THE EFFECTS OF GOAL SETTING ON ADHERENCE TO AN 8-WEEK FITNESS CHALLENGE, GOAL CONFIDENCE, AND IMPROVEMENTS IN PHYSICAL FITNESS

THE EFFECTS OF GOAL SETTING ON ADHERENCE TO AN 8-WEEK FITNESS CHALLENGE, GOAL CONFIDENCE, AND IMPROVEMENTS IN PHYSICAL FITNESS

By

TARA-LYN G. ELSTON, B.Kin.

A Thesis

Submitted to the School of Graduate Studies

In Partial Fulfilment of the Requirements for the Degree

Master of Science in Human Biodynamics

McMaster University

MASTER OF SCIENCE (2004) McMaster University
(Kinesiology) Hamilton, Ontario

TITLE: The Effects of Goal Setting on Adherence to an 8-Week Fitness Challenge, Goal Confidence, and Improvements in Physical Fitness

AUTHOR: Tara-Lyn G. Elston

SUPERVISOR: Dr. Kathleen Martin Ginis

NUMBER OF PAGES: ix, 118

Abstract

Goal setting is widely used in the physical activity domain and is generally believed to enhance performance (Gould, 1993; Pemberton & McSwegin, 1989; Weinberg, 1982). Although goal setting is an effective strategy for improving performance in exercise contexts (e.g., Boyce & Wayda, 1994), specific moderating variables may need to be taken into consideration when implementing a goal-setting intervention. For example, exercise experience (beginners vs. experienced) and goal-setting type (self-set vs. assigned vs. no goals/"do your best") can significantly impact the influence of goals on exercise behaviour (Boyce & Wayda, 1994; Dawson, 2001; Dawson & Brawley, 2000; Martin et al., 1984). It is not known however, if the people with different levels of exercise experience benefit differentially from the various goal-setting types. This issue was addressed in the present thesis. Using an experimental design, 149 men and women with various levels of exercise experience participated in a fitness centre challenge. The effects of exercise experience and goal-setting type (self-set vs. assigned vs. no goals/"do your best") were examined on changes in physiological fitness and adherence over an eight-week period. Additionally, goal confidence and future goal-setting preferences were assessed.

A manipulation check found that most of the participants in the no goal/"do your best" group set goals for the challenge despite not being asked to do so and were re-categorized into the self-set goal group for analyses. The no goal/"do your best" control condition was dropped due to the extremely low *n* that remained. An ANCOVA revealed no significant main effect or interaction for exercise experience and goal-setting type on

adherence (p>.05). A series of univariate ANCOVAs adjusted for baseline fitness scores revealed a main effect for physiological changes with experienced exercisers scoring higher on the grip strength test than beginner exercisers (p<.05). Additionally, there was an exercise experience x goal-setting type interaction with experienced exercisers scoring significantly higher on the grip strength test when goals were self-set rather than assigned (p<.05). Goal confidence was analyzed using an ANCOVA, and a main effect was found with participants in the assigned goal-setting condition showing higher levels of goal confidence than participants in the self-set goal condition (p<.05). The results of this study suggest that overall, assigned goals will lead to greater goal confidence. However, experienced exercisers may have greater performance gains on certain tasks (e.g., grip strength) when they self-set their own goals. These results have implications for the development of goal-setting interventions in physical activity settings.

Acknowledgements

Reflecting on the last three years, I am reminded of the amazing people that have become a part of my life. I am so thankful for the support of my department of Athletics and Recreation and the Department of Kinesiology in my endeavour. Some individuals in particular have guided me through the master's process, and for that, I will be eternally grateful.

Dr. Kathleen Martin Ginis - You have been such a source of inspiration to me over the past few years. Your dedication to your students, your patience, and your quality of research have all provided an environment in which I could learn and excel. Thank you for all of that, and most of all, for your unwavering friendship.

To my committee – Dr. Janet Starkes, Professor Nick Cipriano, and Dr. Diane Stevens. Thank you for being a part of my thesis, providing comments, and dealing with my "part-time" schedule.

To my lab mates – Over three years, some have come and gone. Amy Latimer, Mary Jung, Adrienne Sinden, Julie Fleming, Catherine Lichtenburger, and Kelly Arbour. Thank you all for the continuous feedback and support you have given me.

Debbie Marinoff Shupe and Therese Quigley – Thank you for your support as I worked toward a dream. Your words of encouragement, and understanding as I took time out of work days made it so much easier. I couldn't have done it without you.

Kevin Pressburger – What can I say…the support of the Pita Pit in recruitment of my participants and in running an extremely successful fitness challenge (for FIVE years) has been such a help. I look forward to many more years of collaboration.

Dr. Jennifer Durkin – Who knew that summer that what started out as housemates would evolve into such a wonderful friendship. You motivated me to keep going, even when it was tough. Thank you for encouraging me throughout this process and convincing me that it could be done. You are such a wonderful friend.

To my family – Mom, Dad, Becky and Rachael. You have been there for me from day one. This degree is as much yours as it is mine…I love you all and thank you for always being there.

To Jeff – my future husband (I love saying that). Thank you for always being there, for listening to my presentation a hundred times, and for always making me laugh just when I needed it. This chapter of my life is over…and our life together is just beginning. Let's play!!!

Table of Contents

List of Tables

Review of Literature

The effects of exercise on overall well-being are well documented for people of all ages. Research findings consistently support the importance of exercise in achieving and maintaining physical well-being, psychological well-being, and for improving health-related quality of life (Taylor, Sallis, & Needle, 1985; Surgeon General's Report: U.S. Department of Health and Human Services, 1996). Furthermore, physical activity has been shown to have positive effects on the musculoskeletal system (i.e. health of muscles, bones, and joints), mood, and anxiety and depression across the lifespan (Blumenthal et al., 1999; Surgeons General's Report, 1996). Cardiovascular benefits of exercise include a reduction in the relative risk of death from coronary heart disease (Berlin & Colditz, 1990), reduction in blood pressure (Green & Crouse, 1995; MacAuley et al., 1996) and lower incidences of myocardial ischemia (Ornish et al., 1997) to name a few. Physical exercise has also been show to help in the prevention of age-related impairment in both men and women, for example, improving reaction time, muscle and grip strength, agility, and joint flexibility (McMurdo & Rennie, 1993; Nichols, Omizo, Peterson, & Nelson, 1993; Rantanen et al., 1999; Skelton & McLaughlin, 1996).

Additionally, research has indicated that these benefits can be obtained from accruing 30-60 minutes of moderate daily physical activity, such as brisk walking, gardening, and performing household chores (Blair, Wells, Paffenbarger, 1994; Dunn, Andersen, & Jackicic, 1998). Studies have shown that incorporating physical activity into daily life can help achieve health benefits formerly believed to come only after moderate or intense exercise sessions (Anderson et al., 1999; Dunn, et al., 1998;

Tsutsumi, Zaichkowsky, Takenaka, Oka, & Ohno, 1998). Further, it has been suggested that the more frequently exercise is performed, the greater the improvements in fitness (Williams, 2000).

Knowing that exercise is integral to achieving and maintaining optimal health, exercise must be adopted and maintained as a lifetime habit. Yet despite the well-documented benefits of the preventive nature of physical activity, the adoption of an exercise program remains relatively resistant to change (Bouchard, Shepard, Stephens, Sutton, & McPherson, 1990). Sixty-four percent of Canadians over the age of 18 years are not physically active enough to achieve desired benefits (1999 Physical Activity Monitor, CFLRI). Furthermore, adherence to exercise programs remains startlingly low with research suggesting that approximately 40-65% of exercise participants drop out within the first three to six months of joining a program (Annesi, 1998; Carmody, Senner, Manilow, & Matarazzo, 1980; Dishman, 1988). It is possible that this low rate of adherence may be due to the fact that individuals find the exercise prescription difficult to both understand and follow.

An exercise prescription typically follows a F.I.T.T. formula by which exercise frequency, intensity, type and time are designated (*F*requency, *I*ntensity, *T*ype, & *T*ime) (Perkins & Epstein, 1988). More specifically, guidelines are developed on an individual basis with respect to the optimal level of exercise needed to produce physiological and/or psychological benefits. For example, a cardiovascular exercise prescription for an individual may instruct him or her to jog (*type*) at 75% of his or her maximum heart rate (*intensity*), three times per week (*frequency*) for 30 minutes per session (*time*). Unfortunately, exercise prescriptions typically yield low compliance rates (Martin & Sinden, 2001). It has been suggested

that adherence rates for exercise prescriptions may be even lower than those prescribed for medication regimens as there is a greater behavioural requirement of exercisers (Haynes, Taylor, Snow, & Sackett, 1979).

Given the challenges of exercise adherence, several strategies have been investigated for determining possible methods by which to improve it. A meta-analysis classified 127 studies of exercise-enhancing interventions into categories of behaviour modification (e.g., reinforcement), cognitive behaviour modification (e.g., self-monitoring, goal setting), tailored exercise prescription, health risk assessment, health education, or a combination of these. The largest effect sizes (.25-.56) were found for behaviour modification and cognitive behaviour modification interventions (Dishman & Buckworth, 1996). One cognitive behavioural strategy that has received considerable research interest in a variety of behavioural domains – including exercise – is goal setting.

Goal Setting

In the industrial-organizational context, the term "goal" has taken on many terms such as "management by objectives" and "level of aspiration." However, "goal" is commonly used today in reference to these cognitive regulators (standards set for individuals to monitor their level of performance) of behaviour (Burton & Naylor, 2002). A simple definition of a goal is "what an individual is trying to accomplish" (Locke, Shaw, Saari, & Latham, 1981). A goal has been more explicitly defined as "attaining a specific standard of proficiency on a task, usually within a specified time limit" (Locke et al., 1981). This definition implies that goals help individuals improve performance. Furthermore, this improvement is usually achieved within a specified time, such as by a certain date. A goal allows an individual to attain a quantity or

quality of performance by focusing his or her attention on a particular behaviour (Burton & Naylor, 2002).

In the industrial-organizational literature, goal setting has been extensively studied. Overall, the majority of the industrial-organizational literature suggests that goal setting is an important and useful tool for improving performance at a given task (Campbell & Stanley, 1972; Latham & Baldes, 1975). In fact, one of the most popular motivational techniques used for enhancing performance and productivity in the industrial-organization domain is goal setting.

Prior to 1974, most of industrial-organizational goal-setting research had taken place in laboratory settings. In one of the first field studies of the effects of goal setting, Latham and Kinne (1974) tested the effects of goal setting in a logging company by measuring the number of trees loggers were able to cut down. Loggers were randomly assigned to either a goal-setting condition, or a "do your best" condition. Results showed that within one week, the productivity and attendance of the crews in the goal-setting condition were significantly higher than the crews in the "do your best" condition. The effects of goals on performance were found to be influenced by the potential for self- evaluation, or feedback. In other words, participants that had set goals and were given feedback about their performance demonstrated greater improvements in overall performance than those participants who set goals but were not given feedback. Simply put, without feedback, people may not view a goal or standard as significant, and therefore do not take action in response to it (Locke & Latham, 1990).

Goal-Setting Theory was developed as a result of Locke and Latham's research (Locke, 1986; Locke & Latham, 1990). The basic assumption of this theory

is that an individual's task performance is directly regulated by the conscious goals that one is striving for (Weinberg, 1994). In Goal-Setting Theory, goals are operationally defined as what the individual is consciously trying to do (Locke & Latham, 1990).

Goal Setting and Physical Activity

Knowing that goal setting is effective for improving performance and adherence in industrial-organizational settings, it was suggested that goal setting could work even better in physical activity since the measurement of an individual's performance is typically more objective and immediate in this setting than in industrial-organizational settings (Locke & Latham, 1990). For example, a goal in physical activity could be to increase the amount of time spent on the treadmill by two minutes each week whereas a goal in the industrial-organizational literature may be to increase sales. Participants receive immediate and salient feedback from their performance on the treadmill by measuring the total amount of time spent on the treadmill. Participants with the goal of increasing sales may need to wait to receive feedback from a supervisor to determine whether or not the increase in sales represented an appropriate improvement in performance (Weinberg, 1992, 1994).

Goal setting is a widely accepted practice not just for coaches and fitness professionals, but also for athletes and exercisers. Instructional materials for coaches and fitness professionals advise that goal setting is a reliable motivational technique and it is generally accepted that goal setting will enhance performance (Botterill, 1980; Gould, 1993; McClements & Botterill, 1984; O'Block & Evans, 1984; Pemberton & McSwegin, 1989; Weinberg, 1982). Furthermore, one study found that 100% of the athletes surveyed participated in some type of goal setting (Weinberg,

Burton, Yukelson, & Weigand, 2000). Therefore, there may be merit to Locke and Latham's (1990) positive expectations for goal setting in physical activity contexts.

To test this possibility, considerable experimentation was done looking at performance gains in physical activity as a result of goal setting (Burton, 1993; Dawson, 2001; Hall & Byrne, 1988; Hall, Weinberg, & Jackson, 1987; Smith, Hauenstein, & Buchanan, 1996; Weinberg, 1994; Weinberg, Bruya, Longino, & Jackson, 1988). Results of this research lead to conflicting results with some studies indicating a significant improvement in performance as a result of goal setting (Dawson, 2001; Hall & Byrne, 1988; Hall, Weinberg, & Jackson, 1987), while others showed no significant improvements in performance (Burton, 1993; Smith, Hauenstein, & Buchanan, 1996; Weinberg, 1994).

Various studies have examined goal-setting's effects on physical activity. For example, when looking at performance differences between groups that set goals versus a no-goal control group on a juggling task, no significant differences were found (Hollingsworth, 1975). In another study, contradictory results were found such that participants had higher performance on an archery task in a group that set goals when compared to a no-goal control group (Barnett & Stanicek, 1979). Swimmers that set goals for improving their timed swim showed greater improvements in performance than their no-goal counterparts (Burton, 1989). Conversely, Hall et al., (1987) found no significant difference in performance between a goal-setting group and a no-goal group on a circuit task. Contrary to Locke and Latham's (1990) predictions, these conflicting results led some researchers to conclude that goal setting does not appear to be as potent a method for improving performance in the physical

activity domain as it is in the industrial-organizational domain (Burton, 1993; Hall et al., 1987; Hollingsworth, 1975).

In response to this conclusion, a meta-analysis of literature was conducted to investigate the effects of goal setting on performance in physical activity. The meta-analysis combined 36 studies completed between 1965 and 1993. Studies were included in the analysis if they investigated the effects of goal setting on sport, exercise or motor performance. In addition, each study had to include a comparison group (e.g., a no-goal control group). Results of this meta-analysis indicated that goal setting was effective for improving performance in the physical activity domain producing an average improvement in performance of 0.34 of a standard deviation. Results also suggested that several moderating variables may alter the impact of goal setting (Kyllo & Landers, 1995). Examples of these moderating variables include goal difficulty, self-set versus assigned goals and goal acceptance.

These moderators have also been shown to affect the impact of goal setting in industrial-organizational settings. However, the effects differ across the industrial-organizational and physical activity domains. These differences will be discussed in detail in the following section.

Assigned vs. Self-Set vs. No Goals/"Do Your Best"

Assigned goals versus self-set goals versus no goals/"do your best" goals instructions have received considerable attention in the industrial-organizational literature. Locke and Latham (1990) suggested that assigning participants' goals would lead to better performance than if participants were simply instructed to "do their best". This hypothesis was supported by White et al. (1995) who showed that performance on generating as many uses for a knife as possible was significantly

improved in a group that had been assigned goals when compared to a group that had self-set their own performance goals. However, other industrial-organizational studies have noted that it does not seem to matter whether goal setting is assigned to a participant or self-set in order for performance to be improved (Gollwitzer & Moskowitz, 1996).

In physical activity contexts, the research on self-set versus assigned goals has produced conflicting results also. A variety of different physical activities have been examined, such as riflery, bowling, weight training, track and field, gymnastics and physical education students (Boyce, 1992; Boyce & Bingham, 1997; Boyce & Wayda, 1994; Fairall & Rodgers, 1997; Hall & Byrne, 1988; Lambert, Moore, & Dixon, 1999; Lee & Edwards, 1984). In the majority of the studies, no difference was found in improvements as a function of self-set versus assigned goals (Boyce, 1992; Boyce & Bingham, 1997; Fairall & Rodgers, 1997; Hall & Byrne, 1988). However, two studies found that assigned goals yielded better improvements in performance (Boyce & Wayda, 1994; Lee & Edwards, 1984) and two studies found self-set goals to result in greater improvements in performance (Lambert, Moore, & Dixon, 1999; Martin et al., 1984).

Within the exercise domain in particular, only two studies have examined the effects of assigned versus self-set goals (where participants were instructed set their own goals). Specifically, Boyce and Wayda (1994) conducted a study of the effects of goal setting on improvement of a leg press exercise. Performance on the leg press exercise was selected as the dependent measure as it had been shown to yield the greatest improvement over a 12-week period compared to ten other strength training exercises (e.g., bicep curl, chest press) in a pilot study. Participants were 252 college

females (aged 18-35 years) who were enrolled in a 12-week weight training class. Eighty percent of the students reported never having taken a weight training class, and 61% reported never having participated in weight training. After the completion of baseline fitness testing, participants were randomly assigned to either a self-set goal condition, assigned goal condition, or no-goal/"do your best" control condition. The assigned goal condition was given an individualized, specific, short-term goal based on their baseline leg press performance and the average improvement expected based on the pilot study. The self-set goal condition required participants to set a short-term goal based on their baseline performance, and finally, the no-goal/"do your best" control group was simply instructed by the experimenter to "do their best." At the end of the 12-week training period, it was found that participants in the assigned goal condition improved significantly more on the leg press exercise than did participants in the self-set and no-goal/"do your best" control condition ($p<.05$). Moreover, participants in the self-set condition showed a trend towards greater improvements in performance on the leg press exercise than participants in the no-goal/"do your best" control condition. The results of this study indicated that assigned goals were superior to self-set goals and no goals, and self-set goals approached significance as being superior to the no-goal/"do your best" control condition. Additionally, 80% of the participants indicated confidence in their ability to achieve the goals set by the experimenter, even though the goals were perceived as extremely difficult. Interestingly, the manipulation check performed in this study indicated that 56% of the participants in the no goal/"do your best" condition set goals for their performance in the weight training study despite not being specifically asked to. Caution must therefore be taken, as the no-goal/"do your best" control group was analyzed as a

homogeneous no-goal group when in fact, over half of the group had set goals for their participation in the weight training class.

In the other exercise study, assigned versus self-set goals were examined in conjunction with a formalized walking/jogging program (Martin et al., 1984). Both the daily distance attained by participants and total program attendance were measured. Participants in the assigned goal-setting condition were given a daily distance goal by the experimenter for their participation in the walking/jogging program, while participants in the self-set goal-setting condition were encouraged by the experimenter to set daily distance goals based on how they felt that day. Results of this study nearly attained significance (p=.055) and indicated that participants with self-set goals attended 87.3% of the sessions whereas participants in the assigned goal condition attended only 67.8% of the sessions. In addition, the lowest dropout rates for the program were exhibited in the self-set goal group. Daily distance attained was higher in the self-set goal-setting group (.26km) than in the assigned goal-setting group (.03km) (Martin et al., 1984).

These two studies (Boyce & Wayda, 1994; Martin et al., 1984) are the only investigations of the effects of self-set versus assigned goals on *exercise behaviour*. To summarize their findings, Boyce and Wayda (1994) showed that participants in the *assigned* goal-setting group exhibited greater improvement on a leg press exercise than participants in the self-set or no goal/"do your best" conditions at the end of the experimental period. Conversely, Martin et al. (1984) found that participants who *self-set* their own goals performed better at a walking/jogging program than participants assigned a goal by the experimenter.

One explanation for the discrepancy between the findings of these two studies may be due to goal difficulty. Specifically, the difficulty level of the goals being assigned to the participants may have been different in the two studies and may have influenced subsequent improvements in performance. Boyce and Wayda (1994) selected the average improvement over a 12-week pilot study on a leg press exercise as the goal for their study, while Martin et al., (1984) assigned participants goals for the walking/jogging program based on each individual's previous performance. The moderating influences of goal difficulty are discussed in the next section.

Goal Difficulty

One factor that must be considered when examining the impact of goal setting on performance is goal difficulty. The studies mentioned in the previous section examined the impact of assigned versus self-set goals on improvements in performance. However, noticeably missing from these studies was a discussion pertaining to how the experimenter selected the level of goal difficulty for the assigned goal-setting group. For example, Boyce and Wayda (1994) used a goal of an improvement of 80% on the leg press exercise as this improvement was realistic for the 12-week experimentation period. However, there was no indication of what percentage of the participants could expect to attain this improvement. Attainability is an integral component of the goal-setting process (Kyllo & Landers, 1995). But again, there are conflicting results regarding the ideal level of goal difficulty for industrial-organizational and physical activity settings.

In the industrial-organizational literature, it has consistently been shown that specific, difficult goals lead to better performance when compared to vague, easier goals. A difficult goal is defined as one that is "attainable by only 10% of the

participants" (Locke & Latham, 1990). A meta-analysis of the literature investigating the effects of goal setting on industrial-organizational performance was conducted to examine the impact of goal difficulty. It showed that setting more difficult goals lead to greater performance outcomes than setting moderately difficult or not difficult goals (Mento, Steel, & Karren, 1987).

As goal-setting research evolved in the industrial-organizational domain, it was found that the higher the goal, the higher the performance. In other words, more difficult goals lead to greater improvements in performance than moderately difficult, or low-level difficulty goals (Chidester & Grigsby, 1984; Dosset, Latham, & Mitchell, 1979; Hunter & Schmidt, 1983; Latham, Mitchell, & Dossett, 1978; Locke & Latham, 1990; Locke et al., 1981; Mento, Steel, & Karren, 1987; O'Leary-Kelly, Martocchino & Frink, 1994; Tubbs, 1986; Weldon, Jehn, & Pradhen, 1991; Wood, Mento, & Locke, 1987). In support of this statement, a review of nearly 400 studies with 40 000 participants, in eight countries, performing 88 different tasks, found that when participants were given specific, difficult goals, there was a greater improvement in their performance than when their goals were vague or easy. Interestingly, other results have shown that when participants are simply instructed to "do their best", they typically set goals far below the level necessary to produce a goal-setting effect (White et al., 1995).

Goal-Setting Theory (Locke & Latham, 1990) suggests that there is a positive linear relationship between goal difficulty and performance, and as previously mentioned, this has been strongly supported in the industrial-organizational literature. Logically, this concept of specific, difficult goals being most effective for producing improvements in performance would carry over from the industrial-organizational

literature into the physical activity domain. Surprisingly, goal research in physical activity seems to contradict Locke and Latham's statement that an effective goal is one set at a level that only 10% of the participants are able to attain.

In a review of physical activity studies examining goal difficulty, only 10 of 19 studies supported goal difficulty predictions (Burton & Naylor, 2002). Even more important to note is that a number of these studies contradicted the goal difficulty predictions suggesting that an unrealistically high, or difficult goal could impair performance. For example, a study by Weinberg, Burke & Jackson (1997) examined goal difficulty among athletes and found that overall, athletes preferred setting moderately difficult goals.

In another study, novice and intermediate bowlers were tested for improvements in performance as a result of the level of difficulty at which a goal was set. Forty-five novice and 27 intermediate bowlers were matched according to baseline bowling averages and then randomly assigned to either an a) short-term goal condition, b) long-term goal condition, c) short-term-plus-long-term goal condition, or d) no goal/"do your best" goal condition. To set a challenging and difficult goal, the experimenters chose a goal of an improvement of ten pins over the five-week experimentation period for the three goal-setting groups. The control group received no instructions with respect to goal-setting behaviour. Goals were based on the performance of the class in the eight weeks prior to the start of the study. The average improvement of the participants in the first eight weeks was 5.67 pins knocked down per game. Each participant was asked by the experimenter to keep their goals confidential to avoid contaminating the study design, and each group was given adjoining lanes in an effort to minimize the socialization between the groups. Results

of this study showed that the long-term, difficult goal condition performed better than the "do your best" condition. Additionally, participants in the goal-setting conditions rated their level of confidence significantly higher than the no goal/"do your best" control group (Freirman, Weinberg, & Jackson, 1990).

Within an exercise context, Hall, Weinberg & Jackson (1987) looked at the effects of assigning goals of varying degrees of difficulty on a handgrip dynamometer test. Participants were 94 male university students who were asked to squeeze the handgrip dynamometer at one-third maximum tension for as long as possible. A pilot study was used to determine the length of time that constituted a "difficult" goal for improving performance over two trials. Results indicated that the mean improvement from Trial 1 to Trial 2 was a 2.9% increase in time. Interesting to note is that pilot study participants were polled with respect to the highest level of goal difficulty they would accept. Results indicated that they would accept goals set at 35% above the baseline endurance performance, but reject goals set at or above 47% above the baseline level. These subjective data suggest that participants were substantially overestimating their ability for improving performance on a second trial. Based on the results of the pilot study, the experimenters chose to use three different goal conditions for the main study. The goal conditions utilized were: 1) do your best; 2) improve by 40 seconds; and 3) improve by 70 seconds. These goals represented an overall improvement of 15% and 25% respectively above the mean increase in performance between Trial 1 and Trial 2 in the pilot study.

Results indicated that only the two goal-setting groups performed significantly better on the second trial. Additionally, data analysis revealed that only the "improve by 40 seconds" group had significantly better performance than the "do your best"

group. However, there were no significant differences between the two goal-setting groups, suggesting that a difficult goal (improve by 70 seconds) was not necessary to improve performance. It is important to note that no manipulation check was done in the no goal/"do your best" control group. It is possible that several of the participants in the control group had spontaneously set goals despite not being asked to do so by the experimenter. Results from the pilot study suggested that spontaneously-set goals may be set far above achievable levels which may cause participants to lose motivation and impede their performance. Having manipulation check data on the control group would allow us to see if participants are accepting highly difficult goals and striving to attain them, thereby providing us with additional evidence to support or reject the hypothesis that goals should be set at a level difficult enough that only 10% of the participants could attain it.

In another exercise study, 87 undergraduate students in a fitness class recorded the total number of sit-ups they could complete at baseline (Weinberg, Garland, Bruya, & Jackson, 1990). Participants were then randomly assigned to a condition in which participants were given either realistic goals (attainable), unrealistic goals (extremely difficult), "do your best" instructions, or no goals. Realistic (attainable) goals were to improve by 30 sit-ups over the course of the next five weeks, a number which was demonstrated in a pilot study to be attainable by 40% of the participants. Unrealistic (extremely difficult) goals were to improve by 60 sit-ups over the course of the next five weeks, a number that previous research demonstrated was attainable by less than 1% of the participants. Results indicated no significant difference in performance from trial 1 to trial 2 between the four conditions. Taken together, these studies suggest that setting goals at a difficulty level that only 10% of the participants

are able to attain may not yield the same results in the physical activity domain as in the industrial-organizational domain. One explanation as to why difficult goals may not be as effective in the physical activity domain is that a goal that can only be accomplished by 10% of the participants may be too difficult, resulting in low goal acceptance. In other words, participants being given a goal that is only attainable by 10% of the participants may feel that the goal is too difficult and therefore they may not attempt to attain it.

In contrast, a moderate goal may be most effective for improving performance in the physical activity domain. The definition of a moderate goal is one for which the probability of success approaches 50% (Kyllo & Landers, 1995). To examine the effects of a moderately difficult goal in their meta-analysis, Kyllo and Landers (1995) examined the effects of goals that 50% of the participants could attain. Results of the newly defined *moderately difficult goal* (attainable by 50% of the participants) indicated a mean effect size for improvements in performance of 0.53. This differed from the effects of difficult goals (attainable by 10% of the participants) that yielded an effect size of .09.

In summary, the results of the research in the physical activity domain indicate that overall, goal setting is an effective strategy for improving performance from baseline, (ES= 0.34) and that this effect can be maximized when moderately difficult goals are set (ES= 0.53) (Kyllo & Landers, 1995). When goals that are too difficult to attain are assigned to the participant by the experimenter, the participant may reject the assigned goal in favour of a more realistic goal they set themselves (Weinberg, 1994). Research indicates a distinct difference between the appropriate level of goal difficulty between the industrial-organizational literature, and the physical activity

literature. Goals set at a level that only 10% of the participants are able to attain yield superior results in performance in the industrial-organizational literature, but not in physical activity (Kyllo & Landers, 1995; Locke & Latham, 1990). Greater improvements have been found when participants in physical activity studies are assigned a moderately difficult goal, which is one that is attainable by 50% of the participants (Kyllo & Landers, 1995). Caution must be taken in future physical activity research to ensure that moderate goals are used as opposed to the difficult goals suggested in the industrial-organizational literature. Additionally, researchers need to include a manipulation check to look at the occurrence of spontaneous goal-setting, as research has shown that self-set goals tend to be unrealistic.

Spontaneous Goal-Setting

Typically, goal-setting studies consist of a goal-setting group in which a goal is assigned to the participant by the experimenter, and a no goal, or "do your best" condition in which participants are not given any direction with respect to goal setting. However, based on the results of several studies (Boyce & Wayda, 1994; Galluci, 1995; Weinberg, Burton, Yukelson & Weigand, 2000) we know that many participants engage in goal-setting practices regardless of instructions given to them. This type of goal setting is frequently referred to as spontaneous goal-setting. Spontaneous goal-setting has often been cited as one of the explanations for the inconsistent findings in the physical activity goal-setting literature (Burton, 1989, 1993; Hall & Byrne, 1988; Weinberg, 1992; Weinberg & Weigand, 1993). That is, significant differences in performance may fail to emerge between goal-setting groups and no-goal/"do your best" control groups because the control groups are in fact setting goals for themselves.

As previously mentioned, most goal-setting research has been conducted using assigned goals as they generally are set at a higher level of difficulty than when participants are instructed to self-set their goals (Locke & Latham, 1990). However, manipulations checks are often missing from goal-setting studies. Manipulation checks are designed to determine how many people in no-goal/"do your best" conditions are in fact setting goals for their performance.

While the occurrence of spontaneous goal-setting has remained largely unstudied, a few researchers have included post-experimental questionnaires in their studies to determine the prevalence of spontaneous goal-setting in their no-goal"do your best" control groups. Weinberg, Bruya, & Jackson (1985) and Weinberg et al., (1988) conducted goal-setting studies and investigated spontaneous goal-setting through the use of questionnaires. In these studies, college students completed sit-up tests and were randomly assigned to either an assigned goal-setting condition, or a no goal/"do your best" condition. Results of these studies revealed no significant differences between the groups on sit-up performance. But, in follow-up manipulation checks, it was found that 83% of the subjects in the no-goal/"do your best" control conditions were setting goals for their performance despite the fact that they were not given any goal-setting instructions by the experimenter (Weinberg et al., 1985). This would suggest that one of the reasons no significant performance differences were found between the treatment group and the control group is because the control group was benefiting from self-set goals.

With respect to spontaneous goal-setting in exercise contexts, Galluci (1995) conducted a study at a workplace fitness centre to determine how many members were setting goals. Participants consisted of 96 females and 34 males who were

attending group fitness classes. They had not been given information about goal setting prior to the study. Based on questionnaire responses, results showed that 93% of the participants had set goals for their participation in the exercise program. This supported Weinberg et al's (1985) study in which 83% of the participants in the no-goal/"do your best" control group set goals despite not being given any instructions to do so by the experimenter.

Results of the previously cited studies indicate that participants in a physical activity setting are highly likely to engage in goal-setting behaviours even if experimenters are not asking them to. It was suggested by Locke (1991) that this spontaneous goal-setting is an inherent problem in physical activity research -- more so than in industrial-organizational research because participants are more likely to receive immediate internal feedback (e.g., pain, fatigue) or external feedback (e.g., number of completed repetitions on a weight training task, duration spent on cardiovascular equipment). When immediate feedback is available, participants are able to determine if the goal set is attainable or not, which will help determine if they continue striving for the attainment of the goal, or reject the goal in favour of a more realistic one. It is difficult to withhold performance feedback from participants when they are able to count how many repetitions of an exercise task they have completed (Weinberg, 1992, 1994).

Hall and Byrne (1988) attempted to reduce the occurrence of spontaneous goal-setting by decreasing the amount of competition on a bowling task among study participants. Participants were high school students participating in a bowling class for a school credit, and some of the classes attended the bowling alley at separate times. To control for competition, the experimenters had the control condition,

performing under "do your best" instructions, attend the bowling alley separately from the other classes (i.e., the control condition was not at the bowling alley at the same time as the goal-setting conditions). This prevented any comparison of performance or competition between the participants in the control group and the intervention groups. Additionally, the design eliminated the possibility of participants in the treatment groups from encouraging the participants in the control group to set goals. The reasoning behind this was that competition and social comparison would lead participants in a "do your best" condition to spontaneously set goals. However, despite their efforts, 55% of the participants in the control group still spontaneously set goals. This finding was replicated in a study by Weinberg et al. (1990) where they found the 34% of the participants in a "do your best" condition still spontaneously set goals for their performance on their own. Taken together, these studies show that it is difficult to ensure that the control group does not engage in any goal setting.

It is also difficult for researchers to ensure that treatment group members are in fact striving to attain their assigned goals (Locke, 1991; Weinberg & Weigand, 1993). Participants in a treatment group may reject assigned goals in favour of a self-set goal, and this may be due in part to the role played by physiological feedback in goal setting. For example, if a participant is given an assigned goal of completing 20 push-ups, but is feeling pain and fatigue after completing 10 push-ups, he or she may reject the assigned goal of 20 push-ups in favour of a goal they perceive to be more realistic and less painful (e.g. 13 push-ups).

Physical activity research has shown us that participants in physical activity programs are highly likely to set goals for their participation in activity despite instructions given to them by the experimenter (Boyce & Wayda, 1994; Burton, 1989,

1993; Gallucci, 1995; Hall & Byrne, 1988; Hollingsworth, 1975; Weinberg, 1992; Weinberg & Weigand, 1993). Despite this knowledge, only one study has evaluated the improvement in performance of spontaneous goal-setters in a control group. This was done as a post-hoc analysis in Boyce and Wayda's (1994) exercise study.

Participants were assigned to either a self-set goal, assigned goal, or a no goal/"do your best" control group. Participants in the goal-setting groups were either asked to self-set goals or were assigned a goal for improvement on a leg press exercise. Participants assigned to the "do your best" control condition were given no goal-setting instructions, but rather, were told to do their best over a 12-week period. At the conclusion of the 12-week training period, all participants were polled with respect to their actual goal-setting behaviour. This follow up analysis indicated a spontaneous goal-setting rate of 56% for the participants in the control group. This is one of the only studies to do post hoc analyses on improvements on the leg press exercise for the spontaneous goal-setting group, and it was found that participants who self-set either improvement goals (e.g., increase amount of weight lifted on leg press exercise), or a specific numeric goal (e.g., increase amount of weight lifted on leg press exercise by 25 pounds) improved their performance on the leg press exercise more than participants who did not set goals. (Interesting to note is that of the 56% of the participants who did spontaneously set goals, 50% of the goals were improvement based and 10% were specific numeric goals.) In this study, it was found that participants in the assigned goal group performed significantly better than participants in the self-set goal group ($p<.05$), and the self-set goal group tended to perform better than the no-goal control group, although these differences were not significant. It is possible that if the spontaneous goal-setters had been re-categorized from the control

group into the self-set goal group, the difference between the self-set and no-goal conditions with respect to improvements in performance may have attained significance. It is also possible that the participants who did engage in spontaneous goal-setting had previous experience with the exercise task and therefore were familiar with the amount of improvement they could expect. Unfortunately, exercise experience was not measured in this study. This is important as it could have an influence on the types of goals set.

Exercise Experience and Goal Setting

It has been suggested that exercise behaviours are influenced by social cognitions, and the degree of influence is dependent upon the exercise experience level of the participant (Courneya, Estabrooks and Nigg, 1997; McAuley & Courneya, 1993; Poag-DuCharme & Brawley, 1993; 1994). For example, Courneya et al (1997) found that the effects of cognitive factors, such as goals, vary among participants of different experience levels. In other words, the extent to which goals affect behaviour are moderated by the exercise history of the participant such that beginner exercisers are more influenced by goals (Dawson & Brawley, 2000). One possible explanation for the more salient effects of goal setting on beginner exercisers may be that beginner exercisers have no experience with the behaviour being performed, and therefore find the goals set to provide them with more motivating standards by which to base potential improvement on (Dawson, 2001). Conversely, experienced exercisers are familiar with the behaviour, are generally aware of their exercise abilities, and may have already attained optimal behaviour. Therefore, goals no longer serve as something to which the participant should strive for, but rather, act as a gauge for a

behaviour the participant wishes to maintain (Dawson, 2001; Poag & McAuley, 1992).

The impact of exercise experience on the influence of goals was examined in a study by Dawson (2001). Eighty-seven women involved in a community fitness class program completed an exercise history questionnaire. Self-report was used to determine previous exercise experience, and of the 87 participants, 86% were maintaining a regular exercise program of some type thereby classifying them as experienced exercisers. Maintenance in this study was defined as being involved in a fitness program for the previous two years (Sallis & Hovell, 1990). The participants were instructed to record the goals they had set for their involvement in the fitness classes (self-set goals) and attendance was recorded for the subsequent eight weeks. Overall, results suggested that goals served more as a means by which exercisers could maintain current levels of physical activity performance as opposed to improving them. This differed from the results of a previous study which found that improvements in adherence to a fitness program were made among beginner exercisers as a result of setting goals (Dawson & Brawley, 2000). One suggestion for the discrepancy between the findings of these two studies (Dawson & Brawley, 2000; Dawson, 2001) is that individuals just beginning a new task may need to set motivating standards (goals), and believe that it is possible to achieve them. In contrast, individuals with experience at an exercise task may find that goals do not necessarily provide motivating standards for which they are to strive to achieve, but rather, serve as a means by which they can maintain current adherence levels.

In the meta-analysis by Kyllo and Landers (1995) it was found that among participants who were familiar with a task, the effects of goal setting on performance

improvements were larger for self-set goals than assigned goals. Conversely, it has been suggested that among participants who are unfamiliar with a task (i.e., beginners), assigning goals lead to greater improvements in performance than self-set goals because beginners may not know what a realistic goal is (Boyce & Wayda, 1994). It is important to consider the task being performed when determining the experience level of participants. More specifically, it is possible for an individual to be considered an experienced exerciser, yet be a beginner at a specific task being performed. For example, many individuals have experience riding a bicycle, therefore making the task familiar. This might allow them to have a better idea of what they are capable of with respect to performance on a cycling task. However, these same individuals may have no experience on a rowing machine and therefore be less likely to have a realistic idea of what their performance for that task could be.

To look at the influence of task experience, two studies will be compared. The first is a study by Martin et al. (1984). Thirty-four adults who were healthy but sedentary participated in a walking/jogging program. This would suggest that all of the participants were new to a *formalized* physical activity walking/jogging program. However, none of the participants indicated they were engaging in walking/jogging for the first time. While the walking/jogging *program* itself may have been new to the participants, the exercise *task* (walking/jogging) was not new. Because the participants were experienced, self-set goals may have produced better results than assigned goals. Indeed, results of this study did show that participants in the self-set goal-setting condition improved performance at the walking/jogging program significantly more than participants in the assigned goal-setting condition.

In contrast, in Boyce and Wayda's (1994) study of the effect of goal setting on improving performance on a leg press task, it was found that 80% of the participants had never taken a weight training class, and 61% of the participants had never been involved in weight lifting. This would suggest that the majority of the participants in the study were beginners at the *task* being performed (weight training) and would therefore not know realistic goals to self set for their improvement in performance. Because participants were beginners, assigned goals may have produced better results than self-set goals. Results of this study indicated a greater improvement in performance in the assigned goal-setting condition when compared to the self-set goal-setting condition.

Taking these studies together, overall it seems that assigned goals can have a significant influence on improving exercise adherence among beginners (Dawson & Brawley, 2000). This effect appears to be attenuated when goals are set with experienced exercisers, whereby a very small increase, or no significant increase in attendance at a physical activity program is influenced directly by the act of setting goals (Dawson, 2001). Limited research is available that examines the influence of goals on beginners versus experienced exercisers. However, the studies discussed above indicate that goals may have a differential influence on people with different exercise histories. Therefore, a sensitivity to the exercise experience level of participants needs to be addressed in future research to better understand the social cognitive processes of goal setting.

Summary

The consensus of more than 500 goal-setting studies is that goal setting can have a significant effect on performance improvement and adherence at physical

activity programs (Burton, 1992, 1993; Chidester & Grigsby, 1984; Hunter & Schmidt, 1983; Kyllo & Landers, 1995; Locke & Latham, 1990; Locke et al., 1981; Mento, Steele & Karren, 1987; Tubbs, 1986; Weinberg, 1994; Wood, Mento & Locke, 1987). Several variables can moderate the impact of goals on performance improvement and adherence. For example, who sets the goal (self-set versus assigned), level of goal difficulty (difficult versus moderately difficult versus easy), spontaneous goal-setting and exercise experience (beginners versus experienced) have all been shown to moderate the effects of goal setting on performance and adherence. For example, it is known that moderately difficult goals lead to better performance in physical activity than easy or difficult goals (Kyllo & Landers, 1995). It is also known that several participants in physical activity studies set goals for their participation despite not being asked to do so by the experimenter (Boyce & Wayda, 1994; Gallucci, 1995; Hollingsworth, 1975). Two questions that remain unresolved however, is whether goals should be self-set or assigned and how exercise experience influences the impact of a goal-setting intervention.

Future research needs to examine the effects of self-set versus assigned goals on improvements in performance, as current exercise studies have found conflicting results (Boyce & Wayda, 1994; Martin et al., 1984). Finally, the experience level of participants must be taken into consideration when implementing a goal-setting intervention. While very little research exists on the moderating effects of exercise experience, what research has been done suggests that goals may have a greater influence on beginner exercisers (Dawson & Brawley, 2000) than on experienced exercisers (Dawson, 2001).

Statement of Study Purpose and Hypotheses

The purpose of the present study was to compare the impact of assigned goals versus self-set goals versus no-goals/"do your best" on physical fitness and adherence over an eight-week period and to determine whether these effects varied as a function of exercise experience. There were four hypotheses for the present study.

1 First, it was hypothesized that either type of goal setting (assigned or self-set) would lead to better adherence over an eight-week period when compared to a no-goal/"do your best" control group.

2 Secondly, beginner exercisers in the assigned condition would have greater improvements in fitness levels and adherence than beginners in the self-set and no-goal/"do your best" control conditions because beginner exercisers have no experience with the task being performed and therefore find the assigned goals provide them with more motivating standards on which to base potential improvement. Conversely, experienced exercisers are generally aware of their exercise abilities and may already be exhibiting optimal exercise behaviour. Therefore, experienced exercisers would show greater improvement with self-set goals.

3 The third hypothesis was that participants in the assigned condition would have higher goal confidence, or confidence in their ability to attain the assigned goal because the act of the experimenter setting the goal would cause them to believe that the goal is more attainable.

4 Finally, the fourth hypothesis was that there would be improvements in fitness variables as adherence increased (American College of Sports Medicine, 1991; Karvonen, Kentala, & Mustala, 1957). In other words, participants would score more favourably on a fitness test at time 2 if they engaged in more physical activity over the eight-week testing period.

Goal Acceptance Pilot Study

Before conducting the thesis study, it was important to ensure that beginners at an exercise task would accept a goal set by an experimenter. In a study by Martin et al. (1984) it was found that people were more likely to accept a goal set by themselves than one set by the experimenter. However, it is possible that beginners will have greater acceptance of a goal assigned by the experimenter (assigned) than a self-set goal because of their lack of knowledge regarding what a realistic expectation (or goal) for improvement on the task would be (i.e., beginners on a grip strength task).

To address this issue, a pilot study was conducted with 26 male and 24 female participants (*M* age=23.6 years, SD= 6.7) who had never used a handgrip dynamometer or had their grip strength measured. Participants read a letter of information and agreed to have their grip strength tested (Appendix A). Each participant was instructed on how to perform the grip strength task and the experimenter gave a demonstration. Participants were instructed to use their right hand and to squeeze as tightly as possible. The dynamometer was held away from the body and upside down to prevent participants from seeing their results. After completing the first grip strength task, participants were told they had achieved a score of 25 pounds regardless of the actual score obtained. This was done to control for the impact of performance accomplishments on subsequent goals and goal acceptance. Participants were then randomly assigned to an assigned or a self-set goal condition. In the assigned condition, participants were told that a reasonable expectation for their second grip strength task would be an improvement of 12%. In the self-set condition, participants were asked to set a goal in pounds for their second

grip strength test. The goals for the second test were recorded on a sheet (Appendix B). Participants then completed the second grip strength test after a three-minute rest period. Prior to being given the results of their second grip strength test, participants in both the self-set and assigned goal conditions were asked if they had accepted the goal that had either been set by themselves or assigned to them by the experimenter. Finally, participants were debriefed and provided with their true grip-strength results.

To determine if there was a significant difference between the self-set and assigned goal groups on goal acceptance, a Pearson Chi-Square was calculated. Results showed that there was a significant difference in goal acceptance between the self-set and assigned groups $X^2(1)=9.92$, $p<.05$. The assigned goal group indicated greater acceptance of the goal (Table 1).

Results of this study indicate that there is a distinct difference between the method by which a goal is set (self-set versus assigned) with respect to goal acceptance by beginner exercisers. Knowing this, we wanted to further examine the influence of assigned versus self-set goals on both beginner and experienced exercisers on improvements in performance over a longer period of time as well as to examine which goal setting method would be most effective for improving adherence to a physical activity program. Accordingly, details of the main thesis study are presented next.

Table 1

Chi-Square Table Showing Participants' Goal Acceptance as a Function of Goal Setting

Condition

		Goal Acceptance		
		Accepted	Did not accept	Total
Goal Condition	Self-Set	13	12	25
	Assigned	23	2	25

$X^2(1)=9.92$, $*p<.005$

Note. Participants in the assigned goal group indicated significantly greater acceptance of the goal than participants in the self-set goal group.

Method

Participants

One hundred and forty nine (N=149, M=47, F=102) university fitness centre members between the ages of 18-65 years (M=22.7; SD=6.22) volunteered to participate in this study. Participants were recruited in January as this is when the largest number of beginners join the university fitness centre. Most participants were recruited through posters placed throughout the fitness centre and word of mouth from fitness centre staff and members. Advertisements were also made on the university scoreboard. Respondents that met the study participation criteria made appointments with trained fitness centre staff to begin data collection.

The study required enrolment in a fitness centre challenge that lasted eight weeks. The challenge encouraged fitness centre members to participate in fitness assessments and to have their adherence recorded for an 8-week period. The member with the greatest improvement in fitness variables combined with the highest adherence rate would receive free pita sandwiches for one year from a local establishment. All participants received an informed consent form (Appendix C) that indicated they could participate in the challenge without participating in the study and could withdraw from the study at any time, and still remain in the fitness centre challenge without penalty.

Study Design

The present study employed an experimental design. The dependent variables were adherence, body composition, aerobic fitness, musculoskeletal fitness, and goal confidence. The independent variables in this study were how the participants set their

goals (no-goal control group, assigned goals or self-set goals) and exercise experience (beginners versus experienced).

Behavioural and Psychosocial Measures

Demographic questionnaire. A demographic questionnaire (Appendix D) assessed participants' age and gender. These characteristics were collected for descriptive purposes.

Current Exercise Level. The activity level of participants was assessed in order to classify them as either experienced exercisers or beginner exercisers. Participants were asked on a questionnaire "Immediately prior to joining this fitness challenge, were you: inactive (no exercise in the past month); exercising sporadically (2 or less times in the past month); or exercising regularly (average of 2-3 times per week for the past month)." Participants were then asked "Would you classify yourself as: a beginning exerciser, experienced exerciser or a previously experienced exerciser who has relapsed and is attempting to exercise regularly again" (Appendix E). If the participant answered that they were "exercising regularly" and classified themselves as an "experienced exerciser" they were classified as "experienced". If a participant answered that they were "exercising sporadically" and were a "beginning exerciser" they were classified as a beginner. If a participant indicated that they were either "exercising sporadically" or "inactive" and classified themselves as "a previously experienced exerciser who has relapsed and is attempting to exercise regularly again," they were asked verbally how long it had been since they last engaged in regular physical activity. Those participants indicating a relapse of less than six months were classified as experienced exercisers. Participants indicating a relapse of greater than six months were classified as beginners. In sum, participants were classified as either

experienced (exercises regularly) or a beginner (new to exercise, or greater than six months since regular participation in physical activity). The decision to employ this method of classification was based on personal communication (K. Dawson, personal communication, Nov. 1, 2002) in which it was suggested that the most effective way to determine a subject's exercise history is to ask them.

Barrier Self-Efficacy. Participants' ability to exercise despite the presence of barriers was measured using the Barrier Self-Efficacy Scale (Marcus, Rakowski, & Rossi, 1992) (Appendix F). A measure of self-efficacy was included to ensure that there was no significant difference between the groups with respect to their exercise self-efficacy. This 7-item scale asked participants to indicate their confidence in their ability to exercise regularly despite the presence of barriers (e.g., "I am confident that I can take time out for myself and go to the fitness centre regardless of other commitments", "I am confident that I can plan and prepare in advance so nothing interferes with my exercise time at the fitness centre") on a 0-100% confidence scale. The anchors on the scale were 0% (not at all confident) and 100% (completely confident). Barrier self-efficacy was collected for use as a potential covariate in study analyses. The internal consistency for the scale was verified by calculating Cronbach's alpha. The scale was found to have an acceptable level of internal consistency (α=.86).

Adherence. Adherence for each participant was recorded by trained fitness centre staff and kept in a file at the front desk of the fitness centre. To have their adherence recorded, participants were instructed to go to the fitness centre front desk, and ask the staff to check off the day they engaged in physical activity on a calendar located in their file. Adherence was recorded for activities performed both in the

fitness centre (i.e., group fitness classes, weight training, cardiovascular equipment use) and those activities performed outside of the fitness centre (i.e., jogging, swimming, walking). Both on- and off-site exercise sessions were included because improvements in fitness were being examined as a function of participation in regular physical activity, and it has been found in a national survey that approximately 35% of club members participate in competitive sports, 13% of club members participate in walking for fitness and 3% of club members participate in running for fitness (IHRSA, 2002). Competitive sports, walking and jogging/running are all activities that the university fitness centre members can only engage in outside of the facility so it seemed prudent to have a strategy in place to monitor all activity and not just fitness centre activity. Each time a participant in the challenge came to the facility, they received a stamp on their adherence record. In addition, any exercise bouts that participants engaged in outside of the fitness centre were self-reported to the fitness centre staff and were recorded on their adherence record.

Goal Confidence. Goal confidence was measured with a single item that asked participants to indicate their confidence in their ability to achieve their goals. Responses were made on a 7-point Likert scale (1=not at all confident to 7=very confident) (see Item #2 in Appendices G, H and I).

Manipulation Check. A manipulation check determined if participants remembered and complied with the intervention by asking if they engaged in goal setting in their initial meeting with the experimenter. Participants in the no-goal control group were asked if they had set goals for their participation in the challenge. All participants were also asked to indicate how many action steps they had developed for any goals set in a range of one to six action steps. Participants were

asked to indicate their preferred method of goal setting (self-set versus assigned). The number of times participants referred to their goal-setting worksheet was recorded and choices included forgetting they had a worksheet, never, two times throughout the challenge, 1-2 times per month, 1-2 times per week, more than twice per week and everyday. Finally, participants were asked to indicate how motivating they found the goals and/or goal-setting worksheet to be on a 7-point Likert scale (1=not at all motivating to 7=extremely motivating) (see Item #6 on Appendices G, H and I).

Measures - Fitness Variables

Canadian Physical Activity and Lifestyle Appraisal (CPAFLA): The aerobic fitness, musculoskeletal fitness and flexibility of each participant were measured using a modified CPAFLA test (Canadian Society for Exercise Physiology, 1996) (Appendix D and J). A description of each component measured in this study is provided below:

1. *Body Weight*: Body weight was measured in pounds on a CAS Engineering ND 300 scale located in the fitness centre. Weight was converted to kilograms by dividing the body weight in pounds by 2.2. Shoes were worn when completing this test.
2. *Height*: Height was measured in meters on a height chart securely fastened to the fitness testing room wall. Shoes were worn when completing this test.
3. *Body Fat*: The standard protocol for obtaining a body fat measurement in a CPAFLA assessment is through a five site skinfold measurement (tricep, bicep, subscapular, suprailiac and calf). However, it was found in previous fitness centre challenges that this measure of body fat caused participants a great deal of discomfort and may have contributed to the extremely low return

rate at Time 2. To adjust for this, body fat was measured using an Omron BodyLogic™ Body Fat Analyzer. The body fat analyzer provides a body fat measurement in seven seconds. Participants are instructed to stand up straight with their feet slightly apart. Personal data including gender, age, height and weight are input into the analyzer. The participant grips the handles lightly and presses start. Body fat percentage and the weight of the body fat are displayed on the large digital panel.

4. *Aerobic Fitness*: Aerobic fitness was assessed using a modified Canadian Aerobic Fitness Test (mCAFT). This component of the appraisal involved the participant completing one or more sessions of three minutes of stepping up two steps and then down two steps at pre-determined speeds based on their age and gender. All participants began stepping on double 20.3 centimeter steps. More fit participants completed their appraisal with a single step 40.6 centimetres in height. Instructions and time signals were given by a recording on a compact disc as to when to start and stop stepping and for the measurement of the post-exercise heart rate. Post-exercise heart rate was measured at the carotid pulse by the experimenter for ten seconds and multiplied by six to get a total number of beats per minute. Participants completed as many of the progressively more demanding three-minute bouts as necessary to equal or exceed 85% of the predicted maximum heart rate for the participant's age group. The bouts were made more demanding by increasing the cadence at which the participants were stepping. The final stage reached by the participant was recorded.

5. *Rating of Perceived Exertion*: Participants were asked to indicate their rating of perceived exertion for the aerobic fitness test on a scale of 6 (extremely light)-20 (maximum exertion) (Borg, 2001).
6. *Grip Strength*: Hand grip strength was measured using a Takei Physical Fitness Test© handgrip dynamometer. Both the right and the left hand grip were measured alternately for two trials per hand. Grip strength was recorded in kilograms, and the highest right hand score was added to the highest left hand score to determine the participant's maximum grip strength.
7. *Upper Body Strength*: Upper body strength was measured using push-ups. The upper body strength score consisted of the total number of correct push-ups the participant was able to execute. Men were instructed to lie on their stomach with their legs together. Hands were positioned under the shoulders with the fingers pointing forward. A push-up consisted of the upward motion followed immediately by a downward movement. The test ended if the participant's stomach or thighs touched the mat or when the participant reached muscular failure. Women followed the same testing protocol as men, however, they were instructed to perform the test in the modified push-up position (on their knees instead of their toes).
8. *Muscular Endurance*: Muscular endurance was measured using a partial curl-up test. Participants were instructed to lie in a supine position with their head resting on the mat, arms straight at their sides and parallel to the trunk, palms of hands in contact with the mat, and knees bent at 90 degrees. A cadence of 50 beats per minute was provided by a metronome, and participants were instructed to slowly curl up so the tips of their middle fingers travelled a

distance of ten centimetres, as marked on the mat with masking tape. The muscular endurance score consisted of the total number of correct partial curl-ups the participant was able to execute. The curl-up test ended when the participant's palms or heels raised off the mat, if they were not able to get to the ten centimetre mark, or when the participant reached muscular failure.

9. *Flexibility*: Flexibility was measured using a trunk forward flexion test. A Figure Finder Flex Tester ™ by Novel Products flexometer was used for this measurement. A flexometer is a device designed to measure low back and hamstring flexibility. Participants were instructed to slowly stretch using a modified hurdlers' stretch for 20 seconds twice on each leg before flexibility measurements were taken. Participants sat without shoes, legs fully extended and the soles of the feet placed against the flexometer. Keeping their knees fully extended and arms evenly stretched, the participants were instructed to slowly bend at the hips and lower back to reach forward and push a sliding marker along the scale with their fingertips as far forward as possible. This was repeated for a total of two measurements. The farthest distance reached was recorded in centimetres.

Procedure

Challenge Registration. Participants registered for the fitness centre challenge in the athletics and recreation office of the university. After registering for the challenge, participants were instructed to bring a copy of their receipt to the fitness centre front desk. At the front desk, participants were able to select a date and time to have their first fitness assessment completed. They were given an appointment card that included their appointment information as well as some important reminders for

the day of the assessment. These included: instructions to wear proper attire of shorts, short-sleeved shirt and running shoes; not to eat or consume caffeine for at least two hours prior to the appraisal; no alcoholic beverages for six hours prior to the appraisal; no smoking two hours prior to the appraisal; and avoidance of strenuous physical activity for six hours prior to the appraisal. These instructions were given as it was suggested by CPAFLA that engaging in any of the above mentioned activities within the time frames provided could have a negative impact on the appraisal.

Baseline CPAFLA Assessment: Participants were asked to meet with a fitness assessor (trained fitness centre staff member) at a pre-determined location at a specific date and time. Each fitness assessment began in the university fitness centre where they had the weight measurement taken. Participants were then taken to a fitness testing room for the remainder of their CPAFLA assessment. Once in the fitness testing room, participants were informed that the remainder of the CPAFLA assessment would measure aerobic fitness, musculoskeletal fitness and flexibility. They were also told that should they experience discomfort at any time, they were free to stop the assessment. At baseline, 100% of the participants that came for a fitness assessment completed the full CPAFLA assessment.

At the completion of the assessment, participants were not given any results. They were informed by the fitness assessor that they were to see the experimenter within the next three days to obtain the results of the assessment. Additionally, all were advised that they would receive a coupon for a free pita sandwich at a local establishment.

Baseline Questionnaires and Intervention: Upon arrival at the experimenter's office, participants were informed that a study was being performed in conjunction

with the fitness centre challenge, and that participation in the study was not mandatory for remaining in the challenge. Of the participants who came for results from their baseline CPAFLA assessment, 100% agreed to participate in the study. All participants were given a letter of information to read and were advised of their freedom to withdraw from the study at any time. The letter of information stated that the purpose of the study was to determine factors that influence how well people adhere to exercise programs. Furthermore, they were advised that withdrawal from the study did not exclude them from participation in the fitness centre challenge (Appendix C). After the completion of an informed consent form, participants were given instructions to complete the demographic, current exercise level and barrier self-efficacy questionnaires. At this point, participants were randomly assigned to either the self-set, assigned, or no-goal control group. Participants were stratified as a function of their exercise history (beginner vs. experienced) and randomized so that roughly equal numbers of beginners and experienced exercisers were assigned to each condition.

Self-Set Goal Intervention: Participants in the self-set goal condition had the results of their fitness assessment reviewed with them by the experimenter. In this review, participants were told how the results of their body composition, musculoskeletal fitness and aerobic fitness tests compared with a set of normative Canadian data provided by the Canadian Society of Exercise Physiology (1996). After a brief discussion of the results, participants were given a goal-setting worksheet and instructed to set three personal goals for the fitness challenge. The goal-setting

worksheet (Appendix K) provided a space for three personal goals, with three spaces allocated under each goal for them to create action steps.

Participants were instructed that their first goal was to be adherence-related and their remaining two goals were to be fitness-related. An example of a fitness related goal would be "to improve performance on push-ups". No further instructions were given with respect to the goal-setting practice. After the participant wrote down three goals on the goal-setting worksheet, the experimenter explained the action steps section of the worksheet and encouraged the participant to set three action steps for each goal at some point over the next eight weeks. Action steps were described as short-term plans that would help them achieve the overall goal. The example given to all participants was pertaining to an adherence related goal. Participants were told that an example of an action step related to the adherence goal would be "I will write down my workout days and times in my day planner".

Assigned Goal Intervention: Results of the fitness assessment were reviewed with the experimenter in the same manner as the self-set goal intervention. After the review of the results, the experimenter set three goals for the participant. Goal setting was performed following the SMART principle, which is *S*pecific, *M*easurable, *A*ttainable, *R*ealistic and *T*ime-Oriented (Smith, 1994).

The first goal was adherence-related, and the remaining two goals were fitness-related. Fitness-related goals were set for the two fitness variables the participant scored the lowest on in the CPAFLA assessment. For example, the goals of a participant may be: 1) to exercise four times per week for the following eight weeks; 2) to improve partial curl-ups by 22 and; 3) to improve push-ups by 12.

Specific goal values for improvements in fitness scores were based on the average improvement obtained by participants over the previous two years of the challenge, and this was explained to the participant. This provided a realistic goal for improvements in fitness that could take place over eight weeks. After the three goals had been set, the experimenter explained to the participant what action steps were and encouraged them to fill in three action steps for each goal over the duration of the eight-week challenge.

No-Goal Control Intervention: As with the self-set and assigned conditions, results of the fitness assessment were discussed with each participant. Goal setting was not discussed, and participants in the control group were not given a goal-setting worksheet.

All participants were told that a folder containing an individual adherence record would be kept at the front desk of the fitness centre. They were to inform the fitness centre staff when they engaged in physical activity so that their activity could be recorded. In addition, they received a coupon for a free pita sandwich and were thanked for their participation.

After seven weeks, all participants were contacted by phone and asked to schedule a date and time for their follow-up CPAFLA assessment. This second assessment was completed by a trained fitness assessor eight weeks $\pm$ five days from the date of the baseline assessment. Again, participants were instructed to see the experimenter within five days to get the results of their second assessment. Office hours were set by the experimenter so participants knew when they were able to obtain their results.

Manipulation Check: Participants who arrived for a review of their second CPAFLA assessment were asked to complete a manipulation check questionnaire (Appendix G, H and I). Specifically, the manipulation check asked participants to rate their goal confidence on a scale of 1 (not at all confident) to 7 (very confident), how often they referred to the goal worksheet (0-7 days/week), how many action steps they developed for their goals (1-6 action steps), how motivating they found the goal worksheet to be (1=not at all motivating to 7=extremely motivating), and an open-ended item asking where they kept the goal worksheet during the challenge (Appendix L). Following completion of the manipulation check questionnaire, a brief verbal description of the true purpose of the study was given to the participants. Participants were thanked for their participation, and contact information was provided should they have had any further questions for the researcher. Participants were also given a coupon for another free pita sandwich as a token of appreciation for their participation.

Results

Descriptive Statistics

The mean, standard deviation and observed range for each of the fitness variables and adherence are presented in Table 2.

Baseline Demographics, Barrier Self-Efficacy, Canadian Physical Fitness and Lifestyle Appraisal Results, and Adherence Rates

Table 2

Measures	M ± SD Range	Minimum & Maximum Possible Scores
Age (Years)	22.69±6.22 18-65	N/A
Weight (kg)	71.23±14.14 50.36-111.00	N/A
Height (m)	1.71±.10 1.52-1.96	N/A
Body Mass Index (BMI)	24.35±3.52 17.84-38.00	N/A
Body Fat (percentage)	20.82±7.08 4.00-41.90	N/A
Aerobic Fitness (O_2/min^{-1})	568.17±80.19 310.45-751.20	N/A
Rating of Perceived Exertion (RPE) during the Aerobic Fitness test	13.35±1.97 6.00-19.00	6-20
Grip Strength (kg)	52.13±25.07 12.00-118.00	N/A
Push-Ups (total # completed)	24.79±11.78 0.00-61.00	N/A
Flexibility (cm)	31.92±10.73 2.00-54.50	N/A
Curl-Ups (total # completed)	32.23±28.49 0.00-200.00	N/A
Adherence (# of days exercised over 8 weeks)	21.67±10.68 0.00-55.00	0-56
Barrier Self-Efficacy (Time 1 only)		
Beginners	527.15±101.96 340-700	0-100
Experienced	568.84±81.25 250-700	0-100
Relapsers	537.40±88.99 240-700	0-100

Manipulation Check

A manipulation check was performed to see if participants complied with their initial goal-setting intervention that took place at baseline. A total of 21 participants in the no-goal control condition indicated that they had set goals. These participants were considered to have self-set goals for the challenge and were re-categorized in the self-set condition for all statistical analyses (see Table 3). Through the experimenter's probing, it was determined that the goals spontaneously set by the participants in the no-goal control group were qualitatively similar to the goals set in the self-set goal group insofar as the spontaneous goals were non-specific. An example of a self-set goal was to "decrease my body fat." This was a common goal set by participants in the no-goal control condition as well. After reassigning spontaneous goal-setters to the self-set condition, the no-goal condition consisted of ten participants who did not set any goals whatsoever. This condition was removed from all subsequent statistical analyses due to the extremely small cell size (n=10). The final sample sizes for each condition are shown in Table 3.

Table 3

Number of Participants in Each Condition at Baseline, Post-Test and after Manipulation Check

	Self-Set	Assigned	No Goals	Total
Pre-Test	47	54	48	149
Post-Test	23	32	31	86
Final Classification after manipulation check	44	28	10	86

Note: 21 participants in the no-goal control group indicated on a manipulation check that they had set goals for the fitness challenge. They were included in the self-set goal group for all subsequent analyses.

Analysis of Adherence as a Function of Goal Setting Type and Experience

Our first hypothesis predicted that goal-setting groups would exhibit better adherence over the eight-week test period when compared to a no-goal control group. Due to the extremely low n (n=10), we were unable to test hypothesis 1. To test our second hypothesis and to determine if there was a significant difference in participants' adherence during the eight-week fitness challenge as a function of goal-setting type and exercise experience, a 2 (beginner vs. experienced) x 2 (self-set vs. assigned) ANCOVA was performed on adherence to the fitness challenge. Barrier self-efficacy was entered as a covariate as it has been shown to be a significant predictor of exercise adherence and compliance (McAuley & Blissmer, 2000). Results of this ANCOVA showed that there was no main effect on adherence based on exercise level $F(1, 71) = .59$, $p > .05$ or goal-setting group $F(1, 71) = .001$, $p > .05$. However, experienced exercisers exhibited a non-significant trend for higher overall adherence than beginner exercisers (see Table 4). Contrary to the second hypothesis, the interaction between participants' exercise experience and goal-setting type was also not significant $F(1, 71) = .000$, $p > .05$. Thus, beginners did not adhere to the fitness challenge better as a result of assigned goals, and experienced exercisers did not exhibit greater adherence at the fitness challenge as a result of self-set goals.

Table 4

Mean Adherence over Eight Weeks as a Function of Exercise Experience and Goal-Setting Group

	Type of Goal				
	Self-Set		Assigned		
Exercise Experience	*M*	*SD*	*M*	*SD*	
Beginner	19.70	9.66	19.75	7.78	*M*(beginner)=19.72, SD=8.62
Experienced	23.29	11.07	23.00	10.96	*M* (experienced) = 23.17, SD=10.92
	M(self-set) =22.41, SD=10.74 *M*(assigned) = 22.13, SD=10.19				

Analyses of Improvements in Fitness as a Function of Exercise Experience and Goal-Setting Type

Due to the large number of fitness variables that were tested, it was decided to examine improvements in fitness variables by analyzing each fitness variable individually with a univariate 2 (self-set vs. assigned) x 2 (beginners vs. experienced) ANCOVA. Pre-test scores for the dependent variable were entered as covariates to control for any baseline differences between participants. The level of statistical significance was set at $p<.05$. Table 5 contains the means and standard deviations for all dependent variables, presented as a function of exercise experience and goal-setting type. For each dependent variable, pre- and post-test scores are presented. Table 6 contains adjusted post-test scores for fitness variables as a function of goal-setting condition with baseline fitness scores being controlled for.

Contrary to hypothesis two, there were no main effects of exercise experience or goal-setting type, and no significant interactions for any of the fitness variables except grip strength ($ps > .05$) (see Table 6). There was a main effect for exercise experience on grip strength with experienced exercisers scoring higher overall on the grip strength test, $F(1, 75)=5.49$, $p<.05$. There was also an interaction for grip strength, $F(1, 75) = 9.99$, $p < .05$. Differences between experienced/self-set and experienced/assigned as well as beginner/self-set and beginner/assigned were hypothesized a priori and planned comparisons between these groups were conducted using an alpha of .05. As predicted, subsequent pair-wise comparisons ($p < .05$) revealed that experienced exercisers scored significantly higher on the grip strength test when goals were self-set rather than assigned ($M_{assigned}$=66.3 kg, $M_{self\text{-}set}$=50.0 kg). There was no significant difference in performance on the grip strength test

between the beginner/self-set and beginner/assigned groups. Also interesting to note is that there was a non-significant trend for ***beginners*** to score more favourably on post-test aerobic fitness, grip strength, push ups and flexibility when goals were *assigned* rather than self-set, while *experienced* exercisers scored more favourably on body mass index, body fat, aerobic fitness, push ups, flexibility and curl ups when goals were *self-set* rather than assigned (Table 6).

Table 5

Descriptive Statistics for Fitness Variables at Baseline Pre-test and Post-test

	Self-Set				Assigned			
	Beginners		Experienced		Beginner		Experienced	
Fitness Variable	M	SD	M	SD	M	SD	M	SD
Pre-test Weight	70.59	11.13	74.95	12.84	73.92	16.01	68.99	12.65
Post-test Weight	71.99	11.41	75.97	14.08	73.53	15.47	70.53	13.76
Pre-test BMI	24.58	3.75	24.56	3.12	24.81	3.52	23.63	2.80
Post-test BMI	25.47	2.49	24.11	2.63	24.86	3.59	22.91	5.50
Pre-test Body Fat	21.59	8.32	20.22	6.85	20.34	5.86	20.34	7.36
Post-test Body Fat	22.76	6.32	16.61	5.99	20.39	7.07	21.09	7.30
Pre-test Aerobic	561.28	75.78	547.32	95.35	574.54	79.45	581.51	81.42
Post-test Aerobic	595.21	89.31	598.37	101.72	597.66	89.28	578.94	78.73
Pre-test Aerobic RPE	12.84	2.83	13.56	1.46	13.45	1.80	13.43	2.14
Post-test Aerobic RPE	12.92	1.38	13.63	1.19	13.89	2.12	13.88	2.15
Pre-test Grip Strength	50.24	20.65	49.75	20.25	60.10	29.77	51.01	25.67
Post-test Grip Strength	52.42	22.41	66.25	26.71	66.00	31.70	50.00	23.50

Table 5 (cont'd)

	Self-Set				Assigned			
	Beginners		Experienced		Beginner		Experienced	
Fitness Variable	M	SD	M	SD	M	SD	M	SD
Pre-test Push-Up	22.84	9.90	20.44	10.22	27.31	14.20	24.62	10.10
Post-test Push-Up	31.92	17.12	29.63	9.10	34.44	16.71	28.79	11.49
Pre-test Flexibility	25.55	11.74	29.53	11.84	32.59	10.06	35.39	10.90
Post-test Flexibility	28.63	12.62	33.25	9.84	35.27	8.60	38.67	7.62
Pre-test Curl-Up	19.11	10.89	30.01	44.62	41.14	34.34	31.63	20.94
Post-test Curl-Up	33.42	12.38	36.50	21.77	62.16	57.76	49.25	30.83

Note. Weight = kilograms; BMI (Body Mass Index) = weight (kg)/(height [m])^2; Body Fat = percentage body fat; Aerobic Fitness = O_2/min^{-1}; RPE (Rating of Perceived Exertion)= Borg Scale of Perceived Exertion (6-20) measured immediately after the completion of the aerobic fitness test; Grip Strength= combined right and left hand in kilograms; Push-Ups = total number of completed push-ups; Flexibility = number of centimetres attained on a sit and reach test; Curl-Ups = total number of completed curl-ups.

Table 6

Adjusted Post-Test Scores for Fitness Variables as a Function of Goal Condition and Exercise Level Controlling for Baseline Fitness Measures

	Self-Set				Assigned			
	Beginners		Experienced		Beginners		Experienced	
Post Test Measures	M	SE	M	SE	M	SE	M	SE
1.Weight	73.00	.60	72.32	.36	72.86	.73	72.70	.42
2.BMI	25.08	.90	24.62	.55	24.44	1.09	23.34	.63
3.Body Fat	21.46	.85	20.53	.52	20.18	1.05	20.37	.60
4.Aerobic	582.32	15.32	593.13	10.74	609.91	18.64	587.57	10.74
5.RPE	13.05	.54	13.77	.33	13.60	.66	13.98	.38
6.Grip Strength	57.55	2.47	59.40*	1.53	68.14	3.01	55.61*	1.75
7.Push-Up	32.95	2.53	32.16	1.56	34.35	3.11	29.74	1.78
8.Flexibility	34.19	1.57	35.11	.92	36.35	1.85	35.06	1.09
9.Curl-Up	41.75	11.91	57.36	7.28	35.34	14.28	51.87	8.25

Note. $*p=.05$.

Analysis of Goal Confidence as a Function of Goal-Setting Type

To examine participants' goal confidence and to test hypothesis three, a 2(beginner vs. experienced) x 2(self-set vs. assigned) ANCOVA was performed. Barrier self-efficacy was entered as a co-variate. There was no main effect for exercise experience ($F(1, 65)=.015$, $p>.05$). However, in support of hypothesis four, a main effect was found for goal-setting group ($F(1, 65)=4.81$, $p<.05$) with participants' confidence in their ability to achieve their goals being significantly higher in the assigned goal condition than in the self-set condition. There was no interaction between exercise experience and goal-setting group ($F(1, 65)=2.18$, $p>.05$). (see Table 7)

Table 7

Goal Confidence as a Function of Exercise Experience and Goal Setting

	Self-Set		Assigned		
	M	*SD*	*M*	*SD*	
Beginner	4.67	.71	5.75	.89	*M* (beginner) = 5.21, SD=.95
Experienced	5.14	1.12	5.35	1.19	*M* (experienced) = 5.25, SD=1.10
	M(self-set) = 4.91, SD=1.05*		*M*(assigned) = 5.56, SD=1.04*		

* $p<.05$.

Note: Goal confidence was scored on a 7-point Likert scale (1=not at all confident to 7=very confident).

Analysis of Changes in Fitness as a Function of Adherence and Goal Confidence

One-tailed Pearson product moment correlation coefficients were calculated to examine the relationships between adherence and changes in fitness variables. Improvements in fitness variables were measured as the change in fitness between pre-test and post-test. In order to measure correlations as *improvements* in fitness scores, body weight, body fat and body mass index were reverse scored (i.e., a positive value was used to represent a decrease in body weight, body fat, and body mass index). In support of the dose-response concept that states that the more exercise that is performed the greater the improvements (ACSM, 1991; Karvonen, Kentala, & Mustala, 1957), adherence was significantly correlated with changes in weight, body mass index, body fat, aerobic fitness and curl-ups ($p<.05$). More specifically, participants that had higher adherence exhibited greater improvements in body weight, body mass index, body fat percentage, aerobic fitness score, and curl-ups at the end of the eight-week challenge than participants with a lower rate of adherence. (see Table 8)

To examine a potential relationship between goal confidence and improvements in fitness variables, a series of one-tailed Pearson product moment correlation coefficients were calculated (see Table 8). A significant correlation was found between goal confidence and improvements in flexion whereby participants that exhibited higher confidence in their ability to achieve their goals showed the greatest improvements in their flexibility score at the end of the eight-week challenge ($r=.26$, $p<.05$). No other r's were significant.

Table 8

Observed Correlations Between Goal Confidence, Change in Fitness Variables and Adherence

Measures	1	2	3	4	5	6	7	8	9	10	11
1.Weight	--										
2.BMI	.71**	--									
3.Bodfat	.41**	.66**	--								
4.Aero	.07	.16	.11	--							
5.RPE	.19	.07	-.07	-.23*	--						
6.Grip	.06	.07	-.14	.04	.30**	--					
7.Pushup	.02	.14	.06	.32**	.15	.31**	--				
8.Flexion	.21*	.19	.17	-.03	.18	.55**	.21	--			
9.Curlup	.18	.07	.02	-.05	.21*	.12	.15	.03	--		
10.Adher.	.33**	.39**	.38**	.25*	-.05	.08	.20	.05	.21*	--	
11.Goal Conf.	.18	.17	.20	.07	-.04	.13	-.07	.26*	.05	.22*	--

Note. BMI=Body Mass Index, Bodfat= Body Fat. Aero= Aerobic Fitness, RPE= Rating of Perceived Exertion, Grip = Grip Strength, Adher.. = Total Adherence over 8 Weeks

* *p<.05.* ** *p<.01. All tests are one-tailed.*

Exploratory Analysis of Goal-Setting Preference

On the manipulation check questionnaire, participants were asked how they would prefer to have goals set in the future, by themselves (i.e., self-set) or by a fitness professional (i.e., assigned). Original goal-setting groups were used for this analysis (i.e., no goals, self-set goals and assigned goals). Their goal-setting preferences were analyzed with a Pearson Chi-Square. Results showed that participants in the assigned goal-setting condition had a clear preference for having a trained fitness professional set their goals in the future (75% of the participants preferred assigned, 25% of the participants preferred self-set). The self-set goal condition appeared to have no preference for how future goals were set. The differences between these two groups were significant, $X^2(1)=4.41$, $p<.05$ (see Table 9).

Table 9

Chi-Square Table Showing Participants' Goal Setting Preference as a Function of Original Goal-Setting Condition

		Future Goal-Setting Preference	
		Self-Set	Assigned
Original Goal-Setting Condition	Self-Set	57%	43%
	Assigned	25%	75%*

X^2 (1) = 4.32,* $p<.05$.

Note. At time 2, participants in the assigned goal condition indicated a significant preference for having the experimenter set (assign) goals in the future.

Discussion

This study evaluated the effects of assigned versus self-set goals on adherence to a fitness challenge and subsequent changes in physiological fitness for beginners and experienced exercisers. Participants in the *assigned* goal condition were *assigned* one goal for adherence and two fitness goals. Participants in the *self-set* goal condition were asked to *self-set* one adherence and two fitness goals. Participants in the no-goal control group were given no goal setting instructions other than to simply "do their best."

A majority of participants in the no-goal control group indicated on a manipulation check questionnaire that they had in fact set goals for their participation in the challenge. They were re-categorized into the self-set condition and the control group was dropped from the data analyses.

Examination of the effects of goal-setting type on the study variables revealed significant effects on grip strength, and goal confidence. Experienced exercisers who self-set their goals scored higher on the grip strength test than experienced exercisers who had their goals assigned to them. Goal confidence was significantly higher in the assigned goal-setting condition than the self-set goal-setting condition regardless of exercise experience. Post hoc exploratory analyses also indicated positive correlations between adherence and a variety of fitness variables. Finally, a significant difference was found with respect to how participants would prefer future goal-setting interventions to occur. These results will each be discussed in turn.

Spontaneous Goal-Setting

Results of the manipulation check showed that several of the participants in the no-goal control condition spontaneously set goals for their participation in the

challenge despite not being asked to by the experimenter. This represents a spontaneous goal-setting rate of 68% - a rate that is consistent with the findings of Weinberg et al. (2000), Boyce and Wayda (1994) and Galluci (1995).

One of the possible reasons spontaneous goal-setting is so prevalent in the physical activity domain is because of the immediate feedback participants receive (Weinberg, 1992, 1994). In the present study, participants received immediate physiological and quantitative feedback from their fitness appraisal. For example, at the completion of the curl-up test, participants knew the final number of curl-ups obtained. Additionally, each participant in the study met with the experimenter to review the results of his or her fitness assessment. This was done so that the goal-setting groups were aware of the baseline measures they had obtained, and could therefore appropriately set or be assigned goals. The no-goal control condition participants also met with the experimenter to undergo the fitness assessment review as a means to maintain consistency among the study participants. However, the feedback provided to the no-goal control group may have caused them to set goals for their participation in the study.

The findings of the present study suggest that no-goal control groups used in physical activity goal-setting studies may not be pure control groups, as many of the participants assigned to these control groups proceed to set goals independently of being asked to do so by the experimenter. By re-categorizing the spontaneous goal-setters into the self-set goal-setting condition, we were more confident that we were examining the effects of goal setting on all participants who engaged in goal setting. This is a significant contribution to the literature as previous studies have only examined the spontaneous goal-setting group as a post-hoc analysis.

Goal setting and Adherence

The majority of the studies in the health and exercise literature do not analyze differences in adherence as a function of goal-setting type (e.g., assigned versus self-set) (Annesi, 2002; Boyce & Wayda, 1994). Rather, they only examine goal setting versus no-goal/"do your best" control groups. Hypothesis two predicted that a) for beginners, adherence would be higher when goals were *assigned* rather than self-set, and b) for experienced participants, adherence would be higher when goals were *self-set* rather than assigned. Contrary to the hypotheses, there were no significant differences in adherence rates as a function of either experience level or goal-setting group.

Therefore, the results of the present study suggest that overall, there may be no significant difference in adherence rates based on how goals are set (e.g., self-set versus assigned). One possible reason for this null finding may be that experienced exercisers perceived that they were already displaying optimal behaviour for adherence. It is likely that a change in exercise patterns would not be motivated by goal setting if adherence rates were already high (i.e., a ceiling effect for adherence in the experienced exercisers group) (Poag & McAuley, 1992). With respect to beginner exercisers, it has been found that an improvement in program adherence can result from a motivational treatment (Wankel, Yardley, & Graham, 1985). In the present study, it is possible that the fitness centre challenge and having the experimenter present during the setting of their adherence goal acted as a motivational tool, thereby leading to an increase in program adherence regardless of the type of goal setting.

Parenthetically, if the no-goal control group had a sufficient sample size and was included in the analysis, it is likely that we would have seen a significant

difference between the goal-setting groups and the no-goal control group, therefore suggesting that any type of goal setting (either self-set or assigned) is an effective method by which to improve adherence to a physical activity program. This increase in adherence as a result of goal setting is supported in the literature in which several studies have found a higher adherence rate in goal-setting groups when compared to a no-goal control group (Annesi, 2002; Dawson, 2001).

Goal Setting and Physiological Fitness

The second hypothesis predicted that improvements in performance on the fitness appraisal would be greatest in the *beginner* exercise group when goals were *assigned* and greatest in the *experienced* exerciser group when goals were *self-set.* Results indicated no significant main effects or interaction effects on any of the fitness variables with the exception of an interaction for exercise experience and grip strength. With respect to improvements in grip strength, results were as predicted with *experienced* exercisers scoring significantly greater on the grip strength measure when goals were self-set as opposed to assigned. This finding is particularly important, as it has been shown that grip strength is a good indicator of overall upper body strength (Tornvall, 1963). In addition, trends emerged in several of the fitness variables in the predicted direction with beginners scoring more favourably on aerobic fitness, grip strength, push-ups, and flexibility when goals were assigned, while experienced exercisers tended to score more favourably on body mass index, body fat, aerobic fitness, push-ups, flexibility and curl-ups when goals were self-set.

While the existing literature does not differentiate between participants of different exercise experience levels with respect to performance improvements on exercise-specific variables, it does extensively examine self-set versus assigned goals.

Results of the literature are conflicting with performance improvements in some studies being found as a result of self-set goals (Lambert, Moore, & Dixon, 1999; Martin et al., 1984), while other studies support the use of assigned goals for improving performance (Boyce & Wayda, 1994; Lee & Edwards, 1994). The present study may shed some light on why these discrepancies exist. Specifically, the present study examined the impact of goal setting on performance improvements as both a function of goal-setting type *and* exercise experience. This is a significant contribution to the goal setting and exercise literature, as previous studies have only examined either goal-setting type on its own (self-set versus assigned) (Boyce & Wayda, 1994; Martin et al., 1984) or goal setting (assigned) as a function of exercise experience on its own (Dawson, 2001) rather than together. As suggested by Dawson (2001), goals may take on very different meanings for beginners at a task versus those that are experienced with a task. Thus, it is important to look at the moderating effects of exercise experience when examining the influence of self-set and assigned goals.

It has also been suggested that many people may reject assigned goals in favour of self-set goals (Kyllo & Landers, 1995). What is not known is how many of the participants rejecting the assigned goals are experienced at the task being performed?

To more clearly demonstrate the importance of considering participants' experience level with a physical activity task, refer to the examples of two studies previously discussed. In the study by Martin et al. (1984), an improvement in walking/jogging distance was the dependent variable, and results showed that participants who self-set their goals had a greater improvement in performance than participants who were assigned goals. It is reasonable to assume that all participants

had some level of experience with walking/jogging making them experienced at the exercise task. Not reported in this study was information regarding what participants in the assigned goal-setting condition did with the goals once they were given to them by the experimenter. For example, it is possible that the participants in the assigned goal-setting condition received the goal from the experimenter, and rejected it in favour of a goal they thought to be more realistic. Conversely, Boyce and Wayda (1994) found superior improvements in performance on a leg press exercise when goals were assigned to participants rather than self set. In this study, the majority of the participants were participating in weight training for the first time suggesting that they were beginners at the exercise task. In this study, participants may have not had a realistic idea of what they could expect with regards to improvement, thereby causing more participants to accept and attempt to achieve the assigned goal. A review of literature suggests that *beginners* may have performed better at the task when goals were assigned because the act of assigning goals to the participants by the experimenter indicates that the experimenter, viewed as an expert, has confidence in the participant's ability to achieve the assigned goal (Milgram, 1969; Salancik 1977). Furthermore, the assigned goal provides the participant with a realistic expectation of what a reasonable performance for the task may be, particularly if the task is novel. Keeping this in mind, the present study examined beginner and experienced exercisers separately within the goal-setting groups to determine if there was a difference in performance based on both goal setting and exercise experience level. Specifically, we wanted to determine if beginner exercisers performed better when goals were assigned to them and if experienced exercisers performed better when they were able to set their own goals.

The present study showed trends in the predicted direction with beginner exercisers scoring more favorably on a variety of fitness variables when goals were assigned, while experienced exercisers scored more favorably on several of the fitness variables when goals were self-set. It is possible that if the study challenge were to take place over a longer period of time (e.g., 12 weeks), these differences would have increased and become significant. In addition, having a larger sample size may have more adequately captured performance differences in exercisers of different experience levels as a function of how goals were set.

Goal Setting and Goal Confidence

The third hypothesis predicted that goal confidence would be highest in the assigned goal-setting condition. Results indicated no interaction effects on goal confidence as a function of goal-setting type and exercise experience level. However, as predicted, a main effect was found for goal-setting type with participants in the assigned goal condition indicating significantly greater confidence in their ability to achieve their goals than participants in the self-set condition.

Very few studies have examined the effects of self-set versus assigned goals on goal confidence; however, the literature does suggest that improving goal confidence can improve performance (Poag & McAuley, 1992; Theodorakis, 1996). The results of the present study show that regardless of experience level, having a knowledgeable professional assign goals to participants will lead to improved goal confidence. One possible reason for these findings is that assigned goals may have influenced participants' confidence in their ability to achieve their goal through the impact of verbal persuasion (i.e., a source of self-efficacy, Bandura, 1997). When someone viewed as an expert conveys goals, it may convince participants that if the

experimenter thinks they can do it, then they must be able to do it. In support of this notion, Boyce & Wayda (1994) found that 80% of participants felt positive about the experimenter assigning goals to them.

Adherence and Changes in Fitness

The fourth hypothesis predicted that there would be a relationship between adherence and improvements in fitness. Additionally, it was predicted that there would be a relationship between goal confidence and changes in fitness. As predicted, adherence was significantly correlated with changes in body weight, body mass index, body fat, aerobic fitness and curl-ups such that participants with greater adherence (i.e., exercised more) indicated more favourable changes in the above mentioned variables.

These results are consistent with the physical activity literature which shows that participation in physical activity can lead to favourable changes in physiological fitness. According to the American College of Sports Medicine (1998), the combination of frequency, intensity and duration has been found to be effective for producing a training effect. In general, the lower the stimulus, the lower the effect, while the greater the stimulus, the greater the effect. The findings of the present study support this relationship.

It should be noted however, that our findings are limited by the use of a measure of adherence that did not capture elements of duration or intensity. ACSM (1998) suggests that although changes in fitness can occur with increased frequency, this does not happen independent of duration and intensity. The minimal training intensity recommended to cause physiological changes is 55-65% of a participants heart rate maximum. Furthermore, duration is correlated with intensity with total

volume of training accomplished being the key factor. For example, similar physiological benefits can be obtained from lower intensity-longer duration exercise sessions and higher intensity-shorter duration exercise sessions. Unfortunately, we do not know if the participants engaging in physical activity more frequently were doing so at levels great enough to cause physiological adaptations. Furthermore, the adherence measure was based on self-report. This method has some inherent flaws in that participants may have reported a full week's worth of activity at one time as opposed to informing fitness centre staff after each workout. Due to recall, there may have been some faults in their memory that caused them to report more exercise sessions than they actually engaged in (Washburn & Montoye, 1986). Moreover, it has been recognized that participants often report their exercise behaviour in a socially desirable direction (Kazdin, 1974). Having participants keep a personal log book to record frequency, intensity, type and time in conjunction with publicly recording their adherence at the fitness centre front desk may have been a more effective means of recording program adherence and specific exercise session characteristics such as intensity, type and time (Perkins & Epstein, 1988). In addition, a more detailed adherence record may have given us a basis with which to compare improvements in physiological variables as a function of high and low intensity exercisers as well as high and low amounts of time spent exercising.

Goal Confidence and Physiological Fitness

When examining goal confidence and changes in fitness variables, one significant correlation emerged. Specifically, participants who showed higher goal confidence also showed the greatest improvements on the flexibility test at the end of the eight-week challenge. In the present study, over one quarter of the participants

who completed both fitness appraisals set flexibility related goals. This finding is important because it suggests that regardless of how the goals were set (assigned or self-set), having confidence in the ability to achieve the set goals is important for the actual improvement towards, or attainment of the goal.

Findings in the literature support the notion that the more confident one is in their ability to achieve their goals, the more likely he or she is to meet the goal. For example, Poag and McAuley (1992) found that participants' goal confidence predicted perceived goal achievement at the end of a program. Goal confidence was also found to predict performance on a tennis service task (Theodorakis, 1996).

One possible reason we did not find stronger correlations between goal confidence and improvements in fitness may be related to the sample size. According to Cohen (1992), to obtain a medium effect size for an ANOVA and a chi-square each cell should contain 64 participants and 87 participants respectively. The present study had 32 participants in one cell and 44 participants in the other cell. Low sample sizes in physical activity research have reduced the chance of finding an effect (Kyllo & Landers, 1995).

One other reason for a lack of strong correlations could be due to the duration of the study challenge. A period of eight-weeks lapsed between pre-test and post-test, but it has been suggested that while lower doses of exercise may slightly improve VO_2 max and control or maintain body composition, in order to effectively measure changes in fitness-related variables, a period greater than 15-20 weeks may be required (ACSM, 1998).

Future Goal-Setting Preference

As a post hoc analysis, we decided to look at how participants would prefer to have their goals set in the future. Results of this analysis revealed that while participants in the self-set group had no specific preference for future goal-setting strategies, participants in the assigned goal-setting condition exhibited an overwhelming preference for future goals to be set by a trained fitness professional. Atkinson's (1974) theory of achievement motivation suggests that both excessively high and low level goal difficulty creates a non-optimal motivational level in participants. The ideal achievement motivation is attained with a moderately difficult goal (Kyllo & Landers, 1995). In the present study, the assigned goal-setting condition was given moderately difficult goals which may have made them feel more motivated and in turn, lead to a preference for having the experimenter continue to set goals for them in the future.

Future Directions

The results of this study may lead to important future research. The present investigation examined self-set versus assigned goals on improvements in fitness variables and adherence as a function of exercise experience. Goal setting proved to be effective for improving performance on one of the fitness variables tested in the experienced exerciser group (grip strength), and assigned goals proved to be more effective for improving goal confidence regardless of exercise experience. In addition, participants in the assigned goal-setting condition indicated a strong preference for having a trained professional set future goals. Replicating this study with a larger sample size may increase the likelihood of detecting significant differences on other

fitness variables. In addition, allowing for a greater time lapse between time 1 and time 2 may allow for more pronounced physiological changes to take place.

One of the biggest challenges of the present study was that the no-goal control group did not adhere to the original instructions of simply doing their best, but rather, they proceeded to set goals for the fitness challenge. As a result, we were not able to compare the effects of goal setting to a no-goal control group. It is important for future research to take into consideration this group of people who are spontaneously setting goals for their participation in physical activity experiments. Additionally, future research needs to be done to identify characteristics of the goals set by participants in the spontaneous goal-setting group. For example, knowledge of what types of goals they are setting (e.g., specific vs. vague) and the level of goal difficulty (e.g., easy, moderately difficult, difficult) all may provide a more comprehensive understanding of the spontaneous goal-setting process in the physical activity domain, and allow us to more effectively analyze the impact of spontaneous goal-setting on physical activity performance.

Additional limitations of the present investigation include the generalizability of the results to other age groups. Specifically, would similar effects be found in children or older adults? For children, it is possible that assigned goals lead to significantly greater improvements in performance, as it has been suggested that younger populations may be more likely to believe what a trained professional believes they can attain (Kyllo & Landers, 1995). Conversely, older adults may find assigned goals too controlling thus resulting in decreased self-determination, and therefore prefer to self-set their goals (Deci & Ryan, 1985).

The fitness variables for which the goals were set presented a limitation. Participants in the assigned condition had goals given to them based on the lowest two scores on their fitness assessment. For example, participant "A" may have received his or her lowest scores in flexibility and aerobic fitness while participant "B" may have scored lowest on grip strength and curl-ups. Based on these results, the goals *assigned* to participant "A" would be related to improvements in flexibility and aerobic fitness, while goals for participant "B" would be related to improvements in grip strength and curl-ups. Participants in the self-set group established goals for two fitness variables of their choice out of the six possible fitness variables measured (aerobic fitness, body weight/body mass index, push-ups, curl-ups, grip strength, and flexibility). Thus there was considerable heterogeneity in people's goal pursuits. It is possible that if all participants goals were directed toward the same two fitness tests (e.g., grip strength and flexibility), we may have found a greater improvement in performance on those two variables.

One final limitation of the present study was that it was not possible to measure the percentage of the goal attained for any group other than the assigned goal-setting condition. For example, a goal in the assigned condition may have been to improve curl-ups by 20. At the end of the challenge, if he or she improved curl-ups by 10, he or she would have attained 50% of their goal. Conversely, an example of a goal in the self-set goal group may have been to improve curl-ups. If he or she performed 10 curl-ups at baseline, and 11 curl-ups at post-test, he or she achieved 100% of his or her goal. Future research could instruct participants in a self-set goal group to assign a specific value to his or her goal in order to effectively measure the percent of a goal improvement.

Implications for fitness professionals

Fitness professionals learn the importance of setting goals with their participants through courses and in their readings. In fitness manuals, there is often a brief mention of goal setting (Baechle & Earle, 2000; Cotton & Ekeroth, 1997; Hutton, 2000) and instructions to engage in S.M.A.R.T. goal setting (Smith, 1994). SMART goal setting involves setting a goal that is Specific, Measurable, Attainable, Realistic, and Time-Oriented. Unfortunately, this is typically the full extent of the information given to fitness professionals. No further instructions are given with respect to who should set the goal (the professional or the client), how difficult the goal should be (extremely difficult, moderately difficult, or not difficult), or how the experience level of the participant will affect the overall acceptance of the goal and subsequent improvements in performance and adherence. While goal setting is a very common practice in the field of exercise, it is often implemented by fitness professionals with very little background knowledge on how to more effectively use goal setting with their clients.

The present study has shed some additional light on how fitness professionals can more effectively implement goal-setting practices with their clients. For example, it is clear from the results of this study that having a trained professional set goals leads to greater goal confidence regardless of exercise experience. However, there is also some evidence to suggest that exercisers who have some experience with a task may reap greater benefits from self-setting their goals than participants with no experience with the task. Regardless of experience level, fitness professionals are an important resource for goal setting among exercisers. They can assist the experienced client in developing realistic goals for their participation in the challenge by working

with them on the development of their goals. Similarly, they can also assist the beginner client by assigning realistic goals that are salient to the client. By assigning beginners' goals, it is likely that client's confidence to achieve their goals will be higher, ultimately making both the process towards achieving the goals, and exercise, more enjoyable.

Conclusion

This study has made a significant contribution to the body of literature on exercise and goal setting. It suggests that spontaneous goal-setting is a very common occurrence in the physical activity domain. More specifically, individuals are highly likely to set goals for their participation whether they are asked to or not. This study also provides very tentative evidence that goal setting can have a differing impact on exercisers of different experience levels. Specifically, based on grip strength results, individuals with experience at an exercise task may perform better when goals are self-set rather than assigned. It was found that goal confidence is highest when goals are assigned, and that individuals who are assigned goals have an overwhelming preference to continue to have goals assigned to them in future exercise endeavours. Thus, the results of this study suggest that overall, assigned goals will lead to greater goal confidence. However, experienced exercisers may have greater performance gains on certain tasks (e.g., grip strength) when they self-set their own goals.

References

American College of Sports Medicine (ACSM). (1998). The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory fitness and muscular fitness and flexibility in healthy adults. *Medicine and Science in Sport and Exercise, 30*(6), 975-991.

Anderson, R., Wadden, T., Bartlett, S., Zemel, B. Verde, T., & Franckowiak, S. (1999). Effects of lifestyle activity versus structured aerobic exercise in obese women. *JAMA, 281,* 335-340.

Annesi, J.J. (1998). Effects of computer feedback on adherence to exercise. *Perceptual and Motor Skills, 87,* 723-730.

Annesi, J.J. (2000). *Increasing the motivation to exercise.* Bologna, Italy: Editrice Il Camp.

Annesi, J.J. (2002). Goal-setting protocol in adherence to exercise by Italian adults. *Perceptual and Motor Skills, 94,* 453-458.

Anshel, M. H., Weinberg, R., & Jackson, A. (1992). The effects of goal difficulty and task complexity on intrinsic motivation and motor performance. *Journal of Sport Behavior, 15,* 159-176.

Baechle, T.R., & Earle, R.W. (Eds.). (2000). *Essentials of Strength Training and Conditioning* (2nd ed.). Champaign, IL: Human Kinetics.

Bandura, A. (1986). *Social foundations of thought and action.* New York: Prentice-Hall, Englewood Cliffs, NJ.

Bandura, A. (1997). *Self-efficacy: the exercise of control.* New York: Freeman.

Barnett, M. L, & Stanicek, J. A. (1979). Effects of goal setting on achievement in archery. *Research Quarterly, 50,* 328-332.

Berlin, J., & Colditz, G. (1990). A meta-analysis of physical activity in the prevention of coronary heart disease. *American Journal of Epidemiology, 132*, 612-618.

Blair, S., Wells, C., Weathers, R., & Paffenbarger, R. (1994). Chronic disease: The physical activity dose-response controversy. In R.K. Dishman (Ed.), *Advances in Exercise Adherence* (pp. 31-54). Champaign, IL: Human Kinetics.

Blumenthal, J., Babyak, M., Moore, K., Craighead, W., Herman, S., Khatri, P., Waugh, R., Napolitano,M., Forman, L., Appelbaum, M., Doraiswamy, P., & Krishnan, K. (1999). Effects of exercise training on older patients with major depression. *Archives of Internal Medicine, 159*(19), 2349-2356.

Borg, G. (2001). Borg's range model and scales. *International Journal of Sport Psychology, 32(2),* 110-126.

Botterill, C. (1980). Psychology of coaching. In R.M. Suinn (Ed.), *Psychology in sports: Methods and applications* (pp. 261-268). Minneapolis: Burgess.

Bouchard, C., Shepard, R.J., Stephens, T., Sutton, J.R., & McPherson, B.D. (1990). *Exercise, fitness and health*. Champaign, IL: Human Kinetics.

Boyce, B. A. (1992). Effects of assigned versus participant set goals on skill acquisition and retention of a selected shooting task. *Journal of Teaching in Physical Education, 11,* 220-234.

Boyce, B.A., & Bingham, S.M., (1997). The effects of self-efficacy and goal setting on bowling performance. *Journal of Teaching in Physical Education, 16*, 312-323.

Boyce, B.A., & Wayda, V.K. (1994). The effects of assigned and self-set goals on task performance. *Journal of Sport and Exercise Psychology, 16*, 258-269.

Burton, D. (1989). Winning isn't everything: Examining the impact of performance goals on collegiate swimmers' cognitions and performance. *The Sport Psychologist, 3,* 105-132.

Burton, D. (1992). The Jekyll/Hyde nature of goals: Reconceptualizing goal setting in sport. In T. Horn (Ed.), *Advances in sport psychology* (pp. 267-297). Champaign, IL: Human Kinetics.

Burton, D. (1993). Goal setting in sport. In. R.N. Singer, M. Murphey, & L.K. Tennant (Eds.). *Handbook of research on sport psychology* (pp. 467-491). New York: Macmillan.

Burton, D. & Naylor, S. (2002). The Jekyll/Hyde nature of goals: Revisiting and updating goal setting in sport. In T. Horn (Ed.), *Advances in Sport Psychology* (pp. 459-499). Champaign, IL: Human Kinetics.

Button, S.B., Mathieu, J.E., & Aikin, K.J. (1996). An examination of the relative impact of assigned goals and self-efficacy on personal goals and performance over time. *Journal of Applied Social Psychology, 26*, 1084-1103.

Campbell, D.T., & Stanley, J.C. (1972). *Experimental and quasi-experimental designs for research.* Chicago, IL: Rand McNally.

Canadian society for Exercise Physiology. (1996). The Canadian Physical Activity, Fitness and Lifestyle Appraisal.

Carmody, T.P., Senner, J.W., Manilow, M.R., & Matarazzo, J.D. (1980). Physical exercise rehabilitation: Long term dropout rates in cardiac patients. *Journal of Behavioral Medicine, 3,* 163-168.

CFLRI (2001). *Ontario Physical Activity Profile*. Retrieved October 2, 2003, from http://www.cflri.ca/cflri/pa/surveys/2001survey/2001_on.

Chidester, T.R., & Grigsby, W.C. (1984). A meta-analysis of the goal setting performance literature. In J.A. Pearce & R.B. Robinson (Eds.), *Academy of management proceedings* (pp. 202-206). Ada, OH: Academy of Management.

Cohen, J. (1992). A Power Primer. *Psychological Bulletin, 112(1),* 155-159.

Cotton, R.T., & Ekeroth, C.J. (Eds.). (1997). *American Council on Exercise: Personal Trainer Manual* (2nd ed.). San Diego: American Council on Exercise.

Courneya, K.S., Estabrooks, P.A., & Nigg, C.R. (1997). Predicting change in exercise stage over a three-year period: an application of the theory of planned behaviour. *Avante, 3,* 1-13.

Dawson, K.A. (2001). Predicting community exercise attendance using goal influence and self-efficacy. *Avante, 7*(1), 75-85.

Dawson, K.A., & Brawley, L.R. (2000). Examining the relationship between exercise goals, self-efficacy and overt behaviour. *Journal of Applied Social Psychology, 30*(2), 315-329.

Deci, E.L. & Ryan, R.M. (1985). *Instrinsic Motivation and Self-Determination in Human Behavior*. New York: Plenum Press.

Desharnais, R.B., Bouillon, J., & Godin, G. (1986). Self-efficacy and outcome expectations as determinants of exercise adherence. *Psychological Reports, 59,* 1155-1159.

DiClemente, C.C., Prochaska, J.O., & Gilbertini, M. (1985). Self-efficacy and the stages of self-change smoking. *Cognitive Therapy and Research, 9,* 181-200.

Dishman, R.K. (1988). Overview. In R.K. Dishman (Ed.), Exercise Adherence: its impact on public health (pp. 1-9). Champaign, IL: Human Kinetics.

Dishman, R.K., & Buckworth, J. (1996). Increasing physical activity: a quantitative synthesis. *Medicine and Science in Sports and Exercise, 28*, 706-719.

Dossett, D.L., Latham, G.P., & Mitchell, T.R. (1979). Effects of assigned versus participatively set goals, knowledge of results, and individual differences on employee behaviour when goal difficulty is held constant. *Journal of Applied Psychology, 64*, 291-298.

DuCharme, K.A., & Brawley, L.R. (1995). Predicting the intentions and behaviour of exercise initiates using two forms of self-efficacy. *Journal of Behavioral Medicine, 18*, 479-497.

Dunn, A., Anderson, R., & Jakicic, J. (1998). Lifestyle physical activity interventions: History, short- and long-term effects and recommendations. *American Journal of Preventive Medicine, 15,* 266-297.

Erez, M. (1977). Feedback: A necessary condition for the goal-setting-performance relationship. *Journal of Applied Psychology, 62*, 624-627.

Fairall, D.G., & Rodgers, W.M. (1997). The effects of goal setting method on goal attributes in athletes. *Journal of Sport and Exercise Psychology, 19*, 1-16.

Frierman, S.H., Weinberg, R.S., & Jackson, A. (1990). The relationship between goal proximity and specificity in bowling: A field experiment. *The Sport Psychologist, 4*, 145-154.

Gallucci, N.T. (1995). The effects of goal setting on the maintenance of exercise programs. *Journal of Sport Behavior, 18*(2), 109-122.

Gollwitzer, P., & Moskowitz, G. (1996). Goal effects on action and cognition. In E. Higgins & A. Kruglanski, (Eds), *Social psychology handbook of basic principles* (pp. 361-399). New York, NY: Guilford.

Gould, D. (1993). Goal setting for peak performance. In J.M. Williams (Ed.), *Applied sport psychology: Personal growth to peak performance* (2nd ed., pp. 158-169). Mountain View, CA: Mayfield.

Green, J., & Crouse, S. (1995). Endurance training, cardiovascular function and the aged. *Sports Medicine, 16,* 331-341.

Hall, H. and Byrne, T. (1988). Goal setting in sport: clarifying anomalies. *Journal of Sport and Exercise Psychology, 10,* 189-192.

Hall, H., Weinberg, R. S., & Jackson, A. (1987). Effects of goal specificity, goal difficulty and information feedback on endurance performance. *Journal of Sport Psychology, 9,* 43-54.

Harkins, S.G., & Lowe, M.D. (2000). The effects of self-set goals on task performance. *Journal of Applied Social Psychology, 30,* 1-40.

Haynes, R., Taylor, D., Snow, J., & Sackett, D. (1979). Annotated and indexed bibliography on compliance with therapeutic and preventive regimens. In R. Haynes, D. Taylor, & D. Sackett, (Eds.), *Compliance in Health Care* (pp. 337-474). Baltimore, MD: Johns Hopkins Press.

Hollingsworth, B. (1975). Effects of performance goals and anxiety on learning a gross motor task. *Research Quarterly, 46,* 162-168.

Hunter, J.E., & Schmidt, F.L. (1983). Quantifying the effects of psychological interventions on employee job performance and work force productivity. *American Psychologist, 38,* 473-478.

Hutton, J. (2000). *Personal Trainer Specialist Certification Manual.* Markham: Can-Fit-Pro.

IHRSA. (2001). *Industry Statistics.* Retrieved May 30, 2002, from http://www.ihrsa.org/industrystats/facilities.html.

Kalnbach, L.R., & Hinsz, V.B. (1999). *Journal of Applied Social Psychology, 29(9),* 1854-1878.

Kaplan, R., Reis, A., Prewitt, L, & Eakin, E. (1994). Self-efficacy expectations predict survival for patients with chronic obstructive pulmonary disease. *Health Psychology, 13,* 366-368.

Kazdin, A. (1974). Self-monitoring and behaviour change. In M.J. Mahoney & C.F. Thoresen (Eds.). *Self-control: Power to the person* (pp. 218-246). Monterey: Brooks/Cole.

Kyllo, L.B. & Landers, D.M. (1995). Goal Setting in Sport and Exercise: A Research Synthesis to Resolve the Controversy. *Journal of Sport and Exercise Psychology, 17,* 117-137.

Lam, C.S., McMahon, B.T., Priddy, D.A. & Gehred-Schultz, A. (1988). Deficit awareness and treatment performance among traumatic head injury in adults. *Brain Injury, 2,* 235-242.

Lambert, S.N., Moore, D.W., & Dixon, R.S. (1999). Gymnasts in training: The differential effects of self- and coach-set goals as a function of locus of control. *Journal of Applied Sport Psychology, 11,* 72-82.

Latham, G.P. (2001). The reciprocal effects of science on practice: Insights from the practice and science of goal setting. *Canadian Psychology, 42,* 1-11.

Latham, G.P. & Baldes, J.J. (1975). The "practical significance" of Locke's theory of goal setting. *Journal of Applied Psychology, 60*, 122-124.

Latham, G.P., & Kinne, S.B. (1974). Improving job performance through training in goal setting. *Journal of Applied Psychology, 59*, 187-191.

Latham, G.P., Mitchell, T.R., & Dossett, D.L. (1978). The importance of participative goal setting and anticipated rewards on goal difficulty and job performance. *Journal of Applied Psychology, 63,* 163-171.

Latham, G.P., & Yukl, G.A. (1976). Effects of assigned and participative goal setting on performance and job satisfaction. *Journal of Applied Psychology, 63*, 163-171.

Lee, A.M. & Edwards, R.V. (1984). Assigned and self-selected goals as determinants of motor skill performance. *Education, 105*, 134-136.

Lirgg, C.D., George, T.R., Chase, M.A., & Ferguson, R.H. (1996). Impact of conception of ability and sex-type of task on male and female self-efficacy. *Journal of Sport and Exercise Psychology, 18*(4), 426-434.

Locke, E. A. (1986). The relationship of intentions to level of performance. *Journal of Applied Physiology, 50*, 60-66.

Locke, E. A. (1991). Problems with goal-setting research in sports-and their solution. *Journal of Sport and Exercise Psychology, 13*, 311-316.

Locke, E.A., & Latham, G.P. (1985). The application of goal setting to sports. *Journal of Sport Psychology, 7,* 205-222.

Locke, E. A., & Latham, G.P. (1990). *A Theory of Goal Setting and Task Performance.* Englewood Cliffs, NJ: Prentice-Hall.

Locke, E.A., Shaw, K.N., Saari, L.M., & Latham, G.P. (1981). Goal setting and task performance: 1969-1980. *Psychological Bulletin, 90*, 125-152.

MacAuley, D., McCrum, E.E., Stott, G., Evans, A.E., McRoberts, B., Boreham, C.A., Sweeney, K., & Trinick, T.R. (1996). Physical activity, physical fitness, blood pressure and fibrinogen in the Northern Ireland health and activity survey. *Journal of Epidemiology and Community Health, 50*(3), 258-263.

Maddux, J.E. (Ed). *Self-efficacy, adaptation, and adjustment: Theory, research and application.* New York: Plenum.

Maddux, J.E., Brawley, L., & Boykin, A. (1995). Self-efficacy and healthy decision making: Prevention, promotion and detection. In J.E. Maddux, (Ed.). Self efficacy, adaptation and adjustment: Theory, research and application (pp. 173-202). New York, NY: Plenum.

Marcus, B.H., Rakowski, W., & Rossi, J.S., (1992). Assessing motivational readiness and decision making for exercise. *Health Psychology, 11,* 257-261.

Martin, J.E., Dubbert, P.M., Katell, A.D., Thompson, J.K., Raczynski, J.R., Lake, M., Smith, P.O., Webster, J.S., Sikora, T., & Cohen, R.E. (1984). Behavioral Control of exercise in sedentary adults: Studies 1 through 6. *Journal of Consulting and Clinical Psychology, 52,* 795-811.

Martin, K.A, & Sinden, A.R. (2001). Who will stay and who will go? A review of older adults' adherence to randomized control trials of exercise. *Journal of Aging and Physical Activity, 9*(2), 91-114.

McAuley, E., & Courneya, K.S. (1993). Adherence to exercise and physical activity as health-promoting behaviours: Attitudinal and self-efficacy influences. *Applied and Preventative Psychology, 2*, 65-77.

McConnaughy, F.A., Prochaska, J.O. & Velicer, W.F. (1983). Stages of change in psychotherapy: A follow up report. *Psychotherapy, 26*, 494-503.

McClements, J. D., & Botterill, C.B. (1984). Goal-setting in shaping of future performance of athletes. In P. Klavora & J.V. Daniel (Eds.), *Coach, athlete, and the sport psychologist* (pp. 199-210). Toronto: University of Toronto School of Physical and Health Education.

McMurdo, M., & Rennie, L. (1993). A controlled trial of exercise by residents of old people's homes. Age *and Ageing, 22,* 111-115.

Mento, A.J., Steel, R.P., & Karren, R.J. (1987). A meta-analytic study of the effects of goal setting on task performance: 1966-1984. *Organizational Behavior and Human Decision Processes, 39,* 52-83.

Milgram, S. (1969). *Obedience to authority.* New York: Harper & Row.

Nelson, J.K. (1978). Conceptions of ability and achievement motivation. *Research on Motivation in Education Student Motivation, 1,* 317-321.

Nichols, J., Omizo, D., Peterson, K., & Nelson, K. (1993). Efficacy of heavy resistance training for active women over sixty: Muscular strength, body composition and programme adherence. *Journal of the American Geriatrics Society, 41,* 205-210.

O'Block, F.R., & Evans, F.H. (1984). Goal-setting as a motivational technique. In J.M. Silva III & R.S. Weinberg (Eds), *Psychological foundations of sport* (pp. 188-196). Champaign, IL: Human Kinetics.

O'Leary-Kelly, A.M., Martocchino, J.J., & Frink, D.D. (1994). A review of the influence of group goals on performance. *Academy of Management Journal, 37,* 1285-1301.

Oman, R.F., & King, A.C. (1998). Predicting the adoption and maintenance of exercise participation using self-efficacy and previous exercise participation rates. *American Journal of Health Promotion, 12*, 154-161.

Ornish, D., Scherwitz, L., Billings, J., Gould, L., Merritt, T., Sparler, S., Armstrong, W., Ports, T., Kirkeeide, R., Hogeboom, C. & Brand, R. (1998). Intensive lifestyle changes for reversal of coronary heart disease. *JAMA, 280*, 2001-2007.

Pemberton, C., & McSwegin, P.J. (1989). Goal setting and motivation. *Journal of Physical Education, Recreation and Dance, 60(1)*, 39-41.

Perkins, K.A., & Epstein, L.H. (1988). Methodology Issues and Future Directions for Research. in R.K. Dishman (Ed.), *Exercise Adherence: Its impact on public health* (pp. 399-416). Champaign, Il: Human Kinetics.

Poag, K. & McAuley, E. (1992). Goal setting, self-efficacy and exercise behaviour. *Journal of Sport and Exercise Psychology, 14*, 352-360.

Poag-DuCharme, K.A. & Brawley, L.R. (1992, June). Predicting the unstructured fitness participation of exercise initiates from scheduling and barrier self-efficacy. Paper presented at the Annual Meeting of the North American Society for the Psychology of Sport and Physical Activity, Pittsburgh, PA.

Poag-DuCharme, K.A., & Brawley, L.R. (1993). Self-efficacy theory: use in the predication of exercise behaviour in the community setting. *Journal of Applied Sport Psychology, 5,* 178-194.

Poag-DuCharme, K.A., & Brawley, L.R. (1994). Perceptions of the behavioural influence of goals: A mediational relationship to exercise. *Journal of applied Sport Psychology, 6,* 32-50.

Prochaska, J.O, & DiClemente, C.C. (1982). Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy Theory, Research and Practice, 20,* 161-173.

Prochaska, J.O., DiClemente, C.C., & Norcross, J.J. (1992). In search of how people change: applications to addictive behaviors. *American Psychologist, 47*, 1102-1114.

Rantanen, T., Guralnik. J., Sakari-Rantala, R., Leveille, S., Simonsick, E., Ling, S., & Fried, L. (1999). Disability, physical activity, and muscle strength in older women: The women's health and aging study. *Archives of Physical Medicine and Rehabilitation, 80,* 130-135.

Salancik, G.R. (1977). Commitment and the organizational behaviour and belief. In. B.M. Staw & G.R. Salancik (Eds.). *New Directions in Organizational Behavior* (pp. 1-54). Chicago, St. Clair Press.

Sallis, J.F., & Hovell, M.F. (1990). Determinants of exercise behaviour. *Exercise and Sport Science Reviews, 18,* 307-330.

Schmidt, R. (1982). Motor control and learning: A behavioural emphasis. Champaign, IL: Human Kinetics.

Skelton, D., & McLaughlin, W. (1996). Maintaining functional ability in old age. *Physiotherapy, 82,* 11-18.

Smith, H.W. (1994). *The 10 natural laws of successful time and life management: Proven strategies for increased productivity and inner peace.* New York: Warner.

Smith, J.A., Hauenstein, N.M.A., & Buchanan, L.B. (1996). Goal setting and exercise performance. *Human Performance, 9*(2), 141-154.

Taylor, C.B., Sallis, J.F., & Needle, R. (1985). The relation of physical activity to mental health. *Public Health Reports, 100*, 195-202.

Theodorakis, Y. (1996). The influence of goals, commitment, self-efficacy and self-satisfaction on motor performance. *Journal of Applied Sport Psychology, 8*, 171-182.

Tornvall, G. (1963). Assessment of Physical Capabilites. *Acta Physiologica Scandinavica. Supplementum*. 201.

Tsutsumi, T., don, B.M., Zaichkowsky, L.D., Takenaka, K., Oka, K., & Ohno, T. (1998). Comparison of high and moderate intensity of strength training on mood and anxiety in older adults. *Perceptual Motor Skills, 87*(3), 1003-1011.

Tubbs, M.E. (1986). Goal Setting: A meta-analytic examination of the empirical evidence. *Journal of Applied Psychology, 71*, 474-483.

U.S. Department of Health and Human Services. (1996). *Physical activity and health: a report of the Surgeon General.* Atlanta, GA: U.S. Department of Heath and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Promotion.

Wankel, L.M, Yardley, J.K, & Graham, J. The effects of motivational interventions upon the exercise adherence of high and low self-motivated adults. *Canadian Journal of Applied Sport Science, 10*(3), 147-156.

Washburn, R.A., & Montoye, H.J. (1986). The assessment of physical activity by questionnaire. *American Journal of Epidemiology, 123*, 563-576.

Weinberg, R.S. (1982). Motivating athletes through goal setting. *Journal of Physical Education, Recreation and Dance, 53*(9), 46-48.

Weinberg, R.S. (1992). Goal-setting and motor performance: A review and critique. In G.C. Roberts (Ed.), *Motivation in sport and exercise* (pp. 177-197). Champaign, IL: Human Kinetics.

Weinberg, R.S. (1994). Goal setting and performance in sport and exercise settings: a synthesis and critique. *Medicine and Science in Sports and Exercise, 26,* 469-477.

Weingberg, R.S., Bruya, L., and Jackson, A. (1985). The effects of goal proximity and goal specificity on endurance and performance. *Journal of Sport Psychology, 7,* 296-305.

Weinberg, R.S., Bruya, L., and Jackson, A. (1990). Goals and competition: a reaction to Hall and Byrne. *Journal of Sport and Exercise Psychology, 12,* 92-97.

Weinberg, R.S., Bruya, L, Longino, J., and Jackson, A. (1988). Effect of goal proximity and specificity on endurance performance of primary-grade children. *Journal of Sport and Exercise Psychology, 10,* 81-91.

Weinberg, R.S., Burke, K.L, & Jackson, A. (1997). Coaches' and players' perceptions of goal setting in junior tennis: An exploratory investigation. *The Sport Psychologist, 11,* 426-439.

Weinberg, R.S., Burton, D., Yukelson, D., & Weigand, D. (2000). Perceived goal setting practices of Olympic athletes: An exploratory investigation. *The Sport Psychologist, 14,* 279-295.

Weinberg, R.S., Garland, H., Bruya, L., & Jackson, A. (1990). Effect of goal difficulty and positive reinforcement on endurance performance. *Journal of Sport and Exercise Psychology, 12,* 144-156.

Weinberg, R.S., & Weigand, D. (1993). Goal setting in sport and exercise: A reaction to Locke. *Journal of Sport and Exercise Psychology, 15,* 88-96.

Weldon, E., Jeh, K.A., & Pradhen, P. (1991). Processes that mediate the relationship between a group goal and improved goal performance. *Journal of Personality and Social Psychology, 61,* 555-569.

White, P.H., Kjelgaard, M., & Harkins, S. (1995). Testing the contribution of self-evaluation to goal-setting effects using the social loafing paradigm. *Journal of Personality and Social Psychology, 69,* 69-79.

Williams, M.A. (2000). Cardiovascular and respiratory anatomy and physiology: Responses to exercise. In T.R.Baechle & R.W. Earle(Eds.), *Essentials of Strength Training and Conditioning* (pp.115-136). Champaign, IL: Human Kinetics.

Wood, R.E., Mento, A.J., & Locke, E.A. (1987). Task complexity as a moderator of goal effects: A meta-analysis. *Journal of Applied Psychology, 72,* 416-425.

Appendix A

Participant Letter of Information and Informed Consent Pilot Study

Release of your results for Research Purposes
RESEARCH CONSENT FORM

Dear Participant

In order to serve you better in the future and to promote exercise participation among all Pulse members and potential members, we would like to measure your grip strength as part of a research project. The purpose of this research is to assess factors that may influence how well people improve on a strength test.

You will be tested on your maximum grip strength and asked to complete two brief questionnaires about your physical activity and confidence. All that is required of you is your permission for us to use the results of your grip strength test and results of the questionnaires in a research report.

The results of your grip strength test will be kept in a locked filing cabinet in the Fitness Co-ordinator's office. The only people who will read the surveys are the two individuals listed below and a trained research assistant. Your identity will never be revealed in any reports regarding this study. Once the test is complete, we will remove your name from the data files and replace it with a code number. We will also provide you with a short report of our study findings.

Involvement in this study is your choice. If you choose not to participate in our study, you may still have your grip strength tested and the results will not be used for research purposed. You have the right to quit this study at any time. If you choose to quit the study, your data will be destroyed. You also have the right to refuse to answer any questions on the survey. If you have any questions or concerns about the study, please feel free to contact us at the numbers listed below.

Having read and understood the above, I agree to participate in this study.

Participants Name: _____ Witness' Name: _____

Participants Signature: _____ Witness' Signature: _____

Date: _____ Date: _____

Sincerely,

Tara-Lyn Elston
Fitness Co-Ordinator
Dept. of A & R
McMaster University
Inquiries: (905)525-9140
X23192

Dr. Kathleen Martin
Assistant Professor
Dept. of Kinesiology
McMaster University
(905)525-9140 x23574

McMaster Research & Ethics Board
Chester New Hall Room 111
(905)525-9140 x23142
srebsec@mcmaster.ca

Appendix B

Pilot Study Questionnaire

Name: _____ Age: _____ M F

For each item indicate the degree to which you agree with the statement by using the following scale from 1 to 6.

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

1. I have excellent reflexes _____.
2. I am not agile and graceful _____.
3. My physique is quite strong _____.
4. I don't feel in control when I take tests involving physical dexterity _____.
5. I have poor muscle tone _____.
6. I have a strong grip _____.
7. Sometimes I don't hold up well under stress _____.
8. I am not hesitant about disagreeing with people bigger than me _____.
9. People think negative things about me because of my posture _____.
10. Athletic people usually do not receive more attention than me _____.
11. I am sometimes envious of those better looking than myself _____.
12. I am not concerned with the impression my physique makes on others _____.

When setting goals, you should always keep in mind the principles of SMART goal setting. Goals should be **S**pecific, **M**easurable, **A**ction Oriented, **R**ealistic, and **T**ime Oriented.

Assigned Goal Group

Your goal for the next grip strength test will be to improve by 12%. For you, this will be _____ pounds.

Self-Set Goal Group

What is your goal in pounds for the next grip strength test? _____

Did you accept the experimenter's/your own goal? Yes No

Appendix C

Participant Letter of Information and Informed Consent for Thesis Study

FITNESS CHALLENGE 2002: Release of your Results For Research Purposes
CONSENT FORM/LETTER OF INFORMATION

Dear Pulse Member:

In order to serve you better in the future and to promote exercise participation among all Pulse members, we would like to track your progress through the Fitness Challenge as part of a research project. This research will determine factors that influence how well people adhere to exercise programs.

All that is required of you is your permission for us to use the results of your fitness appraisals and your attendance sheets in a research report. In addition, you will be asked to complete a very brief survey consisting of four questions about your exercise habits.

The results of your fitness appraisals and your survey responses are completely private and will be kept in a locked filing cabinet in the Fitness Coordinator's office. The only people who will read the surveys are the two individuals listed below and a trained research assistant. Your identity will never be revealed in any reports regarding this study. Once the Fitness Challenge is complete, we will remove your name from the data files and replace it with a code number. We will also provide you with a short report of our study findings.

Involvement in this study is your choice. If you choose not to participate in our study, you still may participate in the Fitness Challenge and are entitled to all benefits associated with the Fitness Challenge Program. You have the right to quit this study at any time. If you choose to quit the study, your data will be destroyed. You also have the right to refuse to answer any questions on the survey. If you have any questions or concerns about this study, please feel free to contact us at the number below.

Having read and understood the above, I agree to participate in this study and acknowledge that I have received a copy of this form.

Participants Name: _____ Witness' Name: _____

Participants Signature: _____ Witness' Signature: _____

Date: _____ Date: _____

Sincerely,

Tara-Lyn Elston
Fitness Co-ordinator
Department of Athletics and Recreation
McMaster University
Inquiries: (905)525-9140 x23192

Dr. Kathleen Martin
Assistant Professor
Department of Kinesiology
McMaster University
(905)525-9140 x23574

Appendix D

Client Information Sheet

CLIENT INFORMATION SHEET

Date: _____ Appraiser: _____

Name: _____ Gender: _____ Age: _____

Resting Heart Rate: ___ bpm (if >100 have client rest 5 min. and repeat testing)

Anthropometric Measurements:

Weight : _____ lbs _____ kgs Height: _____ cm _____ m

BMI = $\frac{\text{weight (kg)}}{\text{Height}^2\text{ (m)}} = \frac{\text{\_\_\_\_\_ kg}}{\text{m}^2} =$ _____ Body Fat: _____ %

Aerobic Fitness

Starting Stage: _____

HR: Stage 1: _____ Stage 2: _____ Stage 3: _____ Stage 4: ____
Stage 5: _____ Stage 6: _____ Stage 7: _____ Stage 8: ____

Final Heart Rate: _____bpm

Aerobic Fitness Score:

400+200(O^2 cost)-2.125(Body Mass in kg)-3(age in years)

400+200(_____)-2.125(_____)-3(_____)

= _____

Stage	Males	Females
1	.0097	0.937
2	1.339	1.083
3	1.646	1.299
4	1.859	1.418
5	2.098	1.521
6	2.284	1.717
7	2.400	2.076
8	2.750	2.215

Recovery Heart Rate (4:30 min post exercise): ____bpm

Rating of Perceived Exertion (6-20): _____

Musculoskeletal Fitness:

Grip Strength: *Trial 1* *Trial 2*

R	L	R	L

Combined R & L Max: ___kg

Push-Ups: ____

Trunk Forward Flexion: _____ cm _____ cm

Partial Curl-ups: ____ Health Benefits Ratings Summary Sheet completed: ___

Appendix E

Exercise Experience Questionnaire

Name

Immediately prior to joining this fitness challenge, were you:

_____ inactive (have not exercised in the past month)

_____ exercising sporadically (exercised 2 or less times in the past month)

_____ exercising regularly (exercised on average 2-3 times/week for the past month)

Would you classify yourself as:

_____ a beginning exerciser

_____ experienced exerciser

_____ previously experienced exerciser who has relapsed and is attempting to exercise regularly again. How long has it been since you regularly participated in physical activity? _____

Note. Participants that indicated a relapse of greater than six months were classified as beginners. Participants indicating a relapse less than six months were classified as experienced.

Appendix F

Self-Efficacy Questionnaire

State your **confidence** in your abilities to ***complete*** the following behaviours regularly during the **next 8 weeks** so that you attend *the Pulse.*

0% *not at all confident*	10%	20%	30%	40%	50% *somewhat confident*	60%	70%	80%	90%	100% *completely confident*

My confidence to do the following regularly over the next 8 weeks is: *0-100%*

Making my exercise sessions at the Pulse high on my priority list of weekly activities. _____%

Planning and preparing in advance so nothing interferes with my exercise time at the Pulse. _____%

Rearranging my schedule so that I can fit in my weekly exercise sessions into my day. _____%

Taking time out for myself and going to the Pulse regardless of other commitments. _____%

Finding a time to exercise at the Pulse that most suitably fits my lifestyle (e.g., early in the morning before work/school). _____%

Getting to my exercise session at the Pulse on time as I have planned. _____%

Putting in 2 or more exercise sessions at the Pulse in my week at equally spaced intervals. _____%

State your **confidence** in your abilities to ***complete*** the following behaviours regularly during the **next 8 weeks** so that you attend *the Pulse.*

0% *not at all confident*	10%	20%	30%	40%	50% *somewhat confident*	60%	70%	80%	90%	100% *completely confident*

I am confident in my ability to perform 5 push-ups with proper form _____%

I am confident in my ability to perform 10 push-ups with proper form _____%

I am confident in my ability to perform 15 push-ups with proper form _____%

I am confident in my ability to perform 20 push-ups with proper form _____%

I am confident in my ability to perform 25 push-ups with proper form _____%

I am confident in my ability to perform 30 push-ups with proper form _____%

I am confident in my ability to perform 35 push-ups with proper form _____%

I am confident in my ability to perform 40 push-ups with proper form _____%

I am confident in my ability to perform 45 push-ups with proper form _____%

I am confident in my ability to touch my thighs _____%
I am confident in my ability to touch my knees _____%
I am confident in my ability to touch my shins _____%
I am confident in my ability to touch my ankles _____%
I am confident in my ability to touch my toes _____%
I am confident in my ability to touch beyond my toes _____%

I am confident in my ability to:
Step up and down for 5 minutes at a moderate intensity (RPE=13-14) _____%
Step up and down for 10 minutes at a moderate intensity (RPE=13-14) _____%
Step up and down for 15 minutes at a moderate intensity (RPE=13-14) _____%
Step up and down for 20 minutes at a moderate intensity (RPE=13-14) _____%
Step up and down for 25 minutes at a moderate intensity (RPE=13-14) _____%
Step up and down for 30 minutes at a moderate intensity (RPE=13-14) _____%
Step up and down for more than 30 minutes at a moderate intensity (RPE=13-14) _____%

Appendix G

Self-Set Goal Condition Manipulation Check Questionnaire

Self-Set

PULSE/PITA PIT CHALLENGE 2002

Please answer the following questions by circling the number that best describes what you did or how you felt.

1. Did you set goals with your fitness appraiser during your first fitness appraisal in January/February?

☐ Yes *(proceed to question #2)*

☐ No *(see directly below)*

Did you set goals on your own for this challenge?

☐ Yes *(proceed to question #2)*

☐ No *(you are finished questionnaire)*

2. How confident were you that you could achieve the goals you had set?

1 2 3 4 5 6 7

not at all ***very***

3. Would you have preferred to have had Tara set your goals?

☐Yes ☐No

4. How often did you refer to your goal-setting worksheet throughout the challenge?

- ☐ Worksheet? What worksheet?
- ☐ Never
- ☐ 2 times or less throughout the entire challenge
- ☐ 1-2 times each month
- ☐ 1-2 times each week
- ☐ more than twice each week
- ☐ every day

5. Did you develop additional action steps to help you achieve your goals?

- ☐ 1 action step
- ☐ 2 action steps
- ☐ 3 action steps
- ☐ 4 action steps
- ☐ 5 action step
- ☐ 6 action steps

6. How motivating did you find the goal setting worksheet? (i.e., did it motivate you to push yourself harder?)

1 2 3 4 5 6 7

not at all *somewhat* *extremely*

7. Where did you keep your goal-setting worksheet during the challenge (location)?

Thank you for your time and participation in this challenge! Good luck☺

Appendix H

Assigned Goal Condition Manipulation Check Questionnaire

Assigned

PULSE/PITA PIT CHALLENGE 2002

Please answer the following questions by circling the number that best describes what you did or how you felt.

1. Did Tara set goals for you during your first fitness appraisal in January/February?

☐ Yes *(proceed to question #2)*

☐ No *(see directly below)*

Did you set goals on your own for this challenge?

☐ Yes *(proceed to question #2)*

☐ No *(you are finished questionnaire)*

2. How confident were you that you could achieve the goals Tara had set?

1	2	3	4	5	6	7
not at all		*somewhat*				*very*

3. Would you have preferred to set goals on your own? ☐Yes ☐No

4. How often did you refer to your goal-setting worksheet throughout the challenge?

- ☐ Worksheet? What worksheet?
- ☐ Never
- ☐ 2 times or less throughout the entire challenge
- ☐ 1-2 times each month
- ☐ 1-2 times each week
- ☐ more than twice each week
- ☐ every day

5. Did you develop additional action steps to help you achieve your goals?

- ☐ 1 action step
- ☐ 2 action steps
- ☐ 3 action steps
- ☐ 4 action steps
- ☐ 5 action step
- ☐ 6 action steps

6. How motivating did you find the goal setting worksheet? (i.e., did it motivate you to push yourself harder?)

1	2	3	4	5	6	7
not at all		*somewhat*				*extremely*

7. Where did you keep your goal-setting worksheet during the challenge (location)?

Thank you for your time and participation in this challenge! Good luck☺

Appendix I

No-Goal Control Group Manipulation Check Questionnaire

No Goals

PULSE/PITA PIT CHALLENGE 2002

Please answer the following questions by circling the number that best describes what you did or how you felt.

1. Did you set goals for the Pita Pit Challenge after your first fitness appraisal in January/February?

   ☐ Yes *(proceed to question #2)* ☐ No *(you are finished questionnaire)*

2. How confident were you that you could achieve the goals you had set?

   1 2 3 4 5 6 7
   not at all ***very***

3. Did you write down your goals for the Pita Pit challenge?

   ☐ Yes *(proceed to question #4)* ☐No *(proceed to question #6)*

4. How often did you refer to your written goals throughout the challenge?

- ☐ Never
- ☐ 2 times or less throughout the entire challenge
- ☐ 1-2 times each month
- ☐ 1-2 times each week
- ☐ more than twice each week
- ☐ every day

5. Did you develop action steps to help you achieve your goals?

- ☐ 1 action step
- ☐ 2 action steps
- ☐ 3 action steps
- ☐ 4 action steps
- ☐ 5 action step
- ☐ 6 action steps

6. How motivating did you find your goals and/or goal setting sheet? (i.e., did they motivate you to push yourself harder?)

1 2 3 4 5 6 7
not at all *somewhat* *extremely*

7. Where did you keep your goal-setting sheet during the challenge (location)?

Thank you for your time and participation in this challenge! Good luck☺

Appendix J

Canadian Physical Fitness and Lifestyle Appraisal Guideline Sheet
(given to each fitness assessor)

FITNESS APPRAISAL GUIDELINES

1. Ensure that all of the necessary equipment is present and in working order:
    a. Client information sheet
    b. Scale
    c. Height measurement on wall
    d. CD Player and CD
    e. Body fat analyzer
    f. Steps
    g. Calculator
    h. Perceived exertion chart
    i. Handgrip Dynamometer
    j. Sit & Reach
    k. Mat with 10 cm marked on it
    l. Metronome
2. Briefly discuss the nature of the assessment with the client and inform them that they can stop anytime they feel uncomfortable.
3. Have client sitting quietly in a chair for at least 5 min. while you go through this and then take their resting heart rate (if >100 bpm have client rest another 5 min and repeat testing).
4. Record clients weight in pounds and convert to kilograms by dividing by 2.2. Record clients height in centimeters and convert to meters by dividing by 100.
5. Calculate clients Body Mass Index (BMI).
6. Record clients body fat percentage using body fat analyzer.
7. Make sure you have predetermined your clients starting stage for aerobic fitness and their ceiling heart rate prior to beginning the step test (see sheets in CPAFLA manual for guidelines). Cue CD to appropriate gender and stage and begin aerobic testing. You can allow your client one or two practice steps on the steps.
8. Immediately after the aerobic fitness test, record clients Rating of Perceived Exertion.

9. 4:30 min post exercise, record clients recover heart rate to ensure that they are adequately cooled down.
10. Use the handgrip dynamometer to collect grip strength data. Do each hand 2 times with a break after each test and add together the highest score for the right hand and the highest score for the left hand for a combined right and left maximum score.
11. Have client perform push-up test. Make sure you demonstrate proper form according to CPAFLA guidelines and inform client there is no time limit on this test – it is completed when they cannot perform a push up with proper form.
12. For flexibility, allow the client stretch before taking actual measurements. Clients should remove shoes and place the soles of their feet against the Flexometer. The client will reach forward and slide the marker as far as possible and hold for approximately 2 seconds. Two trials are completed and the maximum score is recorded.
13. Demonstrate proper technique for the curl up. The metronome is used (set at 50 bpm) and done SLOWLY (forward on first beat, back on second). A maximum of 25 will be recorded.
14. Complete the Health Benefits Rating Summary Sheet on back of Client Info sheet using Canadian Guidelines and review with client.
15. Thank client and inform them that they can meet with the experimenter within the next three business days to get their results and coupon for a free pita sandwich.

Appendix K

Goal-Setting Worksheet

THE PULSE/PITA PIT FITNESS CHALLENGE

GOAL-SETTING WORKSHEET FOR _____

When setting goals, play it *SMART*. Goals should be Specific, Measurable, Attainable, Realistic, and have a Time Frame for completion.

Goals and Action Steps

Goal #1 _____

Action Steps	Time Frame	Date Achieved
1.		
2.		
3.		

Goal #2 _____

Action Steps	Time Frame	Date Achieved
1.		
2.		
3.		

Goal #3 _____

Action Steps	Time Frame	Date Achieved
1.		
2.		
3.		

Appendix L

Manipulation Check Descriptive Data and Frequencies

Descriptive Data from Manipulation Check (Items #4, #5 and #6)

Question	M ± SD Range
How often did you refer to your goal-setting worksheet (# of times)?	3.25±1.17 1-6
Did you develop additional action steps to help you achieve your goals (# of action steps developed)?	2.80±1.85 1-6
How motivating did you find the goal-setting worksheet (i.e., did it motivate you to push yourself harder?) (1= not at all motivating to 7= extremely motivating)	4.56±1.57 1-7

Frequencies for Item # 7 on Manipulation Check Questionnaire.

Question: Where did you keep your goal-setting worksheet during the challenge (location)?

Location	Frequency	Percent	Cumulative Percent
1	20	36.4	36.4
2	3	5.5	41.8
3	3	5.5	47.3
4	29	52.7	100.0
Total	55	100.0	

Note. 1= on desk, 2= in file, 3= in binder, 4= other.