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EXAMINING THE EFFECT OF A GOAL-SETTING INTERVENTION ON ADHERENCE TO PHYSICAL ACTIVITY IN MINORITY WOMEN

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EXAMINING THE EFFECT OF A GOAL-SETTING INTERVENTION ON ADHERENCE TO PHYSICAL ACTIVITY IN MINORITY WOMEN

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ABSTRACT

Approximately two-thirds of the Canadian population are not sufficiently active to gain health benefits. Of particular interest, women belonging to ethnic minority groups have been found to have lower rates of participation in physical activity than Caucasian women, the former comprise an extremely inactive segment of the population. Thus, the purpose of the present study was to determine whether a goal-setting physical activity intervention could positively influence leisure time physical activity adherence and self-efficacy among minority women. Ninety-seven ethnic minority women from the London, Ontario community enrolled in the study and seventeen participants withdrew (an overall attrition rate of 17.53%). Repeated measures ANOVAs carried out on the adherence measures revealed significant declines in adherence over the course of the intervention. However, both coping self-efficacy and cardiovascular fitness increased significantly from baseline to the end of the intervention. It was concluded that a 6-week home-based goal-setting intervention can possibly reduce attrition from a physical activity intervention as well as increase self-efficacy scores.

Keywords: goal setting, physical activity, minority women, adherence, self-efficacy

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The Importance of Physical Activity

Physical activity can be defined as "any bodily movement produced by contraction of skeletal muscle that substantially increases energy expenditure" while exercise refers to "a category of leisure-time physical activity in which planned, structured and repetitive bodily movements are performed to improve or maintain one or more components of physical fitness" (Hardman & Stensel, 2003, p.14). Canada's Physical Activity Guide to Healthy Active Living (2003) recommends the accumulation of 60 minutes of physical activity each day, or 30 minutes of moderate activity, four days a week. The guide mentions physical activity and not exercise, and the examples of activities given reflect the broad range of ways in which people can be physically active; for instance, dusting and strolling are listed among the many other activities. Furthermore, the guide suggests accumulating physical activity in 10 minute bouts in order to accommodate it into a busy lifestyle. Similarly, the American College of Sports Medicine (ACSM; Haskell et al., 2007) suggests that adults 18-65 years old should engage in 30 minutes of moderate aerobic activity five days a week, and 20 minutes of vigorous activity on three days each week. They also suggest that aerobic activity can be accumulated in 10 minute bouts rather than one single 30-minute bout. Therefore, it appears possible to improve physical fitness without being restricted to highly structured exercise regimens. Physical fitness refers to the ability to perform daily tasks without fatiguing and with plenty of energy (Caspersen, Powell, & Christenson, 1985). While a distinction does exist between physical activity and exercise, because exercise comprises

a category of physical activity, both are referred to interchangeably for the purposes of the present study.

The benefits of physical activity have long been recognized, and regular physical activity has been shown to aid in protecting against various chronic conditions such as type 2 diabetes, cardiovascular disease, stroke, hypertension, osteoporosis, and many others (Canadian Fitness and Lifestyle Research Institute, 2005). Many of these conditions are preventable, and engaging in physical activity is one way in which people might deter the development of diseases which could eventually be fatal. However, despite the obvious risks of sedentary lifestyles and the benefits of physical activity, approximately two-thirds of the Canadian population are not sufficiently active to gain health benefits (Craig, Russell, Cameron, & Beaulieau, 1999). In fact, researchers have found that the number of Canadians facing health risks due to sedentary lifestyles is more than double the number of Canadians facing health risks due to smoking cigarettes (Russell & Craig, 1995). Furthermore, women are statistically less physically active than men: 47% of Canadian men and only 41% of Canadian women are physically active (Lox, Martin Ginis, & Petruzzello, 2006). This trend has been shown in Ontario as well, with one study finding approximately 54% of men and 48% of women 18 and over are active or moderately active (Statistics Canada, 2005). Data from the United States mirrors this trend with only 34.3% of men and 29.8% of women meeting the ACSM recommendations for moderate activity (Arriaza Jones et al., 1998). Thus, while most of the Canadian population is not acquiring recommended amounts of physical activity, women are even less active, creating an increased risk of the previously mentioned chronic conditions among this population.

Minority Women and Physical Activity

In Canada, visible minorities can be defined as "persons, other than Aboriginal people, who are non-Caucasian in race or non-white in colour" (Department of Justice Canada, 1995, p.2). Hence, Canadian groups that are considered to be visible minorities include South Asians, Chinese, Blacks, Arabs, Filipinos, Latin Americans, Koreans, Japanese, West Asians, Southeast Asians, and others (Canadian Council on Social Development, 2004). A consistent finding among researchers is that members of visible minorities and non-Caucasian ethnic groups have lower rates of participation in physical activity (Lox et al., 2006). Data from the United States suggest that Caucasians are not only more physically active than non-Caucasians but also participate in more vigorous physical activity (Lox et al., 2006). Similarly, a Canadian study looking at levels of physical activity among ethnic minorities found that participation in physical activity is lower among most ethnic minority groups (Bryan, Tremblay, Perez, Ardern, & Katzmarzyk, 2006). Hence, the previously mentioned differences in physical activity participation demonstrated between men and women appear to be mirrored between minority groups and the majority, Caucasian population.

As already noted, women have been found to be less physically active than men and researchers have concluded that women in all ethnic groups are more likely to be physically inactive (Bryan et al., 2006). This suggests that women belonging to ethnic minority groups have a very high rate of physical inactivity, higher than that of Caucasian women, and thus comprise a very inactive segment of the population. In fact, research on minority women consistently has found them to be less physically active than Caucasian women. For example, Brownson et al. (2000) found that women belonging to African

American or American Indian/Alaskan Native subgroups had a higher likelihood of not engaging in any leisure time activity than Caucasian women. Similarly, in other research studying physical activity in women, African American and Mexican women displayed higher levels of inactivity than Caucasian women (Speck & Harrell, 2003). Furthermore, in the United States, there is information suggesting that Asian, Pacific Islander, American Indian, and Alaskan Native women have lower rates of physical activity than white women (Centre for Disease Control and Prevention, 1994). Minority women are not only less active than Caucasian women but are also more likely to suffer from a host of inactivity-related preventable health problems such as hypertension and diabetes, and are at an increased risk of death from cancer, stroke, and cardiovascular disease (Office on Women's Health, 2003). Although a causal link cannot be inferred between the lack of physical activity and the increased prevalence of health problems among minority women, studies have shown that low levels of physical activity are associated with increased risk of cardiovascular disease, stroke, hypertension, and death due to any disease (Salonen, Puska, & Tuomelehto, 1982). Therefore, the lack of physical activity among minority women could be related to many of the health problems faced by this population.

Barriers to Physical Activity

Although most people are aware of the many benefits of being physically active, these benefits are weighed against the costs or barriers to physical activity (Lox et al., 2006). There are a number of barriers to physical activity frequently cited by most of the population, and some researchers (Lox et al., 2006) classify these barriers as either genuine (e.g., inaccessible transportation) or perceived (e.g., lack of time). Aside from

inaccessible transportation and lack of time, commonly mentioned barriers to physical activity include lack of convenience or unavailability of facilities, environmental and ecological factors such as geographical location and climate, physical limitations, boredom, and lack of enjoyment (Lox et al., 2006). Moreover, lack of energy and lack of interest or motivation have also been referred to as major impediments to being physically active (Russell & Craig, 1995).

The above mentioned barriers to physical activity are commonly cited by the general population, and many of the barriers have been found to be evident in groups of women including minority women. For instance, Nies, Vollman, and Cook (1999) in their study looking at physical activity in African American women, found that both African American and Caucasian women stated that lack of time, motivation, and social support were barriers to physical activity. Moreover, other researchers have found lack of time, motivation, and health concerns to be personal barriers to physical activity for minority women with lack of time being the principal barrier stated (Eyler et al., 1998). Lack of time is the most frequently cited barrier to physical activity in the general population, and it has also been found to be the most common barrier to physical activity among African American, Asian, Hispanic, and American Indian women (Wilcox, 2002).

Time as a barrier to physical activity. As previously noted, time is often cited as the primary barrier to physical activity by most of the population, including minority women. Thus, it is important to investigate ways to assist minority women in finding the time for physical activity. Some clinicians believe that people who feel they do not have the time to be physically active do, in fact, have the time, and that lack of time is a perception rather than a reality (Anshel, 2006). Anshel believes that many people

demonstrate poor time management skills. Additionally, in a study conducted on African American and Hispanic women, the relationship between their time commitments and the perceived lack of time for physical activity was assessed. Results from this study found that the women's actual time commitments did not predict the perceived lack of time for activity (Heesch & Masse, 2004). Hence, some believe that it may not be an actual lack of time that leads people to believe that they cannot schedule physical activity into their daily lives, but the way in which they make use of their time.

In their study looking at the relationship between discretionary time and physical activity, Wolin, Bennett, McNeill, Sorensen, and Emmons (2008) found positive associations between participants' self-reported free time and their baseline levels of physical activity. Participants included men and women at 18 different urban worksites who participated in an 18-month intervention. While participants who reported the lowest levels of discretionary time also engaged in the least amount of leisure time physical activity at baseline, there were no associations between levels of discretionary time and physical activity during the intervention or at follow-up. Thus, although the amount of free time participants reported at baseline did appear to affect how much physical activity they were engaging in at baseline, their levels of free time did not affect the amount of physical activity they engaged in while enrolled in a structured physical activity intervention. This finding may hold important implications for clinicians and researchers when attempting to assist participants in making time for physical activity.

Lack of time is commonly mentioned as a barrier to engaging in physical activity by minority women as well as by the general population. However, there is limited research that specifically attempts to assist minority women in finding the time to be

physically active by setting goals for physical activity. It is therefore imperative to work with this population because very little has been done with them in terms of physical activity and goal setting.

Social Cognitive Theory, Goal Setting, and Self-Efficacy

When contemplating any behaviour change, there are various cognitions that individuals experience when intending to change or when actually affecting change. Bandura's Social Cognitive Theory (1986), a theory at the forefront of behaviour change and especially health behaviour change, states that behavioural patterns, personal factors such as cognitions, and environmental factors all interact and influence each other (Bandura, 2001). The theory identifies a specific set of integral determinants: knowledge, perceived self-efficacy, outcome expectations, goals, perceived facilitators and impediments (Bandura, 2004). In the context of health behaviours, knowledge refers to being aware of health risks and the benefits of various health exercises, perceived self-efficacy is the belief that one can control one's health, and outcome expectations refer to the anticipated rewards and costs of different health practices. Additionally, goals refer to the health goals people make and their plans for attaining them, and perceived facilitators and impediments refer to facilitators and barriers to making the changes they seek to make (Bandura, 2004). These determinants, which are also termed constructs, are especially relevant to the adoption of a physical activity program. Specifically, the constructs of goals and self-efficacy have been of interest to researchers attempting to influence change in the physical activity patterns of a population, and have been found to influence physical activity behaviours (Bandura, 1986, 1997; Kyllo & Landers, 1985;

Marcus, Eaton, Rossi, & Harlow, 1994; Marcus, Selby, Niaura, & Rossi, 1992; Martin et al., 1984; McAuley et al., 2007; Shilts, Horowitz, & Townsend, 2004).

Within Bandura's Social Cognitive Theory (1986), goals and specifically goal setting is one of the cognitively-based methods through which behavioural intention can be regulated. A goal can be defined as "that which one wants to accomplish; it concerns a valued, future end state" (Lee, Locke, & Latham, 1989, p. 299). Thus, because a goal represents a valued objective to individuals, goal setting should act as an incentive towards behaviour change. There are several elements of goal setting in the absence of which goals may not be self-motivating or valuable. Goals must be specific, challenging, and proximal in order to provide effective motivation for individuals to change their behaviour (Bandura, 1986). The element of proximity is especially important and refers to reducing large, distant goals into smaller sub-goals that are more easily achieved and through which the larger goal can be attained. Reducing large goals into proximal sub-goals is frequently encouraged and has been suggested as a means of assisting exercisers in achieving their ultimate objectives (Lox et al., 2006).

In the goal-setting literature, three different types of goals are often identified and differ in which person creates the goal. The three types of goals are self-set goals which are set by the participant or person who will be striving to reach the goal, participatory goals which are set jointly by the participant and another person, and assigned goals which are set by someone external to the participant such as a researcher (Locke & Latham, 1990). Specifically, assigned versus self-set goals have been shown to produce differing effects on goal adherence and attainment; for instance, Bandura (1986) stated that when people act under the directives of others in terms of setting goals, they do not

view themselves as responsible for the attainment of those goals. It is only when individuals set and strive to achieve goals that they have set for themselves that a true commitment exists to adhering to those goals. Similarly, self-set goals have been shown to produce better outcomes than assigned goals in the physical activity and exercise literature. In their meta-analysis of research involving goal setting in physical activity, Kyllo and Landers (1995) found that participant-set goals produced significantly better performance gains than assigned goals. As well, better long-term adherence to exercise has been found from self-set goals when compared to assigned goals in a study where participants walked or jogged (Martin et al., 1984).

The attainment of goals can increase an individual's perception of self-efficacy (Bandura, 1986). Self-efficacy is the belief in one's capability to perform actions required to achieve desired attainments (Bandura, 1997). Therefore, if one believes that he/she is capable of performing a task with the expectation of a particular outcome, one will be more likely to attempt the task. Self-efficacy has received a significant amount of attention in the literature and research has shown that it predicts various health actions such as participating in regular physical activity, quitting smoking and attempting to lose weight (Bandura, 1997). Furthermore, it has been shown that self-efficacy can increase the likelihood of people adopting healthier practices by increasing people's diligence at completing a task, and by affecting the way people's bodies respond when working towards a goal (Aronson, Wilson, Akert, & Fehr, 2007). Evidently, self-efficacy is fundamental to a person's belief in their ability to effect personal change and their motivation to do so. As Bandura (2004, p.144) stated, "[U]nless people believe they can produce desired effects by their actions, they have little incentive to act or to persevere in

the face of difficulties". So, high self-efficacy can act as a motivator in performing tasks, and especially in health practices.

Because different behaviours, including exercise, comprise different skills, it has been suggested that self-efficacy is multidimensional (Bandura, 1997). Evidence for this multidimensionality has been found and three types of self-efficacy have been shown to be relevant to exercise (Rodgers, Wilson, Hall, Fraser, & Murray, 2008). Maddux (1995) identified two subsets of self-efficacy: coping self-efficacy which refers to a person's belief in their ability to deal with challenges that might prevent them from completing a task; and task self-efficacy, referring to a person's belief in their ability to perform a task. Scheduling self-efficacy is the third sub-domain of self-efficacy. It developed from research indicating that lack of time was the most commonly cited barrier to exercise (Brawley, Martin, & Gyurcsik, 1998). The three types of self-efficacy have received a considerable amount of attention in the exercise literature (Rodgers et al., 2002; Rodgers et al., 2008; Rodgers & Sullivan, 2001). Thus, it is important to consider the specific types when studying self-efficacy as it relates to exercise.

There are several sources of self-efficacy and these include mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states (Bandura, 1997). Of these sources, mastery experiences provide the optimal way of influencing self-efficacy because they provide the best evidence of whether or not one can perform a particular action (Bandura, 1997). Setting and attaining goals can provide indicators of mastery and subsequently, can increase an individual's self-efficacy for a specific task (Bandura, 1986).

Exercise Intentions

Intention to perform a behaviour has been argued to be the most important determinant of behaviour by a number of researchers across a variety of social cognitive theories (Ajzen, 1991; Rogers, 1983). Ajzen (1991) posits that intentions directly influence the amount of effort a person will put into exerting a behaviour and that intentions represent a plan to perform a behaviour. Behavioural intentions have received much attention in the exercise literature and have been found to be correlated significantly to exercise behaviour (Godin & Shephard, 1990). Of particular interest is the relationship between exercise intention and self-efficacy for exercise. Maddux, Norton, and Stoltenberg (1986) have found self-efficacy to be predictive of exercise intentions, with the intentions being related to actual behaviour. Similarly, in their study looking at the influence of self-efficacy on adherence to exercise, Ducharme and Brawley (1995) found both barrier (coping) and scheduling self-efficacy to be significant predictors of exercise intention. Thus, if the use of goal-setting techniques can increase self-efficacy for exercise, which in turn has been found to be related to exercise intentions, actual exercise behaviour should also be affected.

Adherence

Significant problems in any physical activity intervention are those of adherence. Dishman (1988) found that approximately 50% of patients or clients involved in an exercise program will drop out of the program within six months to a year. This has been a consistent finding in the literature; for example, McAuley (1993) reported a 43% attrition rate from a 5-month long exercise program. Researchers have been interested in gaining insight into the high rate of dropout from physical activity interventions, and

determining possible common characteristics of individuals who fail to adhere to physical activity interventions.

Although physical activity has been shown to reduce stress, stress itself can be a common reason for a lack of adherence to physical activity interventions (Stetson, Rahn, Dubbert, Wilner, & Mercury, 1997). This is of particular interest because physical activity is often promoted as a means to reduce stress, when in fact, trying to adhere to a program may at times cause individuals to experience higher levels of stress and drop out of the program. Having to find transportation to an exercise facility as well as the time to get there may be a source of stress for minority women, especially if the facility is a considerable distance from the women's homes. Thus, home-based exercise programs should be considered as a possible way of increasing adherence to physical activity interventions. In King, Haskell, Taylor, Kraemer, and DeBusk's (1991) research, evidence was found promoting a home-based intervention over a center-based program. In their study, sedentary men and women between the ages of 50 and 65 were randomized into four groups: a center-based high-intensity exercise group, a home-based high intensity exercise group, a home-based low intensity exercise group, and an assessment-only control. Following the 12-month intervention, adherence to the exercise program was found to be better for both home-based exercise groups in comparison to the center-based exercise group. In addition to possibly limiting the stress of attending an exercise facility, a home-based intervention may also be more feasible for minority women in terms of finding the time to be physically active.

Accumulating physical activity in short-bouts as opposed to a single continuous bout may affect adherence to exercise interventions. As previously mentioned, the

ACSM (Haskell et al., 2007) recommends the accumulation of daily physical activity in 10 minute bouts. Intermittent exercise may prove more feasible for minority women who feel that they do not have the time to be physically active, and subsequently, may affect adherence to a physical activity intervention. While there is currently no research on intermittent exercise and minority women, the research that exists with other populations holds promise. For instance, in their study of multiple short bouts of exercise versus one continuous bout with sedentary women, Jakicic, Wing, Butler, and Robertson (1995) found that women who exercised in multiple short bouts reported greater levels of exercise participation than those women who engaged in exercise only once per day. Moreover, in a study consisting of sedentary, obese females, all participants accumulated exercise in 10 minute bouts three times per day, five days per week, for 32 weeks (Snyder, Donnelly, Jacobsen, Hertner, & Jakicic, 1997). Adherence to this intervention was found to be abnormally high, with participants engaging in 82% of their prescribed exercise, providing further support for the benefit of intermittent exercise in relation to increased exercise adherence. Furthermore, Donnelly, Jacobsen, Snyder Heelan, Seip, and Smith (2000) studied the effects of intermittent versus continuous exercise in sedentary women. While the authors found that both groups had similar rates of adherence to the scheduled exercise sessions, the intermittent group walked a greater distance and time than the long-bout group.

As already stated, self-efficacy involves the belief in one's capability of performing actions and overcoming barriers to those actions in order to achieve desired outcomes (Bandura, 1997). The importance of self-efficacy to engaging in physical activity has already been discussed; however, researchers have also found a significant

link between self-efficacy and adherence to, or maintenance of physical activity programs (Prohaska, Peters, & Warren, 2000; Sullum, Clark, & King, 2000; Taylor, 2003). In their research studying attrition and exercise relapse in African Americans, Prohaska et al. (2000) found that low exercise self-efficacy at the beginning of the intervention was a significant predictor of attrition from the program. Similarly, Sullum et al. (2000) found that students who relapsed from an exercise program had significantly lower levels of self-efficacy at baseline than those who remained physically active. High self-efficacy may provide some protection against relapse from a physical activity intervention. Therefore, increasing individuals' self-efficacy should be the goal of clinicians and researchers attempting to engage people in physical activity and maintain adherence to physical activity interventions; and this may be achieved through the mastery experiences afforded by the setting and attaining of goals.

Goal-Setting Physical Activity Interventions Targeting Minority Women

There is currently a paucity of research on physical activity interventions and specifically the effect of goal setting on adherence among minority women. In research conducted by Williams, Bezner, Chesbro, and Leavitt (2005), the effect of behavioural contracts on exercise adherence was studied in postmenopausal African American women. Both the intervention and control groups met with the principal investigator to determine walking goals, as well as develop ways to meet them. However, only the intervention group signed a contract making them accountable for their goals, the control group did not sign any written agreement. Results of this study showed that the contracts did increase adherence to the walking goal; those in the intervention group were more likely to achieve the walking goal than those who didn't sign the contract. However,

while this study did involve goal setting, both groups participated in setting goals and thus the effect of goal setting alone was not examined. Furthermore, Castro, Sallis, Hickmann, Lee, and Chen (1999) in their research studying correlates of physical activity amongst minority women, included goal setting in their intervention design. The purpose of their research was to determine if the intervention could change various psychosocial variables, including self-efficacy, that were all thought to affect physical activity. Participants in the intervention group set goals for the frequency and duration of walking and also received behaviour counselling phone calls. While the number of minutes spent walking per week did increase over the course of the intervention, this increase was seen for both groups. As well, the effects of goal setting alone were not studied as behaviour counselling was also employed.

A recent study looked at the effects of walking goals on exercise self-efficacy amongst older African American women (Williams, Bezner, Chesbro, & Leavitt, 2008). Participants in this intervention were postmenopausal African American women, all of whom met with the principle researcher to set goals for the duration and intensity of their walking sessions, as well as for the number of steps to be walked each day. Researcher-assigned and participant-set goals were combined: the researcher instructed all participants to walk briskly four days per week for 30 minutes a day, participants were told to walk at a somewhat hard intensity, and participants, with input from the researcher, set individual goals for the number of steps to be walked each day. Results of this study indicated that participants who met their goal of walking briskly for four days per week had higher self-efficacy before and after the intervention, and their self-efficacy scores increased from baseline to the end of the program. However, self-efficacy scores

for those who did not meet this goal decreased from baseline to post-intervention. While this study provides interesting insight into goals and self-efficacy among postmenopausal African American women, the effect of goal setting on self-efficacy was not studied as all participants were involved in setting goals. The impact of setting goals on adherence to exercise also was not studied. It is thus increasingly apparent that further research is needed on this topic, as increasing adherence to physical activity interventions is an important issue, and especially important with regards to minority women who have been found to be significantly less active than other women.

Purposes of the Present Study

The purpose of this study was to determine whether a goal-setting physical activity intervention had an effect on physical activity adherence among minority women. Another purpose of this study was to investigate whether the participants' intention to exercise changed over the course of the 6-week intervention and whether any such changes were related to whether the participants were assigned goals or set their own goals. This study also examined the effect of the goal-setting intervention on task, coping, and scheduling self-efficacy directly over the course of the 6-week exercise program. The final purpose of this study was to determine if changes over the 6-week intervention in exercise adherence, intention to exercise and self-efficacy were related. It was hypothesized that participants who were involved in setting their own goals for physical activity duration and frequency would have better adherence during the exercise program compared to those whose goals were assigned. Also, participants who self-set goals were hypothesized to increase their overall self-efficacy, especially scheduling self-efficacy, compared to those whose goals were assigned.

Methods

Participants

This study recruited minority women from the London, Ontario community. Minority women included women from visible minority groups which in Canada are defined as "persons, other than Aboriginal people, who are non-Caucasian in race or non-white in colour" (Department of Justice Canada, 1995, p.2). However, for the purposes of this study, First Nations women were included as these women, along with other minority women, have been found to be less physically active than Caucasian women (Brownson et al., 2000). Minority women were recruited via newspaper advertisements (Appendix B) and flyers (Appendix A) posted in London public libraries as well as on the University of Western Ontario campus (UWO). Additionally, a mass email (Appendix B) was sent to all female UWO students. Various ethnic community groups in the London community were also contacted and given information about the study, as well as a number of UWO campus clubs. Inclusion criteria for participation in the study required that women were: 18-45 years of age at the commencement of the intervention, of non-Caucasian background also including First Nations, not pregnant, not currently taking any medications, able to speak English fluently as well as read and write in English, and currently engaging in physical activity less than two days per week. Women were also asked to complete the Physical Activity Readiness Questionnaire (PAR-Q) (Appendix C) to ensure that they had no medical conditions that would contraindicate exercise. Eligible participants scheduled an initial assessment which took place at the Exercise and Health Psychology Laboratory located in the Arthur and Sonia Labatt Health Sciences Building on the UWO campus.

Measures and Instruments

Participants were asked to complete a demographic information form (Appendix G) which included the following information: age, race/ethnicity, weight, height, education, income, occupation, and marital status.

Exercise intentions. The participants were asked three questions regarding their intent to exercise: Do you intend to maintain your current activity level? Do you intend to increase your current activity level? Do you intend to decrease your current activity level? Participants rated their exercise intentions on a 7-point scale anchored by 1 (strongly disagree) and 7 (strongly agree). This approach to assessing exercise intentions over the course of an exercise intervention with exercise initiates has recently been employed by Milne, Rodgers, Hall, and Wilson (2008). A representation of this item can be found in Appendix I.

Multidimensional Self-Efficacy for Exercise Scale. Participants completed the Multidimensional Self-Efficacy for Exercise Scale (MSES; Rodgers et al., 2008) (Appendix K). This is a 9-item measure which assesses task, coping and scheduling efficacy. Following the stem: "How confident are you that you can exercise when..." participants respond to each of the nine items on a 100% confidence scale where "0 = not at all confident" and "100 = completely confident." An example of a task efficacy item is "complete exercise using proper technique," an example of a coping item is "exercise when you lack energy" and "arrange your schedule to include regular exercise" is an example of a scheduling item. Support has been provided for the validity of the instrument and the internal consistency has been found to be high, demonstrated by a

Cronbach's alpha ranging from .76 to .95 across three measurement points (Rodgers et al., 2008).

Leisure Time Exercise Questionnaire. Participants also completed the Leisure Time Exercise Questionnaire (LTEQ; Godin & Shephard, 1985) (Appendix J), a 3-item measure which assesses the frequency of engaging in mild, moderate, or strenuous activity over a typical 7-day period for at least 15 minutes. The scale gives examples of what comprises mild (minimal effort, e.g., yoga or easy walking), moderate (not exhausting, e.g., fast walking or easy bicycling), and strenuous (heart beats rapidly, e.g., running or vigorous long distance bicycling) activity. Total exercise scores were calculated based on the results of the LTEQ using the following equation to convert responses into METs (metabolic equivalent of physical activity in multiples of resting oxygen consumption): [strenuous x 9] + [moderate x 5] + [mild x 3]. Researchers have found the LTEQ to have high one month reliability, ranging from .24 to .86 and the LTEQ has shown evidence of convergent validity based on being positively related to objective measures of exercise behaviour (Jacobs, Ainsworth, Hartman, & Leon, 1993).

Heart rate monitors. For the duration of the intervention, participants used heart rate monitors to document the frequency, duration, and intensity of their exercise sessions. The Polar RS400 Running Computer was the heart rate monitor used; it is a watch that gives information on heart rate, exercise date, and exercise time among other things. While wearing the Polar watch, participants wore the Polar WearLink 31 coded transmitter which is positioned on the chest and attached to an electrode strap. The transmitters measured participants' heart rates per minute in real time and that information was then recorded on the Polar watches. Participants were required to wear

the electrode strap with the transmitter attached as well as the watch each time they exercised.

Procedures

At the initial assessment, eligible participants had the study described to them in further detail by reviewing the letter of information, and informed consent was acquired. Participants then completed the previously mentioned demographic information form and questionnaires. At this point, participants' weight and height were measured by the researcher, following which participants were asked to sit down and relax for several minutes in order to record their resting heart rate, or as near to it as was possible.

Fitness test. At this point, participants engaged in a sub-maximal fitness test. The single-stage sub-maximal treadmill walking test used was developed by Ebbeling, Ward, Puleo, Widrick, and Rippe (1991) who also showed it to be a valid method of estimating VO_{2max}. Participants were familiarized with the treadmill and then began walking at a speed between 2 and 4.5 mph that corresponded to 60% of their age-predicted maximum heart rate. Once this speed had been established, participants walked for four minutes at a 0% grade, and this constituted the warm-up. After four minutes, the incline was increased to a 5% grade with the speed held constant. Participants walked at the 5% grade for 4 minutes and then the incline was reduced to the 0% grade with participants walking at a slower pace for a cool-down. Heart rates were recorded at the end of the warm-up as well as the end of the test. The test was also repeated at the 6-week conclusion of the intervention. The single-stage sub-maximal treadmill walking test was used because the ACSM (2000) recommends using tests that reflect the primary activity in which the participants will be engaging (e.g., walking or jogging). Also, this

test is recommended for new exercisers who may fatigue more easily than regular exercisers (Noonan & Dean, 2000).

Intervention. Following the sub-maximal fitness test, participants were randomized into one of three groups. Participants in Group 1 or the short-bout group were required to engage in exercise on five or more days of the week for 30 minutes per day with the option of accumulating the 30 minutes over the day in 10-minute bouts. This is in accordance with the recommendations by the ACSM which state that individuals should engage in moderate intensity exercise on five days of the week and that the daily duration can be accumulated in bouts (Haskell et al., 2007). Participants, therefore, were given the option of completing their 30 minutes per day in bouts or all at once based on whichever was most convenient for them. Based on the results of their sub-maximal fitness tests, participants in this group began their 6-week exercise program engaging in exercise at an intensity of 50-60% of their heart rate reserve. Over the course of the 6-week program, the prescribed intensity of exercise that they engaged in was increased gradually with the prescription for intensity in the last two weeks being 55-70% of their heart rate reserve. The prescribed intensities of physical activity comprise moderate-intensity cardiovascular activity which is the minimum intensity recommended by the ACSM (2000) necessary for adults to increase physical fitness.

Participants in Group 2 or the long-bout group were required to exercise three times a week for thirty minutes at a time, similar to the standard protocol of many exercise studies (Babyak et al., 2000; Courneya et al., 2003; Marcus et al., 1999). Like the short-bout group, Group 2 began exercising at an intensity of 50-60% of their heart rate reserve and their exercise prescription increased gradually until they were also

instructed to exercise at an intensity of 55-70% of their heart rate reserve by the conclusion of the 6-week program.

Finally, Group 3 or the goal-setting group began exercising at an individually-determined frequency and decided whether to accumulate their exercise in long or short bouts. Following the fitness assessment, with the help of the researcher, participants in this group filled out a goal-setting sheet (Appendix N) wherein they set goals for frequency and duration of their exercise every week. Their ultimate goal was to exercise according to the ACSM recommendations, five days a week for 30 minutes a day (Haskell et al., 2007), by the conclusion of the intervention. Participants could begin the first week of exercise at any frequency and duration of their choosing and could maintain the same goal for more than one week as long as they progressed to five days per week, 30 minutes a day by the end of the intervention. Similar to the two other groups, participants in this group began exercising at an intensity of 50-60% of their heart rate reserve and aimed to increase their intensity to 55-70% of their heart rate reserve by the conclusion of the study.

Following randomization into one of the three groups, participants were made familiar with the Polar Heart Rate Monitor and showed how to use it. To attempt to keep contact time with the researcher equal between all groups, during the time that the goal-setting group spent filling out their goal sheet for the intervention, participants in the short-bout and long-bout groups spent more time with the researcher practicing use of the heart rate monitor and discussing their exercise options.

The intervention was home-based with all groups engaging in their exercise either at their homes, outside, or at other places of their choosing (e.g., park, gym, etc).

Subjects were encouraged to walk or jog as their primary activity but if they had access to other exercise equipment such as bikes, steppers, or rowers, they could perform those activities instead of or in addition to walking. Guidance in walking and jogging were provided to the participants to ensure that the activities were being done correctly. All subjects wore the previously described Polar RS400 Running Computer watches, and the electrode strap with attached WearLink transmitter while they exercised to monitor the intensity, duration, and frequency of their exercise sessions. Participants also recorded their activity in logs (Appendix M). Each week, participants reported to the lab to have their heart rate data inputted, physical activity logs collected, and goal evaluation conducted. All participants engaged in a weekly goal evaluation with the researcher which consisted of completing a sheet of items questioning if the goals for frequency, duration, and intensity of physical activity were met for the previous week. Participants were also asked to describe what had prevented them from reaching their goals if they did not meet them, and what steps they might take to overcome barriers in the future. Participants who were successful in meeting their goals for the week were asked if they could foresee any future barriers and how they would overcome them. Following the completion of the goal evaluation sheet, participants were reminded of their goal for the coming week.

At the final assessment which occurred following the sixth week of physical activity, all questionnaires were re-administered to participants with the exception of the demographic information form and the LTEQ. Participants also completed their sixth goal evaluation and again engaged in the sub-maximal treadmill walking test.

Data Analyses

Preliminary data analyses consisted of descriptive statistics, one-way ANOVAs and chi-square analyses. These were conducted to ensure that there were no differences between groups in terms of demographic information and attrition. MANOVAs were run following these preliminary analyses to assess changes in the various dependent variables (i.e., adherence, fitness, behavioural intention, and self-efficacy) for the three groups over time. Finally, correlations among these same dependent variables, with the exception of fitness, with respect to how they changed over the course of the intervention were examined. All data analyses were conducted using SPSS Statistics version 17.0 and an intent-to-treat protocol was used with the last available values being carried over to fill in any missing values.

Results

Participants

A total of 97 participants completed the baseline assessment and were randomized into one of the three groups. Over the course of the 6-week intervention, 17 participants left the program, either never returning following the initial assessment, or dropping out after completing at least one week of physical activity within the intervention. Of the 97 participants who initially began the intervention, the mean age, weight, and height were 26.23 years, 60.58 kg, and 159.69 cm respectively. The majority of participants were students (79.4%), currently enrolled in undergraduate studies (44.3%), and were of Chinese descent (30.9%). Please refer to Tables 1 and 2 for a more comprehensive description of the descriptive statistics of this sample.

One-way ANOVA revealed that there were no significant differences between the three intervention groups in terms of age, weight and height ($p > .05$). Furthermore, scores on the Leisure Time Exercise Questionnaire (LTEQ), administered at baseline and expressed in metabolic equivalents (METs), did not differ significantly between groups (one-way ANOVA, $p > .05$). Thus, at baseline, participants in all groups appeared to be similar in terms of descriptive information, as well as total exercise scores measured by the LTEQ.

Table 1

Baseline Descriptive Information for Participants

Variable	Short bout group (n=29)	Long bout group (n=26)	Goal-Setting Group (n=42)	Total (n=97)
Age (yr)	27.24 (7.48)	26.69 (7.94)	25.24 (6.11)	26.23 (7.03)
Weight (kg)	61.16 (10.69)	59.13 (11.09)	61.08 (11.28)	60.58 (10.97)
Height (cm)	160.86 (5.15)	159.56 (6.32)	158.96 (4.39)	159.69 (5.20)

Values are expressed as means (SD).

Table 2

Additional Baseline Characteristics of Participants

Variable	Frequency	Percent
Ethnicity (n=97)		
Chinese	30	30.9
Black	10	10.3
Hispanic	15	15.4
South Asian	4	4.1
East Indian	11	11.3
Pakistani	1	1.0
Sri Lankan	3	3.1
Afghan	2	2.1
First Nations	2	2.1
Middle Eastern	5	5.2

Iranian	3	3.1
Lebanese	1	1.0
Assyrian	1	1.0
Korean	2	2.1
Malaysian	1	1.0
Vietnamese	2	2.1
Egyptian	1	1.0
Filipino	2	3.1
Japanese	1	1.0
Education Level (n=96)		
In university	43	44.3
Undergraduate degree	25	25.8
Graduate degree	21	21.6
College diploma	4	4.1
Professional school degree	2	2.1
Post graduate degree	1	1.0
Marital Status (n=97)		
Single	69	71.1
Married	22	22.7
Common Law	3	3.1
Engaged	1	1.0
Separated/divorced	2	2.1
Children (n=96)		
0	82	84.5
1	7	7.2
2	5	5.2
3	1	1.0
4	1	1.0
Occupation (n=95)		
Student	77	79.4
Research	2	2.0
Administrative Assistant	4	4.1
Social Work	2	2.0
Health Care	2	2.0
Information Technology	2	2.0
Teacher/Professor	2	2.0
Consulting	2	2.0
Customer Service	2	2.0

Note. Income was not included as there were too many missing values.

Exercise Adherence

An overall attrition rate of 17.53% was found, with 17 of the original 97 participants withdrawing from the intervention. By group, a loss of 17.24%, 15.38%, and 19.05% was found for the short bout, long bout, and goal-setting groups, respectively. Chi-square analysis conducted on the percent loss revealed no significant difference between the three groups ($\chi^2 = .39$, $df = 2$, $p > .05$), showing that there was no differential attrition across groups within the intervention.

Repeated measures ANOVAs were carried out for the three adherence measures: frequency, duration, and intensity. All ANOVAs consisted of group by time analyses, group (short bout, long bout, and goal-setting) being a between-subjects variable and time (weeks 1-6) being a within-subjects variable. Hence, separate 3 (group) x 6 (weeks) analyses were performed for all adherence measures, the adherence measures were the dependent variables in each analysis. All significant main effects for group were further analysed using a Tukey test ($p < .05$). All main effects for time were further analysed using repeated measures ANOVAs, and given the number of possible analyses a Bonferroni adjustment was applied ($p = .008$). Finally, a repeated measures ANOVA was performed for the heart rate data to deduce whether participants' heart rates were increasing in accordance with researcher-assigned targets. In this analysis, again group (short bout, long bout, and goal-setting) was a between-subjects variable and time (1-6 weeks) was the within-subjects variable.

Frequency. The frequency adherence measure was analyzed by looking at the number of days per week of physical activity performed by the participants. This information was collected from participants' heart rate monitors wherein each day of

exercise was documented. Data from the participants' activity logs was compared to data from the heart rate monitors in order to account for difficulties participants may have had in using the heart rate monitors at the beginning of the program. The number of days of exercise each week was then calculated by summing the days of exercise for each week. Analysis of frequency revealed both a significant main effect for group, $F(2, 94) = 3.14$, $p < .05$, $\eta^2 = .06$; as well as time, Pillai's Trace = .18, $F(5, 90) = 3.94$, $p < .05$, $\eta^2 = .18$. Further analysis of the main effect for group revealed a significant difference between the short bout ($M = 2.97$, $SD = 1.87$) and goal-setting groups ($M = 2.14$, $SD = 1.21$), while the long bout group ($M = 2.56$, $SD = .93$) did not differ from the other two groups. Further analysis of the significant time effect showed significant ($p < .008$) declines in frequency between weeks 1 and 5, weeks 3 and 5, weeks 1 and 4, and weeks 3 and 4. The descriptive data for time as it relates to frequency of physical activity is shown in Table 3.

Table 3

Descriptive Statistics for Exercise Frequency- Number of Days per Week

	Short bout Group (n=29)	Long bout Group (n=26)	Goal-setting Group (n=42)	Total (n=97)
Week 1	3.41 (2.04)	2.92 (.89)	2.14 (1.18)	2.73 (1.52)
Week 2	3.21 (1.97)	2.69 (.88)	2.05 (1.36)	2.57 (1.54)
Week 3	3.07 (2.30)	2.85 (1.29)	2.40 (1.17)	2.72 (1.62)
Week 4	2.52 (2.21)	2.31 (1.16)	2.21 (1.55)	2.33 (1.68)
Week 5	2.72 (2.19)	2.35 (1.44)	1.67 (1.69)	2.16 (1.84)
Week 6	2.86 (2.31)	2.23 (1.48)	2.33 (1.88)	2.46 (1.93)

Values are expressed as means (SD).

Duration. Duration of activity was measured as the average minutes of physical activity per week for all groups. This data was collected from participants' heart rate monitors which recorded the length of participants' exercise sessions, as well as participants' activity logs. The total amount of time spent exercising each week was calculated and then divided by the number of days of activity for an average duration of activity. Only a significant main effect for time was found, Pillai's Trace = .15, F (5, 90) = 3.21, $p < .05$, $\eta^2 = .15$. Duration decreased over time with significant differences ($p <$ .008) found between weeks 3 and 5, weeks 2 and 5, weeks 3 and 6, and weeks 3 and 4. Please refer to Table 4 for the descriptive information for duration over time.

Table 4

Descriptive Statistics for Average Duration of Physical Activity- Minutes

	Short bout Group (n=29)	Long bout Group (n=26)	Goal-setting Group (n=42)	Total (n=97)
Week 1	30.20 (21.64)	37.05 (13.84)	30.93 (19.60)	32.35 (18.94)
Week 2	29.91 (17.29)	40.74 (21.86)	30.74 (24.61)	33.18 (22.17)
Week 3	29.60 (22.11)	38.38 (17.10)	36.47 (20.58)	34.93 (20.31)
Week 4	22.23 (16.04)	35.30 (16.74)	27.42 (19.95)	27.98 (18.51)
Week 5	24.39 (19.36)	32.43 (20.62)	23.05 (22.56)	25.96 (21.29)
Week 6	28.82 (21.35)	32.77 (21.24)	26.44 (19.89)	28.85 (20.64)

Values are expressed as means (SD).

Intensity. The average minutes of physical activity spent in the prescribed heart rate zone per week was used to measure adherence to intensity. Data from participants' heart rate monitors displayed minute-by-minute heart rate information which was

compared to participants' heart rate prescriptions. The duration of activity performed in the prescribed heart rate zone was summed for the week and an average was calculated by dividing the sum by the number of days of activity. Only a significant main effect for time was found, Pillai's Trace = .15, $F(5, 90) = 3.23$, $p < .05$, $\eta^2 = .15$. The weeks that differed significantly ($p < .008$) included weeks 2 and 5, and weeks 3 and 5, with the number of minutes spent in the prescribed heart rate zone declining from the 2nd and 3rd to 5th week. Descriptive information for intensity of physical activity by time can be found in Table 5.

Table 5

Descriptive Statistics for Average Minutes Spent in Heart Rate Zone

	Short bout Group (n=29)	Long bout Group (n=26)	Goal-setting Group (n=42)	Total (n=97)
Week 1	20.19 (12.28)	23.67 (13.31)	21.09 (14.73)	21.51 (13.59)
Week 2	19.96 (13.10)	26.31 (13.86)	20.99 (14.68)	22.11 (14.10)
Week 3	18.02 (14.32)	23.03 (13.75)	23.47 (16.92)	21.73 (15.40)
Week 4	17.67 (13.15)	22.12 (14.66)	19.62 (13.73)	19.70 (13.77)
Week 5	14.54 (13.18)	20.88 (13.89)	14.96 (15.74)	16.42 (14.63)
Week 6	16.55 (13.90)	22.72 (15.16)	16.88 (12.92)	18.35 (13.95)

Values are expressed as means (SD).

Heart rate. Heart rate information was recorded by participants' heart rate monitors during their exercise sessions. Participants' heart rates were summed each week and averaged by days of activity. Looking at participants' average heart rates per week, a significant main effect for time was revealed, Pillai's Trace = .15, $F(5, 90) =$

all groups. No significant differences were found between groups and there was no significant group by time interaction ($p > .05$). Information for all groups is shown in Table 7.

Table 7

Descriptive Statistics for VO_{2max} (mL/kg/min)

	Short bout Group (n=29)	Long bout Group (n=26)	Goal-setting Group (n=42)	Total (n=97)
Baseline	34.77 (10.74)	30.18 (10.23)	35.20 (8.52)	33.72 (9.82)
Week 6	39.07 (8.96)	35.41 (9.71)	39.29 (5.82)	38.18 (8.08)

Values are expressed as means (SD).

Exercise Intentions

Repeated measures ANOVAs were carried out for the intention measures: intention to maintain current activity level, intention to increase current activity level, and intention to decrease current activity level. All ANOVAs consisted of group by time analyses, with group (short bout, long bout, and goal-setting) set as a between-subjects variable and time (baseline, week 6) set as a within-subjects variable. Hence, separate 3 (group) x 2 (weeks) analyses were performed for all intention measures, intention being the dependent variables in each analysis. All significant main effects for group were further analysed using a Tukey test ($p < .05$).

For the first question of the exercise intentions scale, which asked participants about their intention to maintain their current level of activity, a significant main effect for group was found, $F(2, 94) = 4.59$, $p < .05$, $\eta^2 = .09$. For this question, the long bout ($M = 4.42$) and goal-setting ($M = 3.37$) groups were found to differ significantly ($p <$

.05). Furthermore, a significant main effect for time was found, Pillai's Trace = .32, $F(1, 94) = 43.77, p < .05, \eta^2 = .32$. Between baseline and the conclusion of the program, participants' responses on the scale increased significantly. There was no group x time interaction ($p > .05$).

The second question, consisting of participants' intention to increase their current level of activity, showed only a significant main effect for time, Pillai's Trace = .35, $F(1, 94) = 50.30, p < .05, \eta^2 = .35$. The final scores on the item were significantly lower than those at baseline suggesting that participants' intention to increase activity levels declined from baseline to six weeks.

The third question regarded participants' intention to decrease their level of activity and again only a significant main effect for time was found, Pillai's Trace = .12, $F(1, 94) = 12.34, p < .05, \eta^2 = .12$. Scores on this item increased from baseline to final assessment, meaning that intention to decrease current levels of activity increased over the course of the intervention. Descriptive information, including means and standard deviations for the three items can be found in Table 8.

Table 8

Descriptive Statistics for Exercise Intentions

	Short bout Group (n=29)	Long bout Group (n=26)	Goal-setting Group (n=42)	Total (n=97)
Baseline				
Maintain	2.55 (1.68)	3.54 (2.18)	2.79 (1.60)	2.92 (1.82)
Increase	6.34 (.55)	6.58 (.58)	6.40 (.89)	6.43 (.72)
Decrease	1.45 (1.06)	1.15 (.46)	1.48 (1.33)	1.38 (1.07)
Week 6				
Maintain	5.03 (1.88)	5.31 (1.87)	3.95 (2.22)	4.64 (2.10)
Increase	4.76 (1.68)	5.31 (1.59)	5.45 (1.85)	5.21 (1.74)
Decrease	2.17 (1.54)	2.04 (1.71)	1.90 (1.56)	2.02 (1.58)

Values are expressed as means (SD).

Note. Participants rated their exercise intentions on a 7-point scale anchored by 1 (strongly disagree) and 7 (strongly agree).

Self-Efficacy

The Multidimensional Self-Efficacy for Exercise Scale (MSES) was administered to participants at baseline and at the conclusion of the program. Participants were asked to rate their confidence in completing a variety of exercise tasks relating to coping, task, and scheduling self-efficacy. Separate 3 (group) x 2 (time) repeated measures ANOVAs were conducted on each type of self-efficacy. Group (short bout, long bout, and goal-setting) was the between-subjects variable and time (baseline and week 6) was the within-subjects variable.

Coping self-efficacy. A significant main effect for time was revealed, Pillai's Trace = .05, $F(1, 94) = 4.53$, $p < .05$, $\eta^2 = .05$. Scores for coping self-efficacy were found to increase significantly from baseline ($M = 46.92$, $SD = 23.53$) to the conclusion of the intervention ($M = 51.65$, $SD = 25.53$); however, no significant group effect or group by time interaction was found ($p > .05$).

Task self-efficacy. The main effects for group and time failed to be significant ($p > .05$); however, a significant group by time interaction was found, Pillai's Trace = .07, $F(2, 94) = 3.76$, $p < .05$, $\eta^2 = .07$. The short bout and long bout groups' scores increased between baseline and week six, while the goal-setting group's scores decreased during the same time interval. Refer to Figure 1 for a depiction of the group by time interaction.

Scheduling self-efficacy. No significant effects were found for scheduling self-efficacy. Descriptive information for the three types of self-efficacy can be found in Table 9.

Table 9

Descriptive Statistics for Self-Efficacy Scores

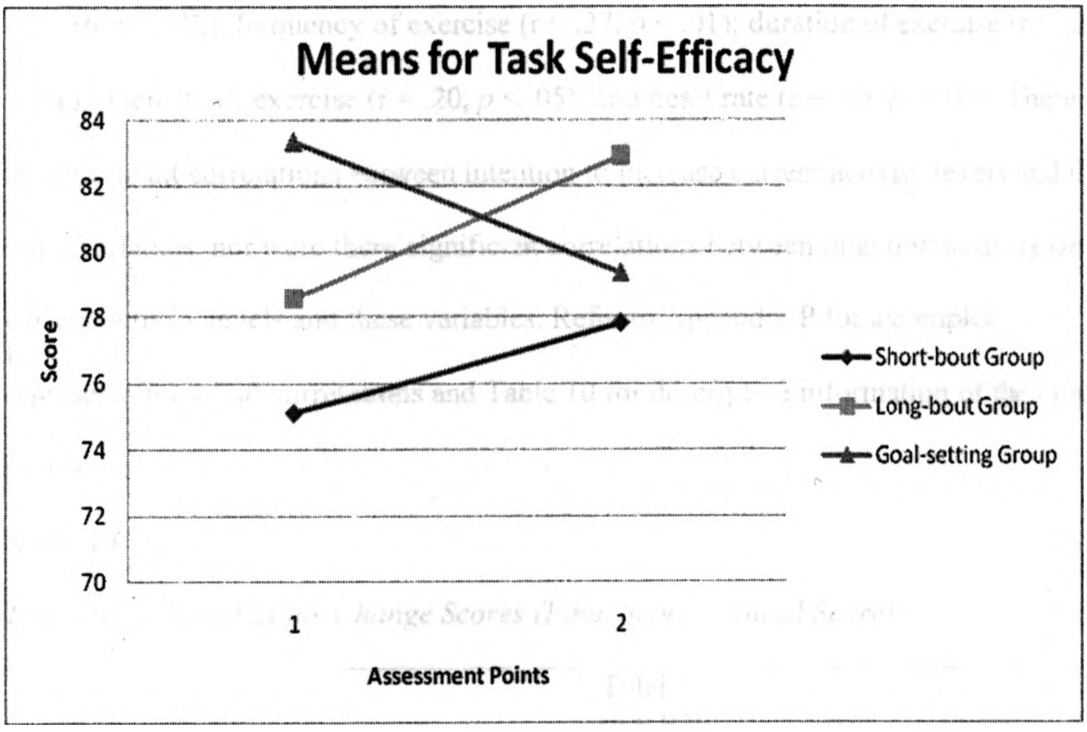
	Short bout Group (n=29)	Long bout Group (n=26)	Goal-setting Group (n=42)	Total (n=97)
Baseline				
Coping	47.13 (25.68)	45.06 (24.68)	47.94 (21.71)	46.92 (23.53)
Task	75.11 (19.25)	78.59 (17.05)	83.37 (9.50)	79.62 (15.33)
Scheduling	73.56 (19.17)	80.96 (16.24)	76.67 (14.74)	76.89 (16.63)
Week 6				
Coping	56.09 (22.00)	51.79 (30.11)	48.49 (24.86)	51.65 (25.53)
Task	77.82 (15.64)	82.95 (16.82)	79.37 (15.96)	79.86 (16.06)
Scheduling	72.18 (20.97)	78.97 (20.35)	67.54 (25.06)	71.99 (22.94)

Values are expressed as means (SD).

Note. Participants responded on a 100% confidence scale where 0 = not at all confident and 100 = completely confident

Figure 1

Group by Time Interaction for Task Self-Efficacy



Correlation Analyses

Correlations among changes in the dependent variables over the intervention were examined. That is, a change score (i.e., 6 week score minus baseline score) for each dependent variable was calculated and the correlations among these change scores were computed. Additionally, correlations between the final self-efficacy scores and final adherence measures were examined, as well as correlations between the final exercise intentions scores and the adherence measures at six weeks.

Change score correlations. A number of significant correlations ($p < .05$) were found between the change score for intention to maintain current level of activity and change scores for several other dependent variables. The change score for intention to

maintain levels of activity was significantly correlated with change scores for: coping self-efficacy ($r = .46, p < .01$); task self-efficacy ($r = .39, p < .01$); scheduling self-efficacy ($r = .36, p < .01$); frequency of exercise ($r = .27, p < .01$); duration of exercise ($r = .28, p < .01$); intensity of exercise ($r = .20, p < .05$); and heart rate ($r = .23, p < .05$). There were no significant correlations between intention to increase current activity levels and these same variables, nor were there significant correlations between intention to decrease current activity levels and these variables. Refer to Appendix P for a complete representation of all correlations and Table 10 for descriptive information of the change scores.

Table 10

Descriptive Statistics for Change Scores (Final Score – Initial Score)

	Total (n = 97)
Intention to Maintain	1.72 (2.66)
Intention to Increase	-1.24 (1.73)
Intention to Decrease	.64 (1.86)
Coping Self-Efficacy	4.73 (24.59)
Task Self-Efficacy	.24 (13.90)
Scheduling Self-Efficacy	-4.90 (21.74)
Exercise Frequency	-.27 (1.69)
Exercise Duration	-3.50 (19.14)
Exercise Intensity	-3.17 (14.86)
Heart Rate	-5.70 (65.70)

Values are expressed as means (SD).

Final self-efficacy and 6-week adherence measure correlations. Pearson correlations were also calculated to determine whether or not significant relationships existed between coping self-efficacy and the three adherence measures (frequency, duration, and intensity). The final coping self-efficacy score was compared to the sixth week adherence measure for all correlations in order to assess whether or not at the conclusion of the intervention, a relationship could be found between the two variables. Final coping self-efficacy was shown to be significantly correlated to frequency of physical activity in the sixth week ($r = .31, p < .01$) Moreover, significant correlations were found between final coping self-efficacy and the average duration of activity in the sixth week ($r = .24, p < .05$), and between final coping self-efficacy and the average weekly minutes of activity spent in the heart rate zone in the sixth week ($r = .27, p < .01$).

The relationship between task self-efficacy at six weeks and the three adherence measures was also analyzed to determine whether or not correlations existed between the variables. When the frequency of physical activity in the sixth week was compared to the final task self-efficacy scores, a significant correlation was found ($r = .26, p < .01$). Similarly, a significant positive correlation was shown between the final task self-efficacy scores and the sixth week average duration of physical activity ($r = .28, p < .01$). Finally, adherence to the prescribed intensity of physical activity in the sixth week was found to be positively correlated to the final task self-efficacy scores ($r = .30, p < .01$).

As well, scores for scheduling self-efficacy at the end of six weeks were compared to the three adherence measures and significant positive correlations were shown. Final scheduling self-efficacy was significantly correlated with the sixth week frequency of physical activity ($r = .32, p < .01$), as well as with the sixth week average

duration of physical activity ($r = .25, p < .05$). A significant positive correlation also was found between final scheduling self-efficacy and the average minutes of activity in the prescribed heart rate zone ($r = .20, p < .05$).

Final exercise intentions and 6-week adherence measures correlations. Correlations between the sixth week scores for intention to maintain current levels of activity and the final adherence measures were examined. Significant correlations were found between intention to maintain activity and the sixth week frequency of physical activity ($r = .47, p < .01$), intention to maintain activity and the average sixth week duration of physical activity ($r = .44, p < .01$), and intention to maintain activity and the average minutes of activity in the prescribed heart zone during the sixth week ($r = .45, p < .01$).

Additionally, final scores for intention to increase current levels of activity were shown to be significantly correlated ($p < .05$) with the three sixth week adherence measures. Intention to increase physical activity was significantly correlated with frequency of exercise ($r = -.36, p < .01$), duration of exercise ($r = -.24, p < .05$), and intensity of exercise ($r = -.25, p < .05$).

Final scores for intention to decrease current levels of activity were also examined in relation to the three adherence measures in the sixth week but the only correlation that reached significance was between intention to decrease activity and frequency of physical activity ($r = .24, p < .05$).

Discussion

The first purpose of this study was to determine if a goal-setting intervention could positively influence adherence to physical activity over the course of a 6-week

intervention. Additionally, the effect of the intervention on exercise intentions and various forms of self-efficacy was also studied in order to assess whether or not goal setting could influence participants' perceived intentions and levels of self-efficacy. Initial hypotheses were consistent with theoretical frameworks involving goal setting (Bandura, 1986); participants in the goal-setting group were expected to demonstrate better adherence to the program over the course of the 6-week intervention compared to the other groups, as well as higher intention scores to be physically active and higher self-efficacy scores at the conclusion of the program. The results of the current study were not consistent with the hypotheses; self-set goals employed by the goal-setting group were not more effective at influencing adherence, exercise intentions or self-efficacy with this population. The findings are discussed below in detail.

Adherence

The attrition rate in this study was relatively low at 17.53%. This is an interesting fact as the typical attrition rate from exercise programs is often much higher (Buckworth & Dishman, 2007). Participants were expected to visit the lab weekly for the goal-setting sessions and to have their activity information recorded; the weekly visits may have made the participants feel accountable and thus more likely to remain in the program. Home-based exercise programs have also produced lower rates of attrition than center-based interventions (King et al., 1991); the fact that participants were able to complete their physical activity in a place of their choosing instead of being restricted to the lab may have made the intervention more feasible and helped to keep the level of attrition low. Also, Dishman (1988) states that 50% of new exercisers drop out of a program within six months to a year, and the current study was only six weeks in length. Thus, the low

attrition rate might be attributed to the short duration of the program. A similar intervention conducted by Williams et al. (2008) involved a convenience sample of older African American women who participated in a 6-week walking program. In the study, 43 women began the program and 35 completed it for an overall attrition rate of 18.6%. It is therefore difficult to attribute the low attrition rate found in the present study to the nature of the intervention or the short duration.

Frequency. The days per week of physical activity differed significantly between the short-bout and goal-setting groups but not the long-bout group. This would be an expected finding for the beginning of the intervention because groups were to engage in differing frequencies of physical activity per week. However, in the sixth week, the goal-setting group was expected to be exercising as frequently as the short-bout group, as the goal-setting group's ultimate goal for frequency of activity was five days per week, the same as that of the short-bout group's throughout the intervention. The goal-setting group never achieved this goal and continued to report fewer days of physical activity per week for all six weeks of the program. Also, there was no significant difference between the long-bout group and the short-bout group although the groups were supposed to maintain differing frequencies of activity throughout the program. This lack of a significant difference suggests that the short-bout group never achieved their goal of being active for five days a week across the six weeks; evidence of this can be found in Table 3 which confirms the similarity in frequency of activity between the two groups. Similarly, the long-bout group did not differ significantly from the goal-setting group although the goal-setting group's goal was to engage in physical activity five days per

week. This again confirms the goal-setting group's inability to reach the prescribed goal in terms of frequency of physical activity.

A significant main effect for time was found wherein all groups engaged in more days of physical activity near the beginning of the intervention, specifically during the first and third weeks, and the lowest frequencies of activity were recorded during the fourth and fifth weeks. This finding is consistent with literature indicating that as participants (new exercisers) progress through an exercise program, adherence usually drops (Dishman, Sallis, & Orenstein, 1985). As well, the results from participants' exercise intentions provide some evidence for this finding. Participants' intention to decrease their levels of activity increased over the course of the intervention. This is consistent with declining levels of activity as intention predicts behaviour (Ajzen, 1991). Thus, while participants were initially expected to maintain their levels of activity during the program, adherence decreased over the course of the exercise intervention which can be explained by participants' intentions.

Duration. In regards to the average amount of time participants spent being physically active each week, only a main effect for time was found with the longest average duration of activity occurring during the third week and the shortest average duration during the fifth week. This finding can also be linked to participants' intention scores. Participants' intention to decrease their level of activity increased which may be reflected in the declining durations of activity.

Intensity and heart rate. In regards to adherence to the prescribed intensity of physical activity, measured by the average number of minutes spent in the correct heart rate zone, the fewest minutes of activity spent in the prescribed heart rate zone were

reported during the fifth week of the study while the most minutes in the heart rate zone occurred during the second week. These results are similar to those for participants' heart rates; the lowest heart rates were found during the fifth week and the highest during the third week of the program. Similarly to the adherence measures for frequency and duration, the decreasing adherence to intensity may have been directly related to participants' increased intention to decrease levels of activity by the end of the intervention. In regards to the actual heart rate scores, although prescriptions for heart rate increased over the course of the intervention, the decline in documented heart rates between the third and fifth week may have been a product of participants becoming used to the physical activity.

In summary, the results in this study demonstrated that self-set goals were not more effective than assigned goals in improving adherence to an exercise program. This finding contrasts with previous research. In their meta-analysis of research involving goal setting in physical activity, Kyllo and Landers (1995) found that participant-set goals produced significantly better performance gains than assigned goals. In addition, better long-term adherence to exercise was found from self-set goals when compared to assigned goals in a study where participants walked or jogged (Martin et al., 1984). One explanation for why the present results differ from previous ones is that the participants in this study were exercise initiates and likely lacked a strong knowledge base for setting their own goals. In such a situation, assigned goals can be more effective than self-set goals (Boyce & Wayda, 1994). Furthermore, the increase in participants' intentions to decrease their levels of activity over the course of the intervention likely played a large part in the declines in adherence. Because of the strong relationship between intentions

and behaviour, an intention to decrease one's level of activity would probably lead to a decrease in that activity.

Cardiovascular Fitness

Cardiovascular fitness, measured as VO_{2max}, increased over the course of the exercise intervention for all groups despite the short duration of the program. Similarly, in their study looking at the effects of resistance training and aerobic exercise on breast cancer survivors, Garner and Erck (2008) found a significant increase in VO_{2max} by the end of their program. Their study involved 11 breast cancer survivors who participated in an 8-week aerobic exercise and weight training program, and VO_{2max} increased by 4.23 mL/kg/min. Possible explanations for the significant increase in VO_{2max} in the present study might be attributed to the fact that many of the women in the study were unfamiliar with treadmills when they first completed the baseline fitness test but by the final testing, were much more comfortable and able to perform the test with ease.

The anxiety that accompanies being in a new setting and beginning a new program may have raised participants' heart rates, which were used to predict VO_{2max}. By the conclusion of the program, participants had been to the lab several times and were more comfortable with the researcher and research assistants as well as the environment, which might have kept the heart rates at lower levels compared to the initial testing. As well, all participants enrolled in the intervention were self-identified non-exercisers. Thus, compared to the initial testing, after six weeks of being physically active, participants would have had better fitness which could have been reflected in the lower heart rates on the final fitness test. Wilbur, Chandler, and Miller (2001), in their 24-week walking intervention with sedentary women, found significant increases in VO_{2max}

among consistent, occasional, and sporadic walkers. They concluded that any increase in activity could positively affect VO_{2max} in previously sedentary women. In sum, although the intervention was short in length, it may have been long enough for participants to improve their cardiovascular fitness.

Intention to Exercise

All items on the exercise intentions scale changed as might be expected based on the nature of the intervention. These patterns of change were also predicted and found by Milne et al. (2008) in their study examining changes in behavioural intention across time. Participants' intention to maintain their current level of activity increased between baseline and the conclusion of the study for all groups. This was a predictable change as participants were engaging in very little or no activity prior to beginning the intervention and were exercising a few days a week by the conclusion of the program. Thus, at baseline, participants did not intend to maintain their current level of activity, but rather increase it, as evidenced by the higher scores for intention to increase activity at baseline.

The goal-setting group had a significantly lower intention to maintain their current level of physical activity than the long-bout group, and also a lower intention than the short-bout group although this difference failed to be significant. Although intention to maintain activity increased for all groups, the goal-setting group did not increase as much as the other groups. An explanation for this finding is that the goal-setting group was instructed to exercise five days a week by the end of the intervention but did not reach this goal. Therefore, it is likely they were not satisfied exercising at their current level and actually intended to increase their level of activity in the future. The fact that the goal-setting group scored highest on intention to increase their exercise level at week

six supports this explanation, although the difference did not reach significance. In contrast, at the end of the intervention, the other two groups were already exercising at a level closer to their target and were more likely to intend to maintain their current level of physical activity.

Participants' intention to increase their current level of activity decreased from baseline to the end of the intervention. This was expected as participants would have enrolled in the study with the intention of being more active, which was reflected in the higher scores on this item at baseline. By the end of the intervention, participants were probably somewhat satisfied with their levels of activity and thus not as interested in further increasing the amount they exercised. However, the final scores on this item were not as low as would be expected if participants had no intention to increase their activity whatsoever. This suggests that many participants were still interested in being more active. A possible reason for this could be that most participants did not achieve their goals for frequency of activity and were perhaps still striving to reach them. There were no significant differences between groups for this item, suggesting that regardless of group, all participants had a stronger intention to increase their activity levels at the beginning of the intervention compared to the sixth week. The goal-setting group's intention to increase activity levels by the conclusion of the intervention was slightly higher than the other groups, suggesting that participants in this group may have been less satisfied with their exercise behaviour by the sixth week; however, this difference was not significant. Therefore, participants in different groups, although instructed to engage in differing frequencies of activity, were relatively similar in their intentions to increase their levels of exercise.

The final item of the exercise intentions scale questioned participants' intention to decrease their current level of activity. Scores at baseline were very low, with participants having little or no intention to decrease their already low levels of activity. While the final scores on this item were slightly higher than the baseline scores, they were still quite low. Final scores for participants in the goal-setting group were slightly lower than the other two groups, although this did not reach significance. However, this finding might be related to the goal-setting group's scores for intention to increase activity which decreased less than the other groups. Although not significant, the goal setting group's intention to increase their activity after six weeks was slightly higher than the two other groups and their intention to decrease activity after six weeks was slightly lower. Overall, it appears that after six weeks of physical activity, participants had increased intentions to decrease their activity.

Self-Efficacy

Physical activity has been shown to produce significant improvements in self-efficacy (Mihalko, McAuley, & Bane, 1996). For the purposes of this study, three types of self-efficacy were studied: coping, task, and scheduling self-efficacy. Between baseline and the end of the intervention, scores for coping self-efficacy increased significantly for all groups. This suggests that the intervention was successful in positively influencing participants' perceptions of their ability to cope with the problems that might keep them from being physically active. However, it is unclear which part of the intervention was responsible for this increase in coping self-efficacy scores, or if it was caused by a combination of various factors. The weekly visits to the lab and the encouragement provided by the researcher is one possible explanation for this

improvement, or the actual engagement in physical activity and filling out the daily logs might also have contributed to the increase. Whatever the reason for this improvement, it is something that was common to all intervention groups because there was no significant difference in coping self-efficacy scores between groups. This finding is not consistent with one of the hypotheses of the study which postulated that the goal-setting group would have better self-efficacy scores than the other groups. However, the results of the present study are similar to the findings of McAuley, Jerome, Marquez, Elavsky, and Blissmer (2003). In their study assessing self-efficacy in older adults, the researchers found an increase in coping self-efficacy, referred to as barriers efficacy, in the first two months of the intervention. The researchers reasoned that after participants had experienced exercise for a few weeks, they had formed accurate expectations which assisted them in believing that they could overcome barriers to exercise that might arise. In the present study, engaging in physical activity may have been sufficient to increase coping self-efficacy in all groups as all participants were probably accustomed to exercise and by the conclusion of the intervention, knew what barriers to exercise to expect. Since there was no significant difference in coping self-efficacy between the groups, it appears that the self-set goals employed by the goal-setting group were not effective in increasing coping self-efficacy beyond the improvements shown by the two other intervention groups.

For task self-efficacy, from the baseline measurement to the conclusion of the program the short-bout and long-bout groups' task self-efficacy increased, as might be expected as they became more comfortable exercising, but the goal-setting group's self-efficacy decreased. This latter finding contradicts the hypothesis that the goal-setting

group's self-efficacy would improve more than the other groups'. The decline in task self-efficacy scores for the goal-setting group suggests that the self-set goals and the gradual increase in the frequency of physical activity each week were not successful in increasing participants' task self-efficacy and may have actually had the opposite effect. Participants in the goal-setting group may have felt defeated when they could not meet their goals for activity one week and then the goal subsequently increased. This may have had the effect of making participants lose confidence in their ability to actually perform the physical activity and engage in activity for a particular number of days per week even though they set the goals for themselves each week and had the option of altering the goals. This finding is similar to the results of a study conducted by Williams et al. (2008) in which participants who did not meet their walking goal showed a decrease in exercise self-efficacy scores between baseline and post-intervention. However, although task self-efficacy scores for the goal-setting group declined from baseline to week six, scores were still relatively high, thus, the decline in scores may not be overly disturbing. Nevertheless, the setting of goals by the goal-setting group does not appear to have been effective in increasing task self-efficacy within this population.

From baseline to the end of the program, no significant changes were evident for scheduling self-efficacy for any of the groups. It would appear that the goal setting employed in this intervention was not successful in increasing participants' confidence in their ability to schedule exercise into their daily lives. This is most likely a reflection of participants' inability to meet their weekly goals; because most participants were unable to be physically active at their assigned or self-set frequency, participants' scheduling self-efficacy did not change over the course of the intervention.

Relationships Between Intention to Exercise and the Other Dependent Variables

Significant positive correlations were found between change scores for intention to maintain current level of activity and change scores for the three types of self-efficacy. This suggests that as intention to maintain current levels of activity increases, so too does participants' coping, task, and scheduling self-efficacy. This finding is similar to previous research demonstrating a relationship between behavioural intentions and self-efficacy (Ducharme & Brawley, 1995). As well, change scores for intention to maintain activity were positively correlated to change scores for all the adherence measures: frequency, duration, and intensity of physical activity, as well as the heart rate data. As intention to maintain activity increases, so does adherence and vice versa. This finding supports the considerable research showing intention is a strong predictor of behaviour, especially in the short term (Ajzen, 1991; Sheeran, 2002).

Final scores for intention to maintain activity showed significant, positive correlations with the frequency, duration, and intensity of physical activity in the sixth week. Thus, as intention to maintain current levels of activity at the conclusion of the program increases, so does adherence to activity in the sixth week. Significant correlations were also found between intention to increase current levels of activity at the end of the intervention and the three adherence measures, but all correlations were negative. In this instance, as participants' intentions to increase their activity following the intervention increased, their adherence at the end of the intervention decreased and vice versa. As well, a weak but significant correlation was found between final scores for intention to decrease current levels of activity and frequency of activity in the sixth week. This suggests that as participants' intention to decrease their current level of activity

increased, frequency of activity in the sixth week of the intervention increased as well. In other words, participants who reported the highest frequency of activity in the sixth week actually had the highest intentions to decrease their activity. The implications of this finding are important as it suggests that the more active participants are, the more likely it is that they will engage in less activity in the future.

Relationship Between Self-efficacy and Adherence

The three types of self-efficacy were all positively correlated with the three adherence measures: duration, frequency, and intensity of physical activity, in the sixth week of the intervention. This supports previous studies (e.g., Rodgers et al., 2008) demonstrating that all three types of self-efficacy are related to exercise behaviour. It also backs the importance of examining all three types of self-efficacy in exercise adherence research (Rodgers et al., 2008; Rodgers & Sullivan, 2001).

Limitations

There were several limitations in the present study which may have affected the results acquired. For instance, because recruitment for the study spanned several months, some participants completed the intervention during the summer and fall months while others participated during the winter. Factors related to the time of year during which participants began the intervention were not studied, but a number of possible seasonal effects may have contributed to the results. Because the study was home-based, those participants who completed the program during the summer or fall may have had the advantage of being able to engage in more physical activity outdoors compared to those who completed the study during the winter. While participants enrolled during the winter months could perform some of their activity outdoors, there were more barriers to doing

so such as icy sidewalks, snow, and freezing temperatures. Furthermore, participants enrolled in the study during the summer and fall were more likely to come in to the lab for every weekly visit as there weren't as many major holidays during this time period as there were for participants enrolled during the winter. The lab was closed for two weeks for the Christmas holiday and during this time participants were emailed their goal evaluation sheet and instructed to email it back to the researcher. As well, at the end of February, many participants did not come in to the lab for their weekly visit during Reading Week, as most participants were students at the university. These missed visits by participants enrolled during the winter may have lowered their motivation to participate in the study as they did not meet with the researcher in person and the encouragement from the researcher might not have been as meaningful over email. Additionally, many participants began the study in January and may have done so because of New Year's resolutions. This may account for part of the attrition rate in the participants who joined at this time since maintenance of New Year's resolutions has been shown to decrease drastically in the weeks and months following January (Norcross & Vangarelli, 1989).

Because of the home-based nature of the intervention, there were limitations to instructing participants how to perform certain exercise activities properly. Participants were made familiar with the treadmill at their baseline assessment to ensure that they were comfortable walking or jogging, which were the main activities endorsed by the researcher. However, because participants were given the option of engaging in any aerobic activity which raised their heart rates into the appropriate target zones, it was not possible to show participants how to perform properly all of the activities they might

possibly have engaged in. Thus, some participants may have been performing activities improperly and might have become discouraged with their lack of knowledge on how to do certain exercises. As well, while the researcher suggested some activities that participants could do, the equipment that the participants could have used outside of the lab was most likely quite different from the equipment in the lab, and participants might have had access to additional equipment at other fitness facilities. Furthermore, because the intervention was advertised as a program that would take place outside of the lab, participants who didn't have access to exercise facilities or who did not want to engage in physical activity outdoors may have been discouraged from participating in the intervention so the portion of minority women who decided to participate in the intervention may have been limited.

The goal of being active five days per week over the course of the intervention for the short-bout group and by the sixth week for the goal-setting group may have been too challenging as most participants did not meet this goal. Attempting to be physically active for five days a week may have discouraged some participants once enrolled in the program and may have affected the results. As well, potential participants may have been discouraged from enrolling in the program because of seeing the advertisements which stated that exercise would be completed three to five days per week. For women who were previously sedentary, exercising for five days per week or even three may have seemed too daunting a task. Moreover, the goal-setting group's ultimate goal of five days per week as recommended by the ACSM guidelines (Haskell et al., 2007) may have been too challenging and perhaps should have been set by the participants. The goal-setting

group was involved in setting their own goals weekly but perhaps they should have set their own goals for the entire intervention for complete autonomy.

Another limitation of the study was the short duration. Six weeks was chosen as the length of the intervention in order to allow for enough time for the goal-setting to increase the frequency of activity each week and to assess the effectiveness of the program in the short-term. The duration of the program may have been too short in terms of seeing real-life rates of attrition; it may have contributed to the low attrition rates seen in this intervention which may not be representative of actual attrition with this population or with this type of intervention. As well, if the intervention had been longer and the goal-setting group's ultimate goal had still been set at five days per week by the end of the program, perhaps better results might have been seen for the goal-setting group. This group might have needed more time to adjust to their weekly activity goals; perhaps a few more weeks at each frequency of activity would have made it easier for the goal-setting group to reach the final goal of five days of exercise per week. The goal-setting group may have performed significantly worse than the short-bout group in terms of frequency of activity because the short-bout group, although they did not actually engage in physical activity five days per week over the course of the program, had the six weeks of the intervention to attempt to meet their goal while the goal-setting group only had one or two weeks depending on how they set their weekly goals. It is possible that if the goal-setting group had been given more time to meet the goal of five days of activity per week, the results might have been more reflective of the initial hypotheses.

The Leisure Time Exercise Questionnaire (LTEQ) was used in the present study to screen participants and ensure that they were not already engaging in regular physical

activity. Exercise scores from the LTEQ were then used to compare the three intervention groups, making sure that no significant baseline differences were found. The LTEQ should also have been administered at the conclusion of the program as an additional method of comparing participants' self-reported activity at baseline to their activity at the conclusion of the intervention. In the present study, comparisons for frequency of physical activity could only be made between the first week of the intervention and the sixth week; no comparisons could be made between the baseline measurements or prior to the program and the end of the intervention. It would have been helpful to have been able to compare exercise scores from the LTEQ at baseline to exercise scores after completion of the intervention in order to assess by how much participants were able to increase their activity during the six week intervention.

Practical Implications and Future Directions

In conclusion, a 6-week goal-setting intervention involving both researcher-set and self-set goals with minority women appears to be effective in preventing attrition. When designing exercise intervention studies, researchers may want to have weekly goal setting and goal evaluation visits or such visits at a set time interval as it might improve accountability and self-efficacy of participants. As well, the short-bout group performed significantly better than the goal-setting group in terms of frequency of physical activity. It appears that having a challenging goal from the beginning of the intervention was the most effective way to assist participants in engaging in the most days of physical activity, instead of giving them smaller goals that increased in difficulty each week. Researchers may want to assign participants more challenging goals for the duration of an intervention, making sure to provide constant encouragement and praise for whatever

activity the participants are able to accomplish. Moreover, VO_{2max} increased over the course of the intervention which shows that shorter duration programs can be employed to achieve significant improvements in cardiovascular fitness.

When planning studies with the aim of increasing coping self-efficacy, researchers may want to utilize goal-setting techniques as scores for this type of self-efficacy increased significantly over the course of the intervention. Furthermore, researchers may want to give participants one challenging goal in terms of frequency of activity, and allow participants plenty of time to reach this goal if the aim is to increase task self-efficacy. In the present study, both the short-bout and long-bout groups reported significantly improved scores for task self-efficacy suggesting that the continued attempt at achieving a consistent goal from week to week increased participants' sense of self-efficacy with regards to performing the physical activity.

In terms of future directions for research, there are several things that researchers can implement in the future to possibly produce better results. The duration of the study could be increased to determine whether or not similar attrition rates to the current study could be attained, or if the low attrition in this study was a product of the shorter duration. As well, in the future, if group is instructed to set their own goals for frequency and duration of activity, they should be given complete control in this regard and not have the ultimate goal set by the researcher. Furthermore, the present study specifically employed goal setting as the variable of interest but future research might use implementation intentions with this population to see if similar or better results could be produced. Implementation intentions involve deciding where, when and what type of physical activity will be completed and have been found to increase frequency of exercise

(Prestwich, Lawton, & Conner, 2003), although no studies to date have used implementation intentions in interventions with a specific focus on minority women. Finally, the present study sought to determine the effectiveness of goal setting on adherence to physical activity amongst minority women. However, the minority women in this study were not asked to state reasons why they found it difficult to engage in regular physical activity. Future research should conduct focus groups or interviews with minority women in order to better understand the barriers to physical activity stated by this population. As well, minority women should be asked for input into the type of programs they would like to see implemented in order to assist them with their physical activity; goal setting might not be the ideal method for assisting minority women in becoming more physically active. If a superior way of increasing adherence in this population exists, it should be employed, and if minority women feel a sense of ownership over a program that they have endorsed, that might also increase adherence to physical activity.

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Appendix A – Recruitment Poster

Faculty of Health Sciences

Health & Rehabilitation Sciences

Minority Women Wanted

For Exercise Study

Your participation in this study is welcome if you:

- Are a healthy, non-white female (ie. Chinese, Black, South Asian, Arab, Filipino, Latin American, First Nations, Japanese, Indian, etc.)
- Are between the ages of 18 and 45
- Exercise less than 2 times per week
- Want to start exercising on a regular basis

What is involved?

- Exercising 3-5 times a week at home or place of your choosing
- Fitness testing
- Questionnaires will be filled out

For more information and to sign up please contact:

Duate Adegbite
MSc Student

Appendix B - Newspaper/Email Advertisement

Minority Women and Exercise

UWO researcher seeks minority women (non-white), ages 18-45, who exercise less than 2 times per week and who want to start exercising on a regular basis. Minority groups include South Asians, Chinese, Blacks, Arabs, Filipinos, Latin Americans, Koreans, Japanese, and others. Your fitness will be tested and you will be given a structured exercise program to follow at home or at a convenient location of your choosing. Contact Duate Adegbite.

Appendix C - PAR-Q

Physical Activity Readiness Questionnaire

PAR-Q

For most people physical activity should not pose any problems or hazards. PAR-Q has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them.

Please read each question carefully and check yes or no opposite the question if it applies to you. Completing this quiz will give you an idea if you should consult your doctor before starting an exercise program. Your doctor can advise you and the researcher as to which exercise and intensity is best for you.

	Yes	No	
1.	____	____	Has your doctor ever said you have heart trouble?
2.	____	____	Do you frequently have pains in your heart and chest?
3.	____	____	Do you often feel faint or have spells of severe dizziness?
4.	____	____	Has a doctor ever said your blood pressure was too high?
5.	____	____	Has your doctor ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise, or might be made worse with exercise?
6.	____	____	Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?
7.	____	____	Are you over age 65 and not accustomed to vigorous exercise?

If you answered YES to one or more questions....

If you have not recently done so, consult with your personal physician by telephone or in person before increasing your physical activity and/or taking a fitness test.

If you answered NO to all questions....

If you answered PAR-Q accurately, you have reasonable assurance of your present suitability for an exercise test and may begin an exercise program with your personal health coach.

Appendix D - Letter of Information

Letter of Information

The Effect of Goals on Adherence to Physical Activity among Minority Women

You are invited to participate in a study being conducted by Dr. Craig Hall and Duate Adegbite from the Faculty of Health Sciences at The University of Western Ontario. The primary purpose of this research is to examine the effect of goals on adherence to physical activity among minority women during a 6-week program. In order to participate in the study you need to be a healthy, non-exercising (less than 2 times a week), minority (non-Caucasian) female between the ages of 18-45 years who intends to begin exercising more frequently. You must not possess any health condition that would be contraindicated for exercise.

Procedures - If you agree to participate, you will complete the following:
Sub-maximal fitness test:
You will be required to undergo a fitness test conducted in the Exercise and Health Psychology Lab located in the Arthur and Sonia Labatt Health Sciences Building. A researcher trained in CPR and first aid will conduct the test. You will walk on a treadmill and the incline of the treadmill will slowly be increased. The test will last approximately 10 minutes. A trained researcher will determine if the test should be terminated earlier if you fail to conform to the exercise test protocol, or experience any signs of excessive discomfort. The fitness test will be repeated after 6 weeks.

Exercise Intervention
You will be given a 6 week cardiovascular program that you will complete at home or in any place of your choosing outside of the Exercise and Health Psychology Lab. The program will involve attaining goals of exercising 3 to 5 times a week at a moderate to high intensity. You will be randomized into one of several groups through the use of a software package. Compliance with the program will be monitored by daily exercise logs, your heart rate while exercising, and the length of time you exercise. You will be asked to exercise for approximately 30 minutes each day that you exercise.

You will be given a heart rate monitor that you will wear each time you exercise; it will record your heart rate, the date, and the length of each exercise session. Once a week you will be required to visit the lab in order to meet with the researcher to review your exercise goals and to have your heart rate data recorded. Your daily logs for that week will also be collected at this time.

Questionnaires:
You will be asked to complete questionnaires that ask you about your motivation to exercise, your confidence in your ability to exercise, why you exercise, and

how frequently you exercise. Completion of the questionnaires should take approximately 10 minutes and will be administered prior to starting the program, at the end of the 6-week program and at the 12-week follow-up.

Feedback from the study
You may request the general findings of this research after the study is complete. If you have any concerns, please feel free to contact the researchers below. This letter is for you to keep.

Potential Risks and Discomforts
You should be aware that physical exercise is associated with certain risks including muscle soreness, muscle or joint injury, heat exhaustion/ stroke, increased heart rate, and in very rare instances heart attack. Every effort will be made to minimize these risks. If at any time you experience pain or difficulty breathing or do not feel well while exercising you should stop exercising immediately and contact your family physician. As well, everyone in the lab is trained in first aid and CPR.

First Aid Protocol
You will be instructed on how to deal with any minor injuries that may occur while carrying out the exercise intervention. If you experience any major medical injuries, you should contact your family physician or go to the nearest hospital emergency department for immediate assistance. You may wish to inform you family physician of your participation in the study.

Potential Benefits
You may experience some of the benefits associated with increased physical exercise including increased energy, cardiovascular benefits, increased strength, better circulation, increased flexibility and weight loss. You may also experience increases in some psychological variables (e.g., increased motivation to exercise).

Voluntary Participation
Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time. You do not waive any legal rights by signing the consent form.

Compensation
You will not receive monetary compensation for your participation in the study; however, there are no costs to participating as you will be given both an individualized cardiovascular program and the use of Polar RS400 heart rate monitors for the duration of the study.

Confidentiality
Your participation in this study is completely confidential. The information from the fitness test and questionnaires will only be for the use of the researchers listed. The completed questionnaires will be stored in a locked cabinet, inside a locked office. After 3 years, all of the questionnaires will be shredded. By participating in this research, you agree that your results may be used for scientific purposes, including publication in scientific and exercise & health specific journals. A master list will be maintained linking your name as a participant to an identifying number. Upon completion of the study, this list will be destroyed. The results of the study will be reported without identifying you personally thus maintaining your confidentiality.

Rights of Subjects
If you have any questions about the conduct of this study or your rights as a research participant you may contact: Office of Research Ethics
The University of Western Ontario
Tel: 519-661-3036.
Email: ethics@uwo.ca

Contact Information:
If you have any questions or concerns about the research, please feel free to contact Dr. Craig Hall or Duate Adegbite.

Appendix E - Informed Consent

Informed Consent

The Effect of Goals on Adherence to Physical Activity among Minority Women

I, _____ have read the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

Signature: _____ Date: _____

Name of Researcher: _____ Date: _____

Signature: _____

Appendix F – Contact Information Form

Contact Information

Name:_____

Participant ID:_____

Month and year of birth (mm/yyyy): _____

Telephone Number: _____

Email address: _____

Home address: _____

_____

_____

_____

Appendix G – Demographic Information Form

DEMOGRAPHIC INFORMATION

The Effect of Goals on Adherence to Physical Activity among Minority Women

ID Number: _____

Age: _____

Date of Birth: _____

Weight: _____ **(lbs)**

Height: _____ **(cm)**

Race/Ethnicity: _____

Income: _____ **Do not wish to answer (check if appropriate):** _____

Highest Level of Education: _____

Occupation: _____

Marital Status: _____

Do you have children? _____ **Number:** ___ **Ages:** _____

Appendix H – Heart Rate Monitor Contract

Heart Rate Monitor Contract

I, _____ agree to return the Polar RS400 computer and accompanying band at the completion of this study or at an earlier time if I choose to no longer participate. I will return the watch and band in their original condition and if damaged or lost, I understand that I will be responsible for the cost of damages or replacement.

Participant's signature: _____ Date: _____

Researcher's signature: _____ Date: _____

Appendix I – Exercise Intentions Scale

Exercise Intentions

Do you intend to maintain your current activity level?

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

Do you intend to increase your current activity level?

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

Do you intend to decrease your current activity level?

1 2 3 4 5 6 7
Strongly Disagree Strongly Agree

Appendix J - LTEQ

Godin Leisure-Time Exercise Questionnaire

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

Times Per Week

a) STRENUOUS EXERCISE
(HEART BEATS RAPIDLY) _____

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

b) MODERATE EXERCISE
(NOT EXHAUSTING) _____

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

c) MILD EXERCISE
(MINIMAL EFFORT) _____

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

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

1. Often _____ 2. Sometimes _____ 3. Rarely/Never _____

Appendix K – MSES

Multidimensional Self-Efficacy for Exercise Scale

The following questions are about YOUR confidence for exercising regularly. Examples of such exercise include jogging, biking, swimming, and weight training. Please rate **HOW CONFIDENT YOU ARE THAT YOU CAN PERFORM** each of the exercise related tasks below.

Rate each item on the following scale:

0	10	20	30	40	50	60	70	80	90	100
No Confidence							**Completely Confident**			

How confident are you that you can . . .

1. Exercise when you feel discomfort. _____
2. Complete your exercise using proper technique. _____
3. Include exercise in your daily routine. _____
4. Exercise when you lack energy. _____
5. Follow directions to complete exercise. _____
6. Consistently exercise 3 times per week. _____
7. Exercise when you don't feel well. _____
8. Perform all of the required movements. _____
9. Arrange your schedule to include regular exercise. _____

Appendix L – Exercise Prescription Form

Exercise Prescription

Age: _____

HR_{rest} = Resting Heart Rate: _____ bpm

HR_{max} = Predicted Maximum Heart Rate (i.e. 220 – age): _____ bpm

HRR= Heart Rate Reserve (i.e. $HR_{max} - HR_{rest}$): _____ bpm

Each exercise session should be preceded by at least 2-5 minutes of an active warm-up (i.e. self-paced exercise near the target heart rate zone) followed by light stretching.

The end of each exercise session should include a light cool-down until heart rate nears pre-exercise values.

It is more important to try to stay within the heart rate ranges than to exercise at one particular heart rate. That means that within each exercise bout it is ok to exercise at various intensities as long as your heart rate is within the range specified.

Weeks 1-2
Target HR zone: 50 – 60% of HRR (_____ bpm - _____ bpm)

Weeks 3-4
Target HR zone: 55 – 65% of HRR (_____ bpm - _____ bpm)

Weeks 5-6
Target HR zone: 55 – 70% of HRR (_____ bpm - _____ bpm)

NOTE: % of HRR calculated as follows: $[(HR_{max} - HR_{rest}) \times \%] + HR_{rest}$

Appendix M – Physical Activity Log

Physical Activity Log

Week: _____
Target Heart Rate Zone: _____

Days	Date	Type of Exercise	Number of Exercise Sessions	Length of Each Session
1				1: 2: 3: 4: 5:
2				1: 2: 3: 4: 5:
3				1: 2: 3: 4: 5:
4				1: 2: 3: 4: 5:
5				1: 2: 3: 4: 5:
6				1: 2: 3: 4: 5:
7				1: 2: 3: 4: 5:

Appendix N – Goal-Setting Sheet

Weekly Goals

Week	Frequency of Exercise	Minutes of Exercise per Day	Number of Sessions per Day
1			
2			
3			
4			
5			
6	5 days per week	30 minutes	

Appendix O – Weekly Goal Evaluation Sheet

Goal Evaluation

1. Did you exercise the required number of days this week?

   _____

   1. a) If you did not, what prevented you from doing so and how will you overcome it next week?

   _____
   _____
   _____
   _____

   1. b) If you did, is there anything that might prevent you in the future and how will you overcome these potential barriers?

   _____
   _____
   _____
   _____

2. Did you exercise for the required length of time each day?

   _____

   2. a) If you did not, what prevented you from doing so and how will you overcome it next week?

   _____
   _____
   _____
   _____

   2. b) If you did, is there anything that might prevent you in the future and how will you overcome these potential barriers?

   _____
   _____
   _____
   _____

3. Did you exercise at the prescribed heart rate intensity this week?

   _____

   3. a) If you did not, what prevented you from doing so and how will you overcome it next week?

   _____
   _____
   _____
   _____

   3. b) If you did, is there anything that might prevent you in the future and how will you overcome these potential barriers?

   _____
   _____

Appendix P - Change Score Correlation Table

Variables	1	2	3	4	5	6	7	8	9
1 Intention to Maintain									
2 Intention to Increase	-.14								
3 Intention to Decrease	.07	-.55**							
4 Coping Self-Efficacy	.46**	-.05	-.11						
5 Task Self-Efficacy	.39**	.10	-.09	.58**					
6 Scheduling Self-Efficacy	.36**	.10	-.08	.67**	.58**				
7 Frequency of Exercise	.27**	-.18	.07	.16	.05	.17			
8 Duration of Exercise	.28**	-.07	-.01	.10	.09	.14	.37**		
9 Intensity of Exercise	.20*	-.06	.03	.10	-.04	.13	.37**	.55**	
10 Heart Rate	.23*	-.10	.11	.07	-.07	.13	.46**	.53**	.84**

** indicates significance at $p < .01$
* indicates significance at $p < .05$

Appendix Q – Ethics Approval

Office of Research Ethics
The University of Western Ontario
Room 00045 Dental Sciences Building, London, ON, Canada N6A 5C1
Telephone: (519) 661-3036 Fax: (519) 850-2466 Email: ethics@uwo.ca
Website: www.uwo.ca/research/ethics

Use of Human Subjects - Ethics Approval Notice

Principal Investigator: Dr. C.R. Hall
Review Number: 15207E **Review Level:** Expedited
Review Date: June 4, 2008
Protocol Title: Examining the Effect of a Goal-Setting Physical Activity Intervention on Adherence to Exercise in Minority Women
Department and Institution: Kinesiology, University of Western Ontario
Sponsor:
Ethics Approval Date: June 27, 2008 **Expiry Date:** May 31, 2009
Documents Reviewed and Approved: UWO Protocol, Letter of Information and Consent
Documents Received for Information:

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

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

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the HSREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the HSREB:

a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) all adverse and unexpected experiences or events that are both serious and unexpected;
c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

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

Chair of HSREB: Dr. John W. McDonald

Ethics Officer to Contact for Further Information			
☐ Janice Sutherland	☐ Elizabeth Wambolt	☑ Grace Kelly	☐ Denise Grafton

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

cc: ORE File