 1 to 9 to indicate your level of agreement with each of the statements.**

10. Our exercise group is united in trying to reach its goals for fitness. _____
11. Members of our group would rather socialize alone than get together as a group. _____
12. We all take responsibility if one of our exercise classes goes poorly. _____
13. Members of our exercise class rarely socialize together. _____
14. Members of our exercise class have conflicting same aspirations regarding the group's progress. _____
15. Members of our exercise class would like to spend time together after the program is over. _____
16. If members of our group have problems in class, everyone wants to help them so we can work together again. _____
17. Members of our group do not stick together outside of exercise classes. _____
18. Members of our group do not communicate freely about the correct method of doing exercises during or after classes. _____

APPENDIX E

The Physical Activity Environment Questionnaire (Note the questionnaire format has been adjusted to fit the page)

This questionnaire is designed to assess your perceptions of your fitness class. There are no right or wrong answers so please give your immediate reaction. Some questions may seem repetitive but please answer ALL questions. Your candid responses are very important to us.

Your responses will be kept in the strictest confidence (Neither your fitness leader nor anyone other than the researchers will see your responses).

PART A.

- The following questions are designed to assess your feelings about **YOUR PERSONAL INVOLVEMENT** with your physical activity group.
- Using the following scale, please write down a number from 1 to 9 to indicate your level of agreement with each of the 13 statements.
- If you neither agree nor disagree, or you do not know, simply respond by using the number '5'.

1	2	3	4	5	6	7	8	9
Very Strongly Disagree	Strongly Disagree	Disagree		Neither Agree Nor Disagree		Agree	Strongly Agree	Very Strongly Agree

1. I like the amount of physical activity I get in this program. _____
2. This physical activity group is an important social unit for me. _____
3. I enjoy my social interactions within this physical activity group. _____
4. This physical activity group provides me with a good opportunity to improve in areas of fitness I consider important. _____
5. I like meeting the people who come to this physical activity group. _____
6. I am happy with the intensity of the physical activity in this program. _____
7. I like the program of physical activities done in this group. _____
8. If this program were to end, I would miss my contact with the other participants. _____
9. I enjoy new exercises done in this physical activity group. _____
10. In terms of the social experiences in my life, this physical activity group is very important. _____
11. This physical activity group provides me with good opportunities to improve my personal fitness. _____
12. The social interactions I have in this physical activity group are important to me. _____

PART B.

- The following questions are designed to assess your feelings about **YOUR PHYSICAL ACTIVITY GROUP AS A WHOLE.**
- Use the following scale to indicate your level of agreement with each of the statements.
- If you neither agree nor disagree, or you do not know, simply respond by using the number '5'.

1	2	3	4	5	6	7	8	9
Very Strongly Disagree	Strongly Disagree	Disagree		Neither Agree Nor Disagree		Agree	Strongly Agree	Very Strongly Agree

1. Members of our physical activity group often socialize during exercise time. _____
2. Our group is united in its beliefs about the benefits of the physical activities offered in this program. _____
3. Members of our physical activity group would likely spend time together if the program was to end. _____
4. Our group is in agreement about the program of physical activities that should be offered. _____
5. Members of our group are satisfied with the intensity of physical activity in this program. _____
6. Members of our group sometimes socialize together outside of activity time. _____
7. We spend time socializing with each other before or after our activity sessions. _____
8. Members of our group enjoy helping if work needs to be done to prepare for the activity sessions. _____
9. We encourage each other in order to get the most out of the program. _____

APPENDIX F

Self-Efficacy Measure (Note the questionnaire format has been adjusted to fit the page)

PART A. Please state how confident you are that you can complete the following behaviors. Use the scale below for your responses and indicate your answer by writing it on the corresponding line.

Please use these definitions when answering the following questions.

Moderate physical activity = Not exhausting, light sweating (e.g. fast walking, tennis, easy bicycling, badminton, aqua fit classes, popular or folk dancing).

Mild physical activity = Not exhausting, not sweating (e.g. easy walking, yoga, archery, fishing, bowling, lawn bowling, shuffleboard, horseshoes, golf).

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Not at all					Moderately					Completely
Confident					Confident					Confident

I am confident that I can:

1. Do mild physical activity for 10 minutes without stopping. _____
2. Do mild physical activity for 15 minutes without stopping. _____
3. Do mild physical activity for 20 minutes without stopping. _____
4. Do mild physical activity for 25 minutes without stopping. _____
5. Do moderate physical activity for 10 minutes without stopping. _____
6. Do moderate physical activity for 15 minutes without stopping. _____
7. Do moderate physical activity for 20 minutes without stopping. _____
8. Do moderate physical activity for 25 minutes without stopping. _____
9. Do strenuous physical activity for 30 minutes without stopping. _____

APPENDIX G

The University of Western Ontario Certification of Approval of Human Research



The UNIVERSITY of WESTERN ONTARIO

Vice-Provost • Health Sciences • Health Sciences Centre

REVIEW BOARD FOR NON-MEDICAL RESEARCH INVOLVING HUMAN SUBJECTS

1996-97 CERTIFICATION OF APPROVAL OF HUMAN RESEARCH

ALL NON-MEDICAL RESEARCH INVOLVING HUMAN SUBJECTS AT THE UNIVERSITY OF WESTERN ONTARIO IS CARRIED OUT IN COMPLIANCE WITH THE SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL GUIDELINES (1981).

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- Alternates are appointed for each member

THE REVIEW BOARD HAS EXAMINED THE RESEARCH PROJECT ENTITLED:
 "Determining the effects of social influences and the theory of planned behaviour on exercise adherence in the elderly."

REVIEW NO: 55670

AS SUBMITTED BY: Professor A. Carron (P. Estabrooks), Kinesiology, Thames Hall

AND CONSIDERS IT TO BE ACCEPTABLE ON ETHICAL GROUNDS FOR RESEARCH INVOLVING HUMAN SUBJECTS UNDER THE CONDITIONS OF THE UNIVERSITY'S POLICY ON RESEARCH INVOLVING HUMAN SUBJECTS.

APPROVAL DATE: 16 December 1996 (UWO Protocol, Letter of Information & Consent)

AGENCY:

TITLE:

Susan Hoddinott
 A.K. McDougall, Chairman

Susan Hoddinott
 Director
 Research Services



The UNIVERSITY of WESTERN ONTARIO

Vice-President (Research)

Ethics Review Board, Dental Sciences Building

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- 16) Mrs. R. Yohnicki, Administrative Officer

Alternates are appointed for each member.

THE REVIEW BOARD HAS EXAMINED THE RESEARCH PROJECT ENTITLED:
"Revising the group environment questionnaire for older adults."

REVIEW NO: E6956

AS SUBMITTED BY: Dr. A.V. Carron - Kinesiology, Thames Hall

AND CONSIDERS IT TO BE ACCEPTABLE ON ETHICAL GROUNDS FOR RESEARCH INVOLVING HUMAN SUBJECTS UNDER CONDITIONS OF THE UNIVERSITY'S POLICY ON RESEARCH INVOLVING HUMAN SUBJECTS.

APPROVAL DATE: February 11, 1999 (UWO Protocol, Letter of Information & Consent)

AGENCY:

AGENCY TITLE:

Bessie Borwein
Bessie Borwein, Chairman

c.c. Hospital Administration