Weight Loss Self-Efficacy and Modeled Behaviour:

Gaining Competence through Example

by

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We accept this thesis as conforming
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Abstract

Weight loss self-efficacy and physical activity indices were obtained for 125 volunteers of both genders, recruited from a small university (82%) and the community (18%). After viewing a video-segment in an exercise and health promotion workshop, half of the participants were given copies of the videos to review at home. Participants in the treatment group (49%) viewed *Body-for-LIFE's: Success Stories 1* (Phillips & Asiano, 1999) video, depicting the successful modelled weight loss behaviours of similar others. Control group participants (51%) viewed *The Soothing Surf at the Wickanninnish Inn* (Heinl, 2002), a neutral relaxation video. The researcher anticipated that self-efficacy would increase for treatment group participants, and that the increases would be strongest for those with take-home copies of the video. It was also expected that physical activity would increase for the treatment group after two months, while the control group was not expected to demonstrate significant change on either measure. The Weight Efficacy Life-Style Questionnaire (WEL) and International Physical Activity Questionnaire (IPAQ) were employed to tap self-efficacy and physical activity. Results supported the first hypotheses, suggesting that weight loss self-efficacy can be cultivated by watching successful models apart from personal achievement. Physical activity however, did not increase as predicted. Implications suggest that participants' beliefs about their ability to lose weight can be strengthened before they experience behavioural weight loss successes. This holds promise for those not willing to take part in behavioural weight loss programs due to a fear of failure, or other reasons.

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CHAPTER ONE: INTRODUCTION

The issue of obesity has received a great deal of attention over the past few decades, and with good reason. With estimates of nearly half the Canadian population considered obese or overweight, and an increasing number of obese individuals within the global population, much awareness has been targeted at better understanding the causes of obesity as well as methods for achieving weight loss, weight loss maintenance, and weight gain prevention (Statistics Canada, 2004). Although research efforts in the past have focused singularly on either the physiological or the behavioural factors involved, most contemporary research has viewed obesity as multiply determined (Wadden, Brownell, & Foster, 2002).

Certainly, with behavioural weight loss treatment programs yielding only short-term benefits, and a high rate of recidivism (Burke, 2001) coupled with similar shortcomings in pharmacologic treatments, (Wadden et al., 2002) it would appear that the obesity epidemic involves a complex interaction of biological, behavioural, cognitive and motivational factors. Health behaviour research does suggest, however, that some of the most beneficial health gains are likely to occur for overweight individuals during the initial action stage, where they first take the step to becoming involved in a healthy life-style (Gorely & Bruce, 2000). While this may seem simple enough, getting overweight individuals to begin this new life-style change may be easier said than done. Research by Andersen (2001), in a national survey of older U.S. adults, found that 39% could be classified as overweight, while 23% met the criteria for obesity. Not surprisingly, these obese older adults were more likely than their overweight and healthy weight counterparts to report participating in no leisure time physical activity.

What methods then, might be used to reach a population who are for the most part inactive physically? What might it take to get overweight individuals to initiate that first step to

improving their life-style and reducing their chances for significant health risks? Part of the problem may be that those who are overweight don't believe that they can do anything to improve their situation. Bandura's (1977) concept of self-efficacy; the belief that something *can* be done to change the situation and that the individual themselves are capable of this change, has been examined extensively in the role of smoking cessation and has also shown to be an important factor in the role of weight loss. According to DiClemente et al., (Work Health Organization, 2003) few constructs predict weight loss and maintenance of that weight loss in as consistent a fashion as self-efficacy focused on overeating behaviours. Moreover, according to Work Health Organization (2003) reports, there is a large amount of evidence suggesting that weight control self-efficacy plays an important role in the battle against obesity.

Indeed, numerous studies have demonstrated a relationship between weight control self-efficacy and actual weight loss. Bagozzi and Edwards (2000) found that for both men and women those who held high self-efficacy beliefs were more likely to engage in weight loss dieting behaviours, and that for men, the initiation of exercise or sport activities was primarily a function of self-efficacy more than outcome expectancies. Research also suggests that those beginning a weight loss program with high weight loss self-efficacy are more likely to lose weight, and that high post treatment self-efficacy is connected with the maintenance of weight loss (Work Health Organization, 2003). Kitsantas, (2000) looked at the self-efficacy beliefs of healthy weight individuals versus those who had been previously overweight and those who were currently overweight. Results found that the healthy weight and previously overweight participants were more likely than those who were currently overweight to report high self-efficacy about their ability to maintain their optimum weight.

While it seems apparent that there is a relationship between weight loss self-efficacy and actual weight loss behaviours, much of the research in the area has been correlational. There have been few attempts to demonstrate that weight loss self-efficacy can be increased for those who do not possess strong levels initially. The attempts that have demonstrated an increase in these beliefs have used behavioural treatments or performance measures where participants have actually lost weight or achieved a level of performance success during the treatment, and afterward found that their self-efficacy had increased in comparison to a baseline measure. It would seem apparent then, from these reports that obese individuals' beliefs about their ability to lose weight have proven to increase only after they have seen some positive improvements. While these findings may be helpful in terms of better understanding methods of maintaining initial weight loss, they do little to address the issue of how those overweight individuals who have never made an attempt to improve their situation, or those who have never seen positive results from their efforts, can increase their beliefs about their abilities to do so.

Since the initial step to take action for most overweight individuals is likely to yield significant health improvements, there is a clear need to investigate methods that might strengthen obese participants' beliefs about their abilities to take this action, and that these initial steps will prove successful in the long run. The current study will attempt to address this question through the use of vicarious learning techniques where participants will observe the success stories of others who began in a similar position to their own. This project will differ from previous attempts to increase self-efficacy beliefs about weight loss, in that the participants will see increases in weight loss self-efficacy prior to seeing positive improvements in their *own* health. By observing the transformation stories of similar others who began overweight, and

through successful efforts at maintaining proper diet and exercise, these individuals' beliefs about their own ability to make this change will grow stronger.

CHAPTER TWO: LITERATURE REVIEW

In this chapter, we have organized the literature into three main sections: 1) Background to Obesity as a Health Problem, 2) Models for Weight Management, and 3) Self-Efficacy Strategies used in Weight Management. *Section one* will address the obesity epidemic, the etiology of obesity, as well as policy measures looking to promote more healthy living. *Section two* will speak to motivation and stages of change, weight loss maintenance, and self-help interventions. *Section three* will highlight past research that has attempted to increase dieting and exercise self-efficacy beliefs, as well as preview self-efficacy as an effective weight-management strategy. The chapter will conclude with research questions and hypotheses.

Background to Obesity as a Health Problem

Recent research by Wadden, Brownell and Foster, (2002) highlights the problem of obesity as a global health concern and one that has become more and more prevalent here in North America, specifically in the U.S. As the authors note, while the past decade has yielded remarkable discoveries in the regulation of body weight, this same period has also witnessed an unparalleled increase in the prevalence of obesity making it one of the nation's most pressing health problems. The study notes that according to World Health Organization (WHO, 1998) criteria, which define obesity as a Body Mass Index (BMI) = 30 kg/m², 25% of U.S. women and 20% of U.S. men can be considered obese (Wadden et al., 2002). Moreover, an additional 25% and 39%, respectively, were considered overweight. This suggests that 55% of Americans are in a situation where they are classified as either overweight or obese while only a minority fall into the healthy weight category. More recent data suggest that the situation is only worsening and that similar trends are being observed in other developed nations (Wadden et al., 2002). These startling findings have led the WHO to declare obesity a global epidemic (WHO, 1998).

With billions of dollars being spent annually on obesity in Canada and the U.S. alone, there is clearly a need to better understand the causes of obesity and methods for combating the problem. According to the authors, the etiology of the obesity epidemic is multiply determined. Genetics are currently thought to explain 25%-40% of the variance in BMI (Wadden et al., 2002) and, while research into this area may hold promise for those with metabolic or other related abnormalities, it is unlikely to solve America's obesity epidemic, they explain.

Wadden et al. (2002) conclude that it is the "toxic" environment that is to blame for the increasing rates of obesity in America and other developed nations. The toxic environment, as it is described, refers to an unprecedented exposure to energy-dense, heavily advertised, inexpensive, and highly accessible foods. This has been combined with an increasingly sedentary lifestyle in which children, for example, watch an average of 28 hr of television a week (Wadden, 2002).

The authors propose that a solution to the problem may be found in policy as a means of prevention. They express little confidence in the ability of behavioural and pharmacologic treatments alone to improve the situation. Rather, they suggest that such measures as regulating food-advertising aimed at children, taxing unhealthy foods and providing resources for physical activity, among others, may be the best way to address the issue before it can become a more serious concern.

Models for Weight Management

Regardless of which methods are most successful, there are a variety of options already available to assist overweight and obese individuals with the weight loss process. Because identifying *effective* interventions for weight loss has proven to be so difficult in the past, it is not surprising that there are many different professional approaches targeted at better understanding

the problem. The following section will attempt to outline the process of gaining control over one's weight, weight-loss maintenance, and methods that individuals use to control their weight without the help of a professional.

Motivation and stages of change. While policy may indeed be effective for the prevention of obesity, Wadden et al. (2002) pay little attention to addressing methods of reaching out to the already obese. In other words, what steps can be taken to make overweight individuals more aware of the consequences of their behaviour, or motivate them to take action to improve their situation? Brownell and Cohen (1995) make an attempt to answer these questions in an article outlining some of the key psychological factors involved in diet behaviour change and how an individual's "stage of change" can have an effect on their ability to take action.

The Transtheoretical Model (TTM; Prochaska & DiClemente, 1983) predicts that behaviour changes in a reliable series of stages and with a reliable series of processes. The five stages of change according to the model are: (1) pre-contemplation, (2) contemplation, (3) preparation, (4) action, and (5) maintenance. Individuals in the pre-contemplation stage have no intent to change their behaviour either because they do not recognize the problem, they deny that they have a problem or they are unwilling to change. Those in the contemplation stage are preparing to take action but have not yet done so and may prolong this step for some time. At the preparation stage, the individual does make the initial step to take action. The action stage involves the modifying of the individual's behaviour or environment, and finally, the maintenance stage works to prevent relapse and integrate change into the individual's life.

According to Brownell and Cohen (1995), the "stages of change" model is useful for better understanding the processes involved in dietary change. As they point out, the first task may be moving an individual from the pre-contemplation stage to the contemplation stage. This

can prove to be a difficult undertaking if the individual does not acknowledge that they have a problem. Moreover, with the end goal for successful weight management usually manifesting itself in some form of maintenance strategy, research has also focused on the pattern of lapses and relapses for many individuals attempting to sustain their weight loss (Wing, 2000). Due to the frequency of these lapses and relapses some researchers have found it difficult to categorize maintenance as a single, final step to change as laid out in Prochaska and DiClemente's (1983) five-stage model.

Weight loss maintenance. There has been some discussion that the maintenance stage itself is a process and that success in this stage cannot be easily defined. According to Wing (2000), objectively defining lapses and relapses in the areas of diet, physical activity, and obesity have proven to be difficult. In the past, obesity researchers have focused on pounds lost at the end of six-month treatment programs as a measure of initial change, and total weight loss from baseline to 18 or 30 months, or the percentage of the initial weight loss that is maintained at 18 or 30 months as the measure of long-term change. Wing (2000) further suggests that the emphasis on weight loss, as opposed to behaviour change, is due in part to the difficulty of measuring intake and exercise behaviour accurately.

Assessing levels of physical activity is challenging, and the problem with many follow-up studies is that researchers often ask only about the last seven days or the past two weeks rather than the full time period from pre to post tests. Maintenance of dietary change where self-report measures are used report fairly good results but may reflect adherence only at the time of measurement. Research indicates that 50% of individuals involved in exercise programs will drop out at some point. This however, may depend on the population studied, the type of exercise program, and the definition of the lapse, relapse, or "dropout" (Wing, 2000).

Making the assessment of weight loss maintenance even more difficult, Wing (2000) further notes that in a recent survey, 50% of those successfully losing weight reported having done so entirely on their own, without help from any type of formal program. It appears that in the area of exercise, life-style physical activity programs produce better long-term adherence than supervised interventions. Also, Wing (2000) suggests that for most individuals, modifying their diet is something that is done on their own, again apart from any type of formal program. For this reason, the author highlights the importance of finding ways to increase the number of individuals willing to participate in self-help programs and finding ways to increase the effectiveness of these programs for short and long-term outcomes.

Self-help strategies for weight management. Indeed, self-help interventions have been used successfully to deal with a broad spectrum of concerns, both within the clinical therapy setting, and by individuals looking to make change apart from the help of a therapist. According to Campbell and Smith (2003), self-help materials are prolific and varied, and can refer to reading books, watching movies, surfing the internet and attending groups. While well-liked in the general population, self-help is frequently recommended by psychotherapists as well. Practicing psychologists commonly recommend self-help books, self-help groups, Web sites, autobiographies, and films (Campbell & Smith, 2003).

Self-help strategies have proven effective in both single studies and meta-analyses across a broad range of disorders and treatments (Campbell & Smith, 2003). Concerns such as problem-drinking and depression have been treated with similar or equal efficacy to more extensive and/or therapist-based interventions (Scogin, 2003), and informational self-help has been noted to be of particular benefit to individuals working on weight management (Campbell & Smith). In some cases, self-administered treatments have been reported as the preferred modality for

consumers, as they are accessible, convenient, and less expensive then traditional therapist administered treatments (Scogin). Certainly, the research investigating the effectiveness of self-help strategies looks promising; however, findings continue to indicate that self-help is best used alongside psychotherapy and not as the sole treatment.

Campbell and Smith (2003) note some key factors counsellors should consider when recommending self-help resources for clients. First, the self-help material must propose activities and/or problem solutions that are seen as doable by the client. Second, the material should be applicable to the client's presenting concerns. These are obviously important variables to consider for those looking to lose or better manage their weight. They must feel that the self-help materials are relevant to their specific concerns and that the activities or goals portrayed can be realistically achieved.

Certainly, whether using self-help or other more formal types of interventions, research suggests it is important to consider these types of psychological factors when taking into account weight management strategies. Brownell and Cohen (1995) point out that while educational and information programs aimed at nutrition are helpful, they are not sufficient to promote behavioural change alone. They argue that there are psychological factors that should be taken into account in conjunction with these programs in order to provide the best chance for not only meaningful dietary modification but for other health behaviour changes as well. These factors include an individual's perceived threat of a particular disease, perceived benefits from changing behaviour, feelings of personal control, social support and self-efficacy.

Indeed, there is strong evidence to suggest that of these psychological factors self-efficacy may be the best predictor of weight control behaviours. Because these beliefs are thought to play such a key role, the following section will review past research that has looked at

self-efficacy as an effective strategy for promoting weight loss. It will identify studies that have attempted to increase self-efficacy through performance or behaviour measures, manipulated self-efficacy through feedback, and studies that have increased self-efficacy through the use of modelled behaviour.

Self-efficacy Strategies for Weight Management

In a recent article, Bandura and Locke (2003) state that: "Among the mechanisms of human agency, none is more central or pervasive than beliefs of personal efficacy. Whatever other factors serve as guides and motivators, they are rooted in the core belief that one has the power to produce desired effects; otherwise one has little incentive to act or to persevere in the face of difficulties" (Bandura & Locke, p. 2). Self-efficacy is the two-part belief that (1) there is something that can be done to change the situation and (2) the individual themselves are capable of this change (Bandura, 1977). Bandura and Locke (2003) further note that efficacy beliefs are able to predict behavioural functioning between individuals at different levels of perceived self-efficacy. This supports previous health behaviour change research suggesting that stage membership within the TTM is associated with different levels of self-efficacy and physical activity (Gorely & Bruce, 2000).

Self-efficacy and weight loss. Numerous studies have examined the relationship between perceived self-efficacy beliefs and weight management. Research by Kitsantas (2000) supports the claim that individuals at different stages of health behaviour change demonstrate different degrees of self-efficacy. In a recent study she examined the self-regulation strategies used by three groups; healthy weight individuals, those who had had weight problems in the past and had successfully lost the weight, and those who were overweight. She also examined the relationship between the use of these self-regulation strategies and perceptions of self-efficacy. The

regulation strategies reported included goal setting, environmental structuring, self-evaluation, information/social assistance seeking, self-monitoring and time management. The results from the study found that participants who were currently overweight used significantly fewer self-regulation strategies than both the healthy weight and previously overweight participants. There were no significant differences between the healthy weight group and the previously overweight group in terms of the total number of self-regulation strategies used. Moreover, overweight participants reported significantly lower self-efficacy perceptions than both the previously overweight group and those who were of healthy body weight.

While Kitsantas (2000) notes that there are limitations to these findings due to the small sample size, the study does appear to provide "further evidence that self-efficacy perceptions play a pivotal role in weight loss and maintenance" (Kitsantas, p. 814). The healthy weight group as well as the previously overweight group believed that they were more competent in applying their self-regulation strategies, even in the face of difficulties. The overweight group was less likely to feel competent about applying these strategies. This was further demonstrated in the relationship both groups displayed between self-regulatory strategies used and their perceived self-efficacy beliefs. These findings however, were only correlational and did not consider whether participants in the previously overweight group had high perceived self-efficacy initially, which led to their current health state, or whether their self-efficacy increased due to the positive results seen from the weight loss. Granted, the focus of the study was to investigate strategies used by each of the groups to *maintain* optimal weight, the question remains: what can be done to increase weight loss self-efficacy beliefs for overweight individuals who do not possess confidence in these beliefs initially?

There have been few attempts at increasing health related self-efficacy beliefs in the literature. Even more uncommon are studies that have looked into increasing participants' weight loss specific self-efficacy beliefs. The problem may be due in part to the fact that there are few true instruments for tapping into weight management/weight loss self-efficacy. Some existing measures are the Eating Self-Efficacy Scale (ESES) and the more recently developed Weight Efficacy Life-Style Questionnaire (WEL) which focus primarily on the dieting aspects of weight loss. There have however, been a number of studies that have investigated methods of increasing exercise-related self-efficacy beliefs through the use of behavioural or other performance related treatment measures. As exercise, among other factors, is linked to decreased prevalence of obesity (Mihalko & McAuley, 1996) these studies are worth noting.

Increasing self-efficacy through performance or behaviour measures. Mihalko and McAuley (1996) for example, attempted to increase exercise self-efficacy for a group of overweight participants through the use of an acute exercise treatment. Ninety-four middle aged participants with a mean body fat percentage of 29.96% had measures of self-efficacy taken before and after a graded exercise test (GXT). Participants were required to pedal on an exercise bike at 50 rpm at an initial workload of 150 kg/min. The workload was increased by 150 kg/min every two minutes until the subjects had reached 70% of their predicted maximum heart rate. Prior to participation in the GXT participants took part in a 20-week exercise program involving low impact aerobic exercise (walking) three times a week.

Results from the study indicated that fitness and exercise-related self-efficacy beliefs increased significantly for participants from pre to post-tests. More specifically, measures of bicycling, and walking self-efficacy were found to have increased during this period. This study supports growing evidence suggesting that efficacy perceptions can be increased through

participation in behaviour or performance related activities where participants feel that they have achieved some level of mastery over their situation. Participants in the Mihalko and McAuley (1996) study experienced success in both the exercise and walking tasks that they were assigned in that they were able to successfully complete both tasks without dropping out. After experiencing this level of achievement, their perceptions of self-efficacy related to these specific activities increased. The study also identified that perceptions of efficacy in one activity, in this case bicycling, may carry over to beliefs about one's competence in other related areas.

A similar attempt at increasing self-efficacy was made with children in a Labbe and Welsh (1993) study conducted in a private school. In this case, 70 fourth grade and 54 fifth grade students were randomly assigned to either an eight-week control group, which involved participation in regular physical education classes, or an experimental condition in which students were asked to participate in an aerobic program incorporating three days per week of jogging during the physical education period. The goal for the experimental group was to maintain a sustained target heart rate for at least 20 continuous minutes during these sessions. Measures of general self-efficacy as well as running-specific self-efficacy were taken before and after the eight-week program. The results found that across pre and post-test measures there was no change in general self-efficacy. However, the children who participated in the running program demonstrated a significant increase in their running self-efficacy scores as well as significant improvements in their resting heart rates in comparison to the control group.

As the authors note, participants in past related research (Labbe & Welsh, 1993) as well as the current study, demonstrated increased "…self-efficacy on tasks similar to those included in their rehabilitation program, but not on tasks unrelated to those activities" (Labbe & Welsh,

p. 4). This would seem to support the findings of Mihalko and McAuley (1996) which, as previously mentioned, found an increase in self-efficacy beliefs across similar physical activities. Once again, in the Mihalko and McAuley as well as the Labbe and Welsh studies, participants experienced a degree of mastery over the physical activities that they were asked to perform. These feelings of competence also seemed to be transferable to other related tasks.

It would not seem unreasonable to assume that these findings might also provide some insights into the area of weight management. Clearly, there is a strong argument for lifelong regular physical activity as a necessary preventative measure against obesity. If overweight participants can be led to believe that they are capable of successfully participating in physical activities, this will be a highly beneficial step on the road to future weight control. Wadden et al., (2002) note that facilitating increased physical activity among overweight individuals is one of the most primary concerns in battling obesity as physical activity is the best predictor of weight loss maintenance.

In light of these findings, there would appear to be a need to reach those obese individuals with low self-efficacy beliefs about their abilities to succeed in any kind of exercise or diet related tasks aimed at losing weight. Perhaps they would gain a sense of competence in these areas if they took the effort and saw that they can be successful. A likely problem for many of them is that they fear failure. They may have made an attempt at dieting in the past but were unable to adhere to the strict guidelines. Possibly, they joined a local fitness club but became too busy with work to take advantage of the facilities. For whatever reason, they may require some convincing that they can become successful and make this change in their lives if they put forth the effort.

Manipulating self-efficacy through feedback. Research by McAuley, Talbot, and Martinez (1999) suggests that self-efficacy beliefs can indeed be manipulated through the feedback that participants receive about their performance whether it is positive or negative. Individuals in this study were asked to complete exercise-related performance measures. However, this manipulation differed from the previous studies in that participants' self-efficacy beliefs were altered not by their own interpretations of their mastery over the situation but by how they were led to believe they performed through the feedback that they received. The study involved the recruitment of female college students for participation in an exercise study for women. Participants were screened for women who were low to moderately active in their weekly physical activity. Sixty-five percent of the women reported that they would exercise between zero to one day per week. They were asked to visit the laboratories on two separate occasions. Within the first session, they were randomly assigned to either a high-efficacy (HE) or low-efficacy (LE) feedback condition and were asked to complete an initial efficacy measure immediately prior to a graded exercise test. The test involved sub maximal graded exercise on a cycle ergometer for six to eight minutes. During this period, the pedaling workload for each participant was subsequently increased every two minutes until the women had reached a target heart rate that was greater than 70% of their age predicted maximum heart rate.

As soon as the women had completed this test, they were given false feedback in regard to their performance. Participants in the HE condition were congratulated and informed that their performance had placed them in the top 20^{th} percentile in comparison to fitness levels of other women of similar age and activity history. They were also shown a computer printout comparing their heart rates to fictional individuals who were identified as "average." The HE group was told that their performance far exceeded that of the average participant. They were led to believe

that they had demonstrated superior cardio respiratory fitness. In contrast, the LE group was led to believe that their performance had placed them in the bottom 20th percentile for college-aged women of similar age and activity history. They were told that their heart rates were much higher than the average woman in their category and that this was typical of poor cardio respiratory fitness. However, they were also told that their condition could be reversed through regular aerobic activity. After receiving the feedback, both the HE and LE groups completed the efficacy measures once more.

Upon arriving at the lab for the second scheduled visit, a research assistant recounted the previous feedback the women received from their graded exercise test. This served to reinforce any change in efficacy beliefs that may have occurred during the first session. They were then asked to complete the self-efficacy measure again before being asked to begin a 20-min bout of acute exercise on a Stairmaster exercise machine. Once they were finished, participants were asked to complete the self-efficacy measure for a final time.

The authors found that they were able to successfully manipulate the efficacy beliefs of these women. The results suggest that while the HE and the LE groups showed no differences in their reported self-efficacy prior to the feedback they received, there were significant differences between the two groups after receiving feedback. While the groups did not differ in their actual physical performance levels, the HE group, which was led to believe that they were successful, demonstrated greater efficacy than the LE group which were led to believe that they had performed poorly. These beliefs then carried over to the second exercise task that was performed. The HE group felt that they were more competent in their abilities both before and after the time spent on the Stairmaster in comparison to the LE women.

McAuley et al., (1999) demonstrate that self-efficacy beliefs can be manipulated through measures other than performance-related self-evaluation. Even though both groups of women did not differ in their actual performance levels, the feedback that they received was apparently enough to outweigh any self-evaluations they might have had about their competence in these activities. If the groups had not received this feedback about their performance, it would be reasonable to assume that they both might have demonstrated an increase in self-efficacy after completing the exercises. This was the case in both the Mihalko and McAuley (1996) as well as the Labbe and Welsh (1993) experiments which followed a similar protocol with the exception that they did not provide the feedback. These findings are useful because they suggest that self-efficacy beliefs can be altered not simply by one's feelings about their own sense of accomplishment but also by information or feedback that they receive from other sources. The hope of the current research is that self-efficacy can be altered by watching the positive modelled behaviour of similar others, apart from one's own achievement at the task.

If the effects from feedback or positive motivation alone can be isolated apart from one's own performance, this would provide some strong insights into methods of reaching those overweight individuals who do not feel that they are capable of taking part in the behavioural or performance aspect due to a fear of failure. The hope of the current study is that by modelling the successful transformation of individuals who began in a situation similar to their own, but were able to successfully lose weight through diet and exercise; overweight individuals will feel that they too are capable of this transformation. The thinking here is that modelled success, seen through a similar other, will serve as a sort of positive example which will increase overweight individuals' beliefs about their own ability to succeed in the same way.

Increasing self-efficacy through modelled behaviour. The effectiveness of this type of modelling as a means of changing *behaviour* has been well documented in the literature. Observational or social learning is effective and adaptive. The research suggests that through vicarious conditioning, where individuals learn from seeing or hearing about the consequences of others' behaviour, the individual will become more or less likely to engage in those behaviours themselves; depending on the outcome (Atkinson, Atkinson, Smith & Bem, 1993). With the current research, the prediction is that the positive modelled exercise and dieting behaviours seen in the videotapes will help to also change participants' *beliefs* about their own ability to succeed in the same way the models had.

There have been previous attempts at increasing self-efficacy beliefs through the use of modelled exercise behaviour. Ng, Tam, Yew, and Lam (1999) worked with participants who had been diagnosed with chronic obstructive pulmonary disease as part of a rehabilitation plan. These participants were assigned to either an experimental condition, which involved a one-month behavioural exercise program complemented with video modelling techniques, or a control condition which involved the behavioural exercise program alone. The behavioural aspect of the exercise program for both groups included cycling as well as gradual upgrading of walking on a treadmill. Within the experimental condition, participants were able to view video tapes of professionals modelling the techniques that they were later going to perform. Measures of exercise self-efficacy and exercise performance were taken before and after the one-month program had been completed.

The authors found that both the experimental as well as the control groups displayed improvements in exercise performance as well as exercise self-efficacy. However, the participants in the video modelling condition displayed greater improvements in both areas

compared to the control group. Therefore, it would seem that having witnessed others execute the task in a way that demonstrated mastery over the situation, allowed participants in the experimental condition to feel more competent about their ability to master the task as well. Both experimental and control groups grew in their beliefs about their exercise competence but the positive modelling appeared to further strengthen those beliefs.

The Ng et al., (1999) study proposes that the modelling of successful performance on exercise related tasks allows those watching to feel more capable in their own attempts at mastering the situation, even when the models are clearly at a higher level than the viewers. The current study hopes that participants watching the successful, positive, weight loss behaviours of *similar* others will have an even greater impact, and will allow these participants to feel more competent in their own ability to successfully lose weight in the same way the models had.

Summary

This chapter has identified obesity as a global epidemic. More and more, people of all ages are living increasingly sedentary life-styles and being bombarded by fast-food advertising and quick-fix miracle diets. With nearly half of the North American population alone considered overweight, or obese, and similar trends being seen world-wide, there is a definite need for new interventions aimed at promoting weight loss as a "lifestyle" change and not a one-time intervention. Of course, this is easier said than done. Past studies looking at behavioural and/or educational approaches alone have proven less than sufficient, and studies of long-term weight loss maintenance have demonstrated that lapses and relapses in weight loss behaviour are common.

Recent research has emphasized the importance of targeting psychological factors in conjunction with these types of treatments as a means of achieving better long-term adherence.

One such factor, self-efficacy, has proven to be an excellent predictor of weight loss and weight loss maintenance with regard to overeating and exercise behaviours. As weight loss self-efficacy beliefs play such an important role in an individual's attempts at losing weight, and later management of that weight loss, finding ways to increase these beliefs initially, for those who may have low self-efficacy from the start, is an important area for investigation.

The current research hopes to build upon research efforts from the past, and demonstrate that weight loss self-efficacy can be increased for these individuals *before* their own successful participation in weight loss behaviours. The prediction is that by having participants simply watch the successful weight loss behaviours of similar others on videotape, and for some having the opportunity to review the videos at home, this will be enough to increase their own beliefs about their ability to lose weight, and will translate into actual weight loss behaviours two months afterward for these individuals.

Hypotheses

H1a: Participants who witness modelled positive weight loss behaviours will show a significant increase in their weight loss self-efficacy beliefs from pre-test to follow-up, while the control group will not demonstrate a change.

H1b: Participants asked to review a videotape of modelled positive weight loss behaviours at home during the two-months are expected to demonstrate higher self-efficacy scores than those watching the same videotape at the initial meeting only. Individuals from the control group asked to review a neutral videotape at home during the two months will again not be expected to demonstrate a change and therefore will report the same levels of self-efficacy as the control-no homework group.

H2a: Those participants who witness the positive weight loss model will engage in significantly more physical activity two months following the intervention when compared with their baseline measure. Individuals in the control condition are expected to report less increase in physical activity two months following the initial "workshop" session.

H2b: Participants given the opportunity to review the videotape of the modelled positive weight loss behaviours at home are expected to report higher levels of physical activity than those who have no homework. Individuals in the control condition, regardless of whether they reviewed the neutral video at home during the two months, or at the initial meeting only, are not expected to show any improvement in physical activity levels.

H3: There will be a positive correlation between the two-month follow-up weight loss self-efficacy beliefs and two-month follow-up physical activity levels when controlling for the baseline weight loss self-efficacy measures.

CHAPTER THREE: METHODS

Participants

One hundred and twenty-five participants, males (n = 31) and females (n = 94), were recruited through local newspaper ads (see Appendix I), notices to local churches, and announcements made to classes at Trinity Western University. Participants' reported ages broke down into the following categories: 68% aged 17 to 24 years, 18% aged 25 to 44 years, and 13% aged 45 to 64 years. Ethnic background was reported as: 91% Caucasian, 4% Asian, 2% African, 2% Hispanic, and 2% reporting some "other" ethnicity. Eighty-two percent were university students, while the remaining 18% were members of the community not currently attending university. One participant failed to complete the WEL at the initial workshop session, and five participants failed to complete the follow-up WEL and IPAQ measures. Sub-scale item means were used for missing WEL data, and pre-determined item values were used for missing IPAQ scores (see Appendix B), when fewer than three items were left incomplete.

Body weight classification was determined through Body Mass Index (BMI) measures calculated from participants' reported height and weight when first arriving at the lab (BMI = kg/m^2, World Health Organization, 1998). From the BMI calculations, the sample included 9 (7%) participants considered to be obese (BMI > 30), 32 (26%) who were overweight (BMI > 25), 77 (62%) in the healthy weight range (BMI = 18.5 to 25), and 7 (6%) considered to be underweight (BMI < 18.5). By comparison, Canadian national statistics report 15% of adult Canadians to be obese, 33% overweight, 47% within the normal weight range, and 3% considered to be underweight (Statistics Canada, 2004).

Recruitment asked for volunteers willing to participate in research looking at healthy ways to enjoy eating and exercise. As an added incentive, all participants were presented with an

opportunity to enter a $50 draw, to be held at the conclusion of the study. Participants from first-year psychology classes were offered one percent bonus credit for their participation in the project as well. Volunteers were provided with contact information for the study, or in the case of classroom recruitment, were asked to leave their name, phone number or e-mail address on a sign-up sheet. Individual and group meetings were scheduled over the phone or through e-mail, and participants were alternately assigned by waves to the treatment or control conditions.

Classroom recruitment was carried out in five undergraduate psychology and human kinetics classes at Trinity Western University. From a total sample of 180 students, 99 (55%) agreed to participate in the project. At the initial workshop session, 40 of the 99 (22% of the total recruitment sample) participated in the first stage of the experiment. When the study had been completed, 36 students (20% of the total student recruitment sample) had followed-through to complete the final stage of the project.

Measures

Weight Efficacy Life-Style Questionnaire (WEL). To tap participants' weight loss self-efficacy beliefs, the Weight Efficacy Life-Style Questionnaire (WEL) was used (Clark, Abrams, Niaura, Eaton & Rossi, 1991; see Appendix C). Participants were asked to respond to statements addressing diet, exercise, and genetic factors. Items were rated on a 10-point scale ranging from 0 (not confident) to 9 (very confident). The scale is made up of a total of 20 items, grouped into five subscales, with each subscale consisting of four items. The five subscales are: Negative Emotions, Availability, Social Pressure, Physical Discomfort, and Positive Activities. Sample items for Negative Emotions include: "I can resist eating when I am anxious (nervous)," for Availability: "I can control my eating on the weekends," for Social Pressure: "I can resist eating even when others are pressuring me to eat," for Physical Discomfort: "I can resist eating even

when I have a headache" and for Positive Activities: "I can resist eating even when I am watching TV."

Internal consistency for the WEL is good, with Cronbach's alpha coefficients reported as .88 for Negative Emotions, .83 for Availability, .89 for Social Pressure .84 for Physical Discomfort and .79 for the Positive Activities subscales (Clark, Abrams, & Niaura, 1991), while the total WEL has been estimated at .92 (Fontaine & Cheskin, 1997). The scale has demonstrated good external validity as its use in two long-term (19 and 26 weeks) weight management programs demonstrated a significant pre to post-treatment, $p < 0.05$, improvement on overall WEL scores (Clark et al., 1991). It has also shown good convergent validity, demonstrating a significant correlation with the Eating Self-Efficacy Scale (ESES), $r\ (19) = -.67$, $p < .001$ (the negative correlation is due to the scales being scored in opposite directions).

Because the WEL focuses primarily on the dieting aspect of self-efficacy, four new items were developed to address the exercise and genetic factors also believed to contribute to the construct. The added Exercise component consisted of two items: "I can control my physique through regular weight training," and "I can control my level of fitness by engaging in vigorous exercise at least three times a week." The Genetics factor also contributed two new items to the scale: "I can control my weight easily, even without exercising, because I have a high metabolism," and "I can control weight gain, even without monitoring my diet, because I stay slim naturally." Several graduate students reviewed the modified instrument for clarity of wording, format, and "fit" of the new items with the rest of the scale. The final version of the questionnaire incorporated this feedback (see Appendix D). A Principle Component Analysis was run to better determine how the four new items would load with the original five WEL subscales. The analysis showed that the two added Exercise items, as well as the two Genetics

items, loaded strongly onto their own separate factors, independent of the original WEL subscales (see Appendix E).

Internal consistency for the original 20-item WEL was good at the initial administration of the test. Cronbach's alpha coefficients for the subscales were as follows: .87 for Negative Emotions, .83 for Availability, .82 for Social Pressure, .74 for Physical Discomfort, .64 for Positive Activities, and an overall alpha of .93 for the total 20-item scale. The addition of the four new items did little to alter the internal consistency of the measure at time one. Cronbach's coefficients remained high, reporting an overall alpha of .92 for the revised 24-item WEL, and an alpha of .73 for the new four-items when grouped as a separate subscale.

International Physical Activity Questionnaire (IPAQ). In order to assess participants' recent levels of physical activity, the short-format, last seven days, self-administered (S7S) International Physical Activity Questionnaire (IPAQ) was used. The test is a seven-item measure gauging participants' physical activity levels across the previous seven days from the time the test is taken. Sample items include: "During the last seven days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics or fast bicycling?" and "During the last seven days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis?" (see Appendix B).

In a recent study by Craig, Marshall, Sjøstrom, Bauman, Booth, Ainsworth et al. (2003), the IPAQ was standardized on 2450 male and female participants aged 25-49 years, across fourteen countries, including 1974 participants who completed the various short form versions of the measure. Because the self-reported IPAQ data were not normally distributed, Spearman correlation coefficients were used as a primary measure of agreement for reliability and validity measures. Tests of repeatability for the IPAQ short-format tests, over a three to seven day period,

indicated that 75% of correlation coefficients observed were above $\rho = 0.65$ (ranging from 0.88 to 0.32). Repeatability for the S7S, the version used in the current study, reported a Rho, $\rho = 0.75$, ($N = 292$). Tests of concurrent validity between short and long versions of the IPAQ showed reasonable agreement. Pooled ρ for the two versions was $\rho = 0.67$. Criterion validity for the measure demonstrated a correlation of $\rho = 0.30$ against a CSA accelerometer, which kept track electronically of time spent engaging in physical activity and time spent sitting. Tests of repeatability within the current study, using pre-test and follow-up test scores from control/no-homework participants, across a 2-month period, demonstrated a Spearman's Rho of $\rho = 0.85$ ($N = 22$). "The IPAQ instruments are recommended as a viable method of monitoring population levels of physical activity globally for a population 18-69 years of age" (IPAQ, 2003).

Procedure

When arriving for their initial appointment (group format: 54%, individual format: 46%), participants in both the treatment and control groups were asked to fill out a series of questionnaires in the following order. First, they were asked for some background information regarding physical characteristics, activity levels, involvement in sports, current and past dieting, illnesses, medications, desire to improve health, and other demographic information (see Appendix A). They were next asked to complete the IPAQ to assess their physical activity levels over the past seven days. After completing the IPAQ, they then filled-out the WEL tapping their current beliefs about their ability to lose weight. Each of the groups was then shown a twenty-minute video segment.

Participants in the treatment condition were shown a 20-minute segment from a video entitled *Body-for-LIFE: Success Stories 1* (Phillips & Asiano, 1999). The segment modelled the effective weight-loss behaviours of two overweight individuals (one of each gender) who,

through proper diet and exercise, were able to lose weight and become physically fit over a 12–week period. Participants were given a brief description of the content of the video and were simply told to watch and enjoy the video (see Appendix F). The control group was shown a 20-minute segment from *The Soothing Surf at the Wickanninnish Inn* (Heinl, 2002). The segment consisted of looping footage of crashing surf from the Inn's ocean-front property on Vancouver Island. Participants were instructed to use the 20-minute portion of the video as a relaxation tool (see appendix G). After viewing the video-clips, participants in both groups were again asked to complete the WEL.

Before being dismissed, half of the participants in each of the treatment and control groups were encouraged to take home a copy of the video they had just watched. They were instructed to review the video at home every second week over the following two months, and were given take-home questionnaires to complete after each viewing (see Appendix H). The take-home questionnaires consisted of three questions: "How much do you remember of the video," "What did you think about the quality of the video," and "Did you enjoy the video?" Two months following the initial workshop appointment, participants were again contacted and asked to complete the IPAQ and the WEL for a final time (group format: 53%, individual format: 48%).

CHAPTER FOUR: RESULTS

Descriptive Statistics

Mean and standard deviation scores were calculated for the Weight Efficacy Lifestyle Questionnaire (WEL) time one total data (M = 5.94, SD = 1.40; see Table 1). A non-significant (p = .44) Shapiro-Wilk test of normality determined that the WEL baseline data were normally distributed. A baseline ANOVA was conducted to explore possible group differences in self-efficacy for participants assigned to watch different video types (Group), and for participants assigned to different levels of homework (Homework). The results demonstrated that there were no significant effects for baseline WEL total scores, (Group main effect: $F(1, 120) = .139$, p = .71; Homework main effect: $F(1, 120) = .338$, p = .56; and Group X Homework interaction effect: $F(1, 120) = .694$, p = .41; observed power = .127). This suggests that all conditions were similar in their levels of weight loss self-efficacy prior to the workshop interventions.

Mean and standard deviation scores were also calculated for IPAQ time one total MET minutes (M = 2998, SD = 3753; see Table 1). A significant ($p < .001$) Shapiro-Wilk test of normality determined that the IPAQ baseline data were not normally distributed but had a highly positive skew. A Mann-Whitney test for non-parametric data and a preliminary ANOVA were conducted on IPAQ time one total MET minutes, to determine if there were significant differences between the two video Group conditions, or a significant Group X Homework interaction. Results of the Mann-Whitney indicated that there were no significant differences between the video conditions at baseline, z = -1.52, p = .13. The ANOVA supported this finding, indicating that there were no significant effects for baseline IPAQ total MET minutes, (Group main effect: $F(1, 120) = .308$, p = .58; Homework main effect: $F(1, 120) = 1.350$, p = .24; and

Table 1

Intercorrelations, Means, and Standard Deviations for WEL and IPAQ Test Times

Tests	1	2	3	4	5
1. WEL time 1	--	.90**	.78**	.06	.07
2. WEL time 2		--	.78**	.07	.09
3. WEL time 3			--	.07	.12
4. IPAQ time 1				--	.79**
5. IPAQ time 2					--
Mean	5.94	6.26	6.15	2998	2899
Standard Deviation	1.40	1.38	1.35	3753	3708

Note. Mean Weight Efficacy Lifestyle Questionnaire (WEL) total scores ranged from 0 (not confident) to 9 (very confident). Mean International Physical Activity Questionnaire (IPAQ) total MET minutes indicated the average number of minutes participants spent engaging in physical activity during the past week.

*$p < .05$, **$p < .01$

Group X Homework interaction effect: $F(1, 120) = .564$, $p = .45$). Both the non-parametric and parametric tests agreed that all groups were similar in physical activity levels at baseline.

Hypotheses

Hypothesis 1a predicted that individuals in the treatment condition would demonstrate a significant increase in their weight loss self-efficacy beliefs from pre-test to follow-up (pre-test: WEL $_{T1}$, post-test: WEL $_{T2,}$ follow-up: WEL $_{T3}$) while the control group participants would not demonstrate a significant change. A 2 X 2 X 3 (Group X Homework X Time) mixed design ANOVA was conducted to identify differences between the groups. Results of the analysis found that there was a significant two-way interaction between Group and Time, $F(1.73, 197.02) = 4.78$, $p = .01$, $\eta^2 = .040$ (with Greenhouse-Geisser corrections). Participants in the treatment condition showed a continued increase in mean WEL total scores from time one through time three ($M_{T1} = 5.90$, $M_{T2} = 6.24$, $M_{T3} = 6.35$), while control group participants, after showing an initial increase from time one to time two, returned to scores similar to their baseline at time three ($M_{T1} = 5.95$, $M_{T2} = 6.19$, $M_{T3} = 5.98$; see Figure 1).

There was also a significant three-way Group X Homework X Time interaction $F(1.73, 197.02) = 5.13$, $p = .01$, $\eta^2 = .043$ (with Greenhouse-Geisser corrections), as predicted in hypothesis 1b. Looking at the mean scores for treatment-homework participants from time two, when the homework was assigned, to time three mean WEL total scores, the increase in self-efficacy ($M_{T2} = 6.14$, $M_{T3} = 6.48$) was greatest for these individuals. The control-homework participants, in contrast, showed a drop in self-efficacy from time two to time three ($M_{T2} = 6.28$, $M_{T3} = 5.81$; see Figure 2).

Hypotheses 1a and 1b were supported by these results (see Table 2). Without considering the effects of homework, treatment group participants as a whole reported greater confidence in their ability to lose weight at the two-month follow-up, while control group participants were in

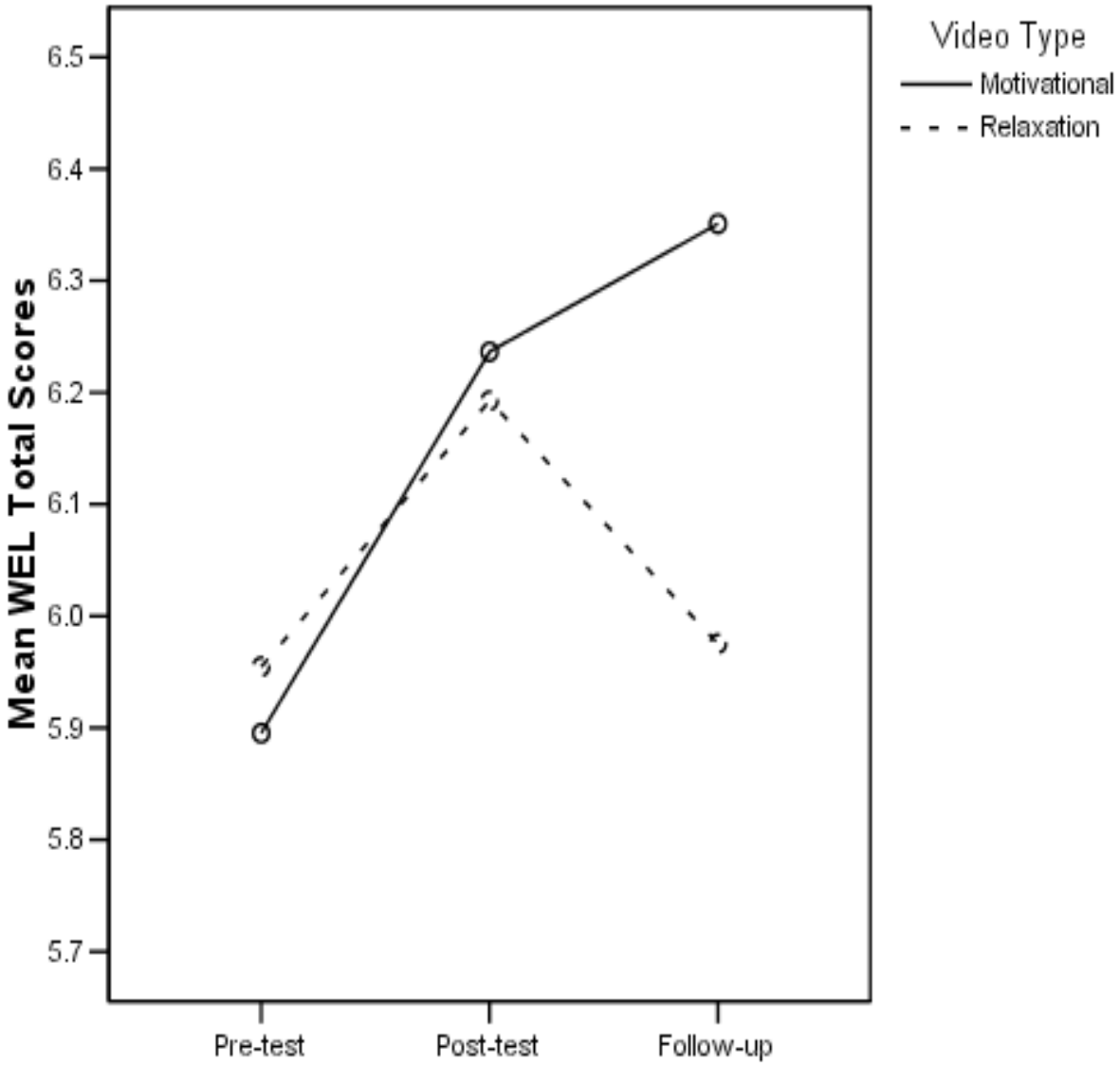

Figure 1. Interaction effect of video type (Group) with participants' reported mean Weight Efficacy Lifestyle Questionnaire (WEL) total scores at three test time intervals, where mean WEL total scores ranged from 0 (not confident) to 9 (very confident).

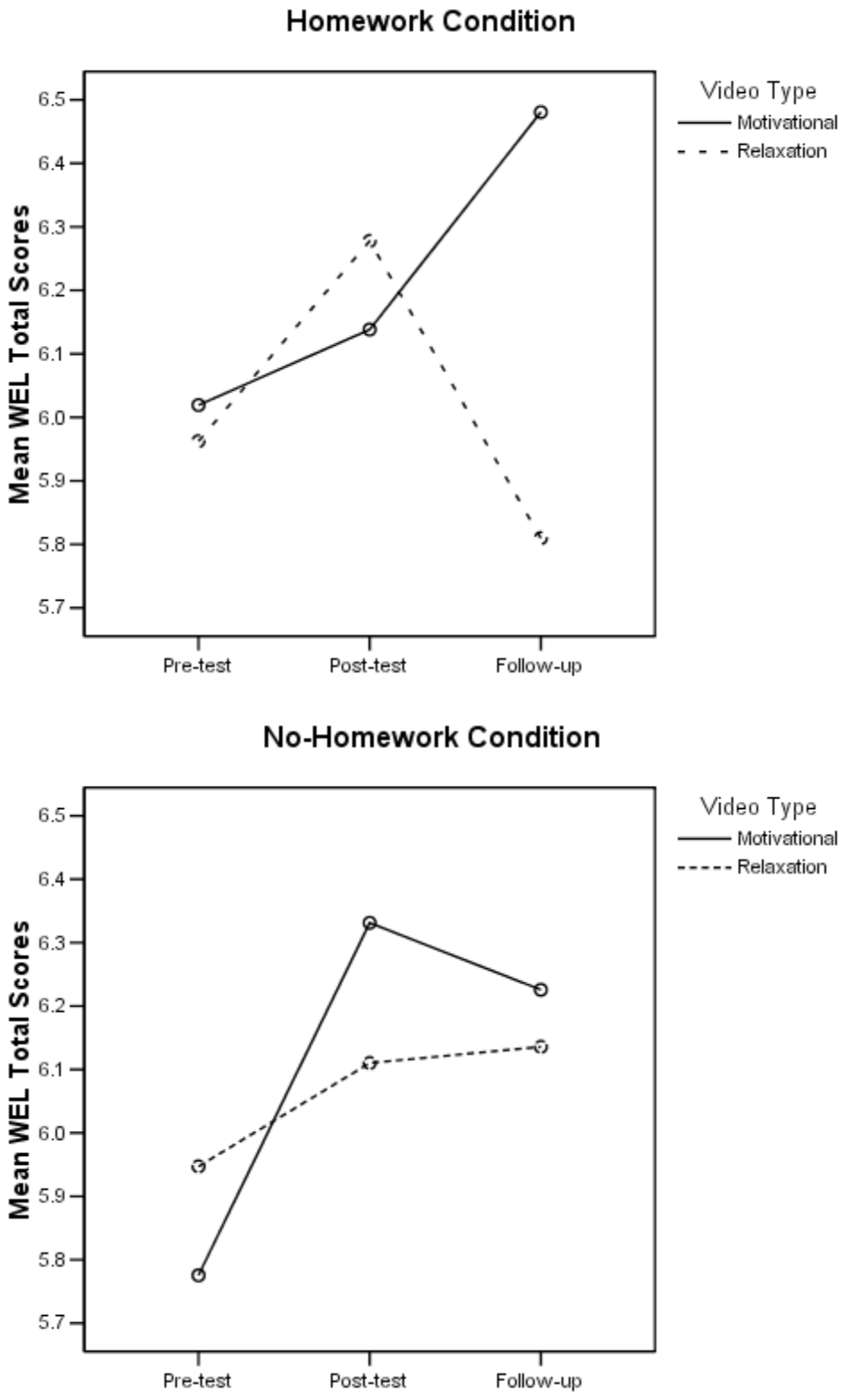

Figure 2. Interaction effect of Group and Homework (Homework vs. No-Homework) level with participants' reported mean WEL total scores at three test time intervals, where mean WEL total

scores ranged from 0 (not confident) to 9 (very confident). The top panel indicates that treatment-homework participants showed their strongest gains in mean WEL total scores from time two, when the homework was assigned, to time three. Control-homework participants showed a decrease in mean WEL total scores across this same time. The bottom panel indicates that while treatment no-homework participants showed an initial increase from time one to time two, their reported mean WEL total scores leveled off from the time the homework was assigned, to time three. A similar pattern was observed for control no-homework participants.

Table 2

Analysis of Variance for Weight Loss Self-Efficacy

Source	*df*	*F*		η^2	*p*
		Between subjects			
Group (G)	1	.26		.002	.61
Homework (H)	1	.01		.000	.91
G X H	1	.10		.001	.76
Error (between)	114				
		Within subjects			
Time (T)	1.73	8.57	**	.070	.00
T X G	1.73	4.78	*	.040	.01
T X H	1.73	0.73		.006	.47
T X G X H	1.73	5.13	*	.043	.01
Error (within)	197.02				

* $p < .05$, ** $p < .01$

the same place two months later as when they had started. It was further anticipated in hypothesis 1b that by providing some treatment group participants with a take-home copy of the motivational weight loss video, this would reinforce their belief in their ability to succeed in the same way the models had. Again, this appeared to be the case. Having the opportunity to review the video at home, the treatment-homework group demonstrated the strongest increase in mean self-efficacy from time one to time three WEL scores for any group. In contrast, the control-homework condition showed a decrease in weight loss self-efficacy over that same time.

An additional exploratory 2 X 2 X 3 X 2 (Group X Homework X Time X Weight) mixed design ANOVA was conducted to identify potential weight category differences. Overweight and obese participant data, classified by BMI calculations, were combined to create a new weight category (Heavy weight), due to small cell sizes, which was compared against the combined scores of underweight and normal weight participants (Moderate weight). A three-way Group X Time X Weight interaction was not found to be significant, $F(1.78, 194.12) = 1.92$, $p = .16$ (with Greenhouse-Geisser corrections), nor was the primary Group X Homework X Time X Weight interaction. However, the latter did approach significance, $F(1.78, 194.12) = 2.86$, $p = .07$, $\eta^2 = .026$ (with Greenhouse-Geisser corrections), where Heavy weight participants in the treatment-homework group demonstrated the greatest increase in weight loss self-efficacy from time one to time three WEL scores.

The interaction pattern, while only approaching significance, suggests that the treatment-homework intervention was felt most strongly for the Heavy weight participant sub-sample. While both Heavy weight and Moderate weight participants in the treatment-homework group showed continued increases in weight loss self-efficacy from baseline to time three, those in the Heavy weight group demonstrated the greatest gains. This helps rule out the possibility that

Moderate weight participants may have been masking weaker scores for the Heavy weight individuals.

Hypothesis 2a predicted that participants watching the successful modelled weight loss behaviours of others will themselves engage in significantly more physical activity two months following the intervention, compared with their baseline measure. Individuals in the control group were not expected to demonstrate a significant change. Because the data for the IPAQ sample were not normally distributed, both a Wilcoxon Signed Ranks test, for non-parametric data, and a 2 X 2 X 2 (Group X Homework X Time) mixed design ANOVA were used to identify physical activity differences between the groups.

Contrary to expectations, the results of the Wilcoxon Signed Ranks test indicated no significant differences for either the treatment group, $z = 1.08$, $p = .28$, or the control condition, $z = -1.57$, $p = .12$, from time one to time two (pre-test: IPAQ $_{T1,}$ follow-up: IPAQ $_{T2}$) IPAQ total MET minutes. Similarly, a 2 X 2 X 2 mixed design ANOVA found that there was no significant main effect of Time, $F(1, 114) = .457$, $p = .50$, or Group X Time interaction, $F(1, 114) = .000$, $p = .99$. When including Homework as a second independent variable for hypothesis 2b, the Group X Homework X Time interaction also did not prove to be significant, $F(1, 114) = .076$, $p = .78$. Surprisingly, all groups but the control-no homework condition reported a decrease, although not significant, in mean total MET minutes at follow-up.

Hypotheses 2a and 2b were not supported by these results (see Table 3). Physical activity levels showed no significant change for any condition across the two months, let alone the predicted increases for treatment and treatment-homework groups. Due to the high percentage of students in the sample, and the overlap of the two-month follow-up with student exam schedules,

Table 3

Analysis of Variance for Physical Activity Levels

Source	*df*	*F*	η^2	*p*
		Between subjects		
Group (G)	1	0.45	.004	.50
Homework (H)	1	1.84	.016	.18
G X H	1	.99	.009	.32
Error (between)	114			
		Within subjects		
Time (T)	1	0.46	.004	.50
T X G	1	0.00	.000	.99
T X H	1	0.19	.002	.67
T X G X H	1	0.08	.001	.78
Error (within)	114			

* $p < .05$, ** $p < .01$

the analysis was re-run comparing Life-course categories to determine if student exams had masked the effect for the remaining non-student participants.

Data from 1st/2nd year university students, 3rd/4th year university students, and community members' IPAQ total MET minutes were respectively combined, as the cell sizes were initially too small, to create three separate Life-course categories. A 2 X 2 X 3 (Group X Time X Life-course) mixed design ANOVA was used to identify differences between the groups. Results however, found that the interaction was not significant, $F(2, 110) = .76$, $p = .47$, suggesting that Life-course category did not interact with physical activity levels as anticipated. Apparently, the student exam schedule did not contribute to student participants exercising any differently from each other, or from community member participants over the two months.

Hypothesis 3 predicted a positive correlation between the two-month follow-up physical activity levels and two-month follow-up weight loss self-efficacy beliefs, when controlling for baseline weight loss self-efficacy. Again, contrary to expectations, Pearson's product-moment correlations found that for both the treatment and the control groups the relationship between follow-up mean WEL total scores and follow-up IPAQ total MET minutes was non-significant, $r = .14$, $p = .15$, and $r = .09$, $p = .26$ respectively, when controlling for the baseline WEL measures.

Post Hoc Analyses

In addition to the primary hypotheses, post hoc analyses were conducted to identify potential demographic differences. A 3 X 3 X 2 (Time X Life-course X Gender) mixed design ANOVA was used to look for significant main effects and/or interaction effects for Life-course and Gender variables across the three WEL measurement times. Group and Homework variables were not included in the analyses as the cell sizes became too small.

Results from the post hoc tests uncovered significant Time X Gender, $F(1.69, 185.59) = 3.47$, $p = .04$ (with Greenhouse-Geisser corrections), and Time X Life-course X Gender, $F(3.37, 185.59) = 4.59$, $p = .00$ (with Greenhouse-Geisser corrections) interactions. Most notably, the Time X Gender interaction found that male participants, after an initial increase, demonstrated a drop in weight loss self-efficacy from time two to time three mean WEL total scores, while female participants, on the whole, remained relatively stable in their WEL scores across all three measurement times (see Figure 3).

A similar 2 X 2 X 2 (Time X Weight X Gender) mixed design ANOVA was used to identify potential Weight and Gender category differences across the two IPAQ measurement intervals. Again, Group and Homework variables were excluded from the analyses as the cell sizes became too small. Unlike the WEL however, no significant main effects or interaction effects were observed for the IPAQ measures. Gender and weight did not appear to have a confounding influence on physical activity levels.

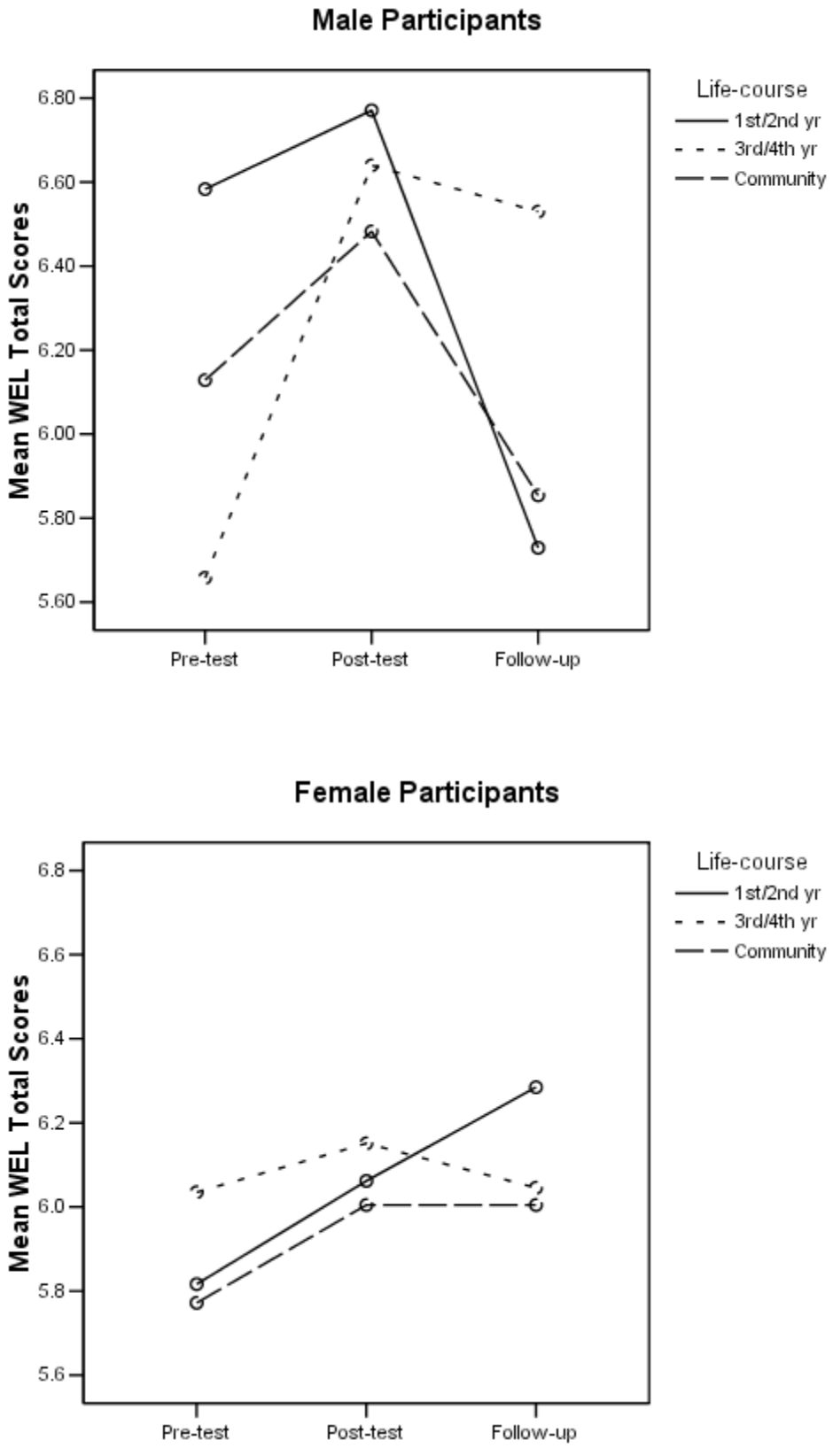

Figure 3. Interaction effects of Life-course with mean WEL total scores, for male and female

participants, at three test time intervals. Mean WEL total scores ranged from 0 (not confident) to 9 (very confident). The top panel demonstrates that after an initial increase in mean WEL total scores, male participants, as a whole, showed a sharp decrease in self-efficacy from time two to time three. The bottom panel indicates that female participants, in contrast, remained relatively stable across all three measurement times.

Summary of Results

Hypotheses 1a and 1b, the primary hypotheses, were supported by the results. Participants given the opportunity to watch the weight loss success stories of similar others demonstrated an increase in their own weight loss self-efficacy at the end of two months whereas those watching a neutral relaxation video did not demonstrate this same change. Moreover, participants given the opportunity to review the motivational videotape at home showed an even greater increase in these beliefs, when compared to those watching the video at the initial workshop session alone. Control participants asked to review a neutral relaxation video at home actually showed a decrease in weight loss self-efficacy over the two month period.

Exploratory analyses investigating potential weight category differences across WEL measurement times found that Heavy weight participants, although the interaction was not quite significant, demonstrated the greatest increase in weight loss self-efficacy, compared with the remaining treatment and treatment-homework participants. The Heavy weight group experienced the strongest increase from pre-test to follow-up mean WEL total scores, an encouraging result, as this was the sub-sample of interest.

Not so encouraging were the results from hypotheses 2a and 2b, as they were not supported. Both treatment and treatment-homework conditions demonstrated no significant increases in physical activity over the two months. In fact, there were no noticeable differences observed for any condition from time one to time two IPAQ total MET minutes. An exploratory analysis investigating potential Life-course category distinctions determined that student and community members were no different in their reporting of physical activity, in spite of the overlap of the student exam schedules with follow-up IPAQ measures.

Largely dependent on the significant results from both previous hypotheses, hypothesis 3 was not supported. The predicted positive correlation between follow-up mean WEL total scores and follow-up IPAQ total MET minutes, when controlling for the effects of baseline mean WEL total scores, was not observed. While weight loss self-efficacy was shown to increase for treatment and treatment-homework participants over the two-month period, the same increases were not seen in the physical activity levels of these groups. Had both variables increased for these participants as predicted, a significant positive correlation would likely have been observed.

Finally, post hoc tests were used to identify potential demographic differences. One notable result uncovered a significant Time X Gender interaction across the three WEL measurement times. Male participants' weight loss self-efficacy scores peaked at time two, while demonstrating a drop in self-efficacy from post-test to follow-up mean WEL total scores. Female participants, in contrast, reported fairly consistent scores across all three WEL measurement times.

CHAPTER FIVE: DISCUSSION

As anticipated, weight loss self-efficacy was shown to increase for individuals who viewed the successful weight loss stories of similar others, apart from their own successful participation in the weight loss behaviours portrayed. In addition, participants given the opportunity to review the success stories at home demonstrated an even greater increase in these beliefs when compared to those watching the motivational video at the initial workshop session alone.

In contrast, physical activity levels did not increase as expected for these individuals, in conjunction with the increases in weight loss self-efficacy. Possible explanations will be explored in the following section. This final chapter clarifies and integrates the results. The hypotheses, along with exploratory and post hoc analyses are examined first, and implications of the results are clarified. Finally, limitations of the study and areas for future research are discussed.

Hypotheses

H1: The significant Time X Group and Time X Group X Homework interactions observed in hypothesis 1 provide some encouraging insights into how initial weight loss self-efficacy can be increased. Past research has shown that self-efficacy can be strengthened by first allowing participants to achieve some level of mastery over exercise or dieting behaviours (Labbe & Welsh, 1993, Mihalko & McAuley, 1996). Ng, Tam, Yew, and Lam (1999), demonstrated that exercise self-efficacy can be further increased for participants, in conjunction with behavioural programs, when they see the successful modelling of the exercise activity by professional models. However, there is little if any research looking at ways to increase exercise, diet, or weight loss specific self-efficacy apart from behavioural interventions.

The current study differs from those previous by demonstrating that self-efficacy can be increased for participants, aside from any type of exercise or diet-related behavioural program. The individuals assigned to watch the successful exercise and dieting behaviours of others showed an increase in their own confidence about their ability to succeed, without having engaged in the activities themselves. Moreover, unlike the Ng et al., (1999) study, the models portrayed in the video were not experts. They were average individuals who began overweight and through their own efforts at dieting and exercise, were able to achieve excellent fitness.

Participants watching the models' success stories, in hypothesis 1a, demonstrated an immediate increase in weight loss self-efficacy after viewing the motivational videotape, but showed an even greater increase in these beliefs two-months later at follow-up. In contrast, the control group participants, who, while showing a similar initial increase in self-efficacy after the preliminary viewing of a neutral video, showed no overall improvement at follow-up.

It appeared that simply watching the success stories of someone like themselves, without any type of reinforcement, aside from the take-home video for treatment-homework participants, was enough to increase weight loss self-efficacy, and to maintain or further strengthen these beliefs over the two-month interval. Participants watching the relaxation videos did not maintain this same heightened level of self-efficacy at the end of the two months. With the only difference between the two groups being the content of the respective videos, the subject matter seen in the success stories appeared enough to increase participants' confidence, contributing to the sustained increase in weight loss self-efficacy for those in the motivational group.

This effect would seem quite powerful. Weight loss self-efficacy was increased without any mandated physical activity. It is also encouraging, because while there is research supporting the importance of self-efficacy and the benefits of increased self-efficacy for weight loss, there is

a lack of research addressing ways to reach those who will not get involved in behavioural weight loss programs because of a fear of failure or other reasons. If weight loss self-efficacy is low from the start, then it will likely be necessary to address this problem at the outset of a weight loss program. Once self-efficacy has been increased, there are many documented health benefits that can follow. The results from hypothesis 1a suggest that it is possible to increase weight loss self-efficacy for overweight or obese individuals before they experience any weight loss successes or failures of their own.

Not to be overlooked, the results from hypothesis 1b suggest that weight loss self-efficacy can be further strengthened by reviewing the motivational success stories of others on a continued basis. Participants receiving a take-home copy of the motivational videotape demonstrated an even greater increase in weight loss self-efficacy than those treatment group participants viewing the same video at the initial workshop session alone. It was anticipated that these individuals might use the take-home video as a self-help tool, where it could be reviewed at home on their own time. In this way, the video may well have acted as reinforcement. After each home viewing, participants could have felt further encouraged that they can succeed in the same way the models had.

Those given the opportunity to review the take-home video-segment, however, were sporadic in their viewing habits. While it was recommended that they watch the video at least four times over the two-month time period, the mean number of viewings was much less (motivational: $M = 1.41$, and relaxation: $M = 1.90$) and many reported not watching the video at all (motivational: 45%, and relaxation: 30%). Conceivably, for the treatment-homework participants, simply being aware that they possessed the video and that they were able to watch it

at their convenience was enough to remind them of the modelled success they had seen during the initial video workshop.

Exploratory analyses further dissecting the treatment and treatment-homework groups into Moderate and Heavy weight categories, found that increases in self-efficacy were most noticeable for the Heavy weight participant sub-sample. Surprisingly, Heavy weight participants in the treatment-homework group reported watching the take-home video fewer times than the Moderate weight participants in the same condition. Nevertheless, the Heavy weight individuals reported greater gains in weight loss self-efficacy from time two, after the time the homework was assigned, to follow-up mean WEL total scores.

While a Group X Homework X Time X Weight interaction only approached the significance level, the Heavy weight participants in both the treatment and treatment-homework groups demonstrated the strongest increases in mean WEL total scores across the two months when compared to their Moderate weight counterparts within the same conditions. This was very encouraging, as it helped rule out the possibility that Moderate weight participants may have been masking increases in weight loss self-efficacy for the Heavy weight participants. It also demonstrated that the sub-sample of interest was impacted most powerfully by the intervention.

H2: The non-significant Time X Group and Time X Group X Homework interactions observed in hypothesis 2 were surprising, especially in light of the significant increases in weight loss self-efficacy discovered in hypotheses 1a and 1b. It was thought that an increase in self-efficacy would translate into increased levels of physical activity, particularly since the weight loss behaviour seen in the motivational video modelled primarily positive exercise behaviour. This, however, was not the case, and there were no significant differences observed in exercise

activity for either the treatment or control groups from time one to time two IPAQ total MET minutes.

As this result was unexpected, the analysis was re-run using Life-course category as a between subjects variable. With 81% of participants reporting to be students, and with the follow-up measure falling in the midst of a busy exam schedule for many of them, it was thought that this may have influenced their responses. Because the IPAQ S7S measure, used to gauge physical activity, asked only about the time spent being physically active in the last seven days, it was predicted that students pre-occupied with studying that week may have been less active then normal, causing them to report lower then expected levels of physical activity. However, an analysis of the three Life-course categories across measurement times and treatment conditions, showed no significant differences between the student groups and community members. Apparently, the hectic exam period did not contribute to the student participants exercising any differently than the community members.

It may also have been the case, speaking in the context of the Transtheoretical Model (Prochaska & DiClemente, 1983), that treatment group participants had intentions to begin exercising more frequently but had not yet taken action. An increase in self-efficacy may have led some to move from a pre-contemplation stage to a contemplation stage or from a contemplation stage to a preparation stage. Possibly, some were in the process of moving toward the action stage where increases in physical activity could have been seen at a three-month interval. For these participants, simply moving to a point where they considered taking action could be an important step that may have gone unnoticed.

Also going unnoticed may well have been other weight loss strategies, apart from increases in physical activity that could have indicated an effort on the part of participants to lose

weight. As the weight loss process involves a combination of factors, with exercise being just one, it is possible that increases in weight loss self-efficacy could have translated into other action steps not assessed in the study, like changes to diet, or less time spent watching television. So, while physical activity did not increase for the treatment or treatment-homework groups, it should not be ruled out that these participants may have been making alternate attempts at losing weight.

H3: The non-significant correlation between time three mean WEL total scores and time two IPAQ total MET minutes, when controlling for time one mean WEL total scores, was also surprising. Given the importance of physical activity, and with some considering it the best predictor of weight loss (Wadden et al., 2002), it was certainly thought that participants who viewed the modelled positive exercise behaviour would show an increase in their own physical activity, and that this would correspond with their increases in weight loss self-efficacy. However, while weight loss self-efficacy increased as predicted, physical activity remained stable for the treatment groups across the two-month period. Had physical activity levels increased as anticipated in hypotheses 2a and 2b, a significant relationship between weight loss self-efficacy and actual weight loss behaviour through exercise would likely have been observed.

Post Hoc Analyses

In addition to the primary hypotheses, post hoc procedures were conducted to identify potential demographic differences. Without considering Group or Homework level, Gender and Life-course category differences were investigated across the three WEL measurement times. In the same way, Gender and Weight category differences were explored for pre-test and follow-up IPAQ measures. As there were no significant results observed for the IPAQ tests, the significant WEL post hoc findings are discussed only.

Uncovered in the WEL analyses were significant Time X Gender and Time X Life-course X Gender interactions, occurring across the two-month period. Most notably, the Time X Gender interaction identified a strong initial increase, followed by a sharp decrease in WEL scores for male participants after time two, the time the homework was assigned for those in the video take-home conditions. Female participants, in contrast, demonstrated a slight but steady increase in WEL scores across the three measurement times.

Interestingly, for the male participants, 1st and 2nd year students, and community members were those demonstrating the most noticeable decreases in weight loss self-efficacy from post-test to follow-up. The 3rd and 4th year students did not show the same decline in WEL scores across this time. Conceivably, the senior students were more committed to their studies than the younger student participants, and this may have been reflected in their commitment to the study as well. It is unclear why the male community members responded in the same way, as they appeared more motivated than the student participants in general.

A comparable pattern was seen with control-homework participants in hypothesis 1b. Those receiving copies of the relaxation video to review at home demonstrated a similar decrease in self-efficacy from post-test to follow-up measurement times. It may have been the case that male participants within this condition had an impact on male scores in general. The mundane task of reviewing the relaxation videos across the two months could well have created an apathetic attitude toward the project, and a subsequent decrease in weight loss self-efficacy.

Theoretical Implications

One problem with past weight loss self-efficacy research is the diversity in the types of studies conducted, making it difficult to summarize the findings and report generalizable conclusions (Work Health Organization, 2003). Much of the past research has been correlational,

or has investigated areas related to weight loss but not targeting weight loss specific self efficacy. As there is also some uncertainty about just what factors contribute to an individual's beliefs about their ability to lose weight, finding ways to measure the construct has proven to be a complicated task.

The current research however, provides support for past findings like those of Kitsantas (2000), suggesting that overweight individuals initially possessed lower self-efficacy than individuals of lesser weight, when measured apart from experimental interventions. Overweight and obese participants, in the current study, began with lower self-efficacy at their baseline measure then their normal weight and underweight counterparts. So, not surprisingly, there is some agreement that many who are overweight or obese begin with a fragile sense of confidence in their ability to lose weight successfully.

Other researchers (Mihalko & McAuley, 1996, Labbe & Welsh, 1993) have attempted to increase self-efficacy in areas related to weight loss through behavioural exercise or dieting programs, where participants achieve some level of success or mastery at these behaviours. The results suggest that self-efficacy can be increased through these types of interventions, and that the gains in self-efficacy can be transferred to other related activities. In keeping with this, it seems sensible that these findings should carry over to weight loss-specific self-efficacy. However, while these results seem promising, they apply only to those who will first become involved in a behavioural routine.

In reality, many overweight or obese individuals may not be in the position to take this initial step. They have low weight loss self-efficacy from the start, and this prevents them from becoming involved in any sort of behavioural program. If the exercise or dieting behaviours are never initiated, these individuals will likely not achieve the success necessary to increase weight

loss self-efficacy. The hope of the current research was to increase these beliefs before behavioural interventions, allowing those with low initial self-efficacy to gain the confidence needed to become successful in a behavioural routine of their own.

While it would seem that this is an area worthy of attention, it has received little consideration in the literature. This is somewhat surprising considering that pre-treatment self-efficacy has been shown to be significantly related to weight loss (Clark et al., 2003). Again, much of the existing research has focused on post treatment self-efficacy and maintenance of weight loss after behavioural interventions. This, however, is dealing with only one half of the problem and neglects to address that for many, increased pre-treatment self-efficacy (pre-behavioural treatment) may be necessary before any behaviour change can take place.

The primary contribution of the current research to the literature is in its demonstration that weight loss self-efficacy *can* be increased for participants apart from successful participation of their own in behavioural programs. Simply watching the successful modelled weight loss behaviour of similar others was enough to help these individuals feel more confident in their own ability to succeed in the same way. This holds promise for those who may be caught in the pre-contemplation stage and may never take the necessary action steps unless they can be convinced that their efforts will pay off.

What's more, participants given the opportunity to review the modelled success stories regularly at home, in conjunction with the initial video workshop, showed an even stronger increase in weight loss self-efficacy over the two-months when compared to those watching the video at the initial video workshop alone. This speaks to the importance of reinforcing success stories for participants. While the initial viewing of the motivational video itself was enough to increase weight loss self-efficacy, having the opportunity to review the video-segment at home

was an even more powerful means of increasing these beliefs, possibly a factor contributing to maintenance of weight loss self-efficacy over longer time periods.

Homework as a variable in and of itself however, did not appear to be the sole contributing factor. Control participants, given the same opportunity to review a neutral video at home, actually showed a decrease in weight loss self-efficacy over the two month period. It seems that the combination of the video content and the reinforcement of the content were what proved to have the greatest impact. Research suggests that self-help interventions like these are most effective when participants can relate to the characters seen in the videos, when the behaviours portrayed are relevant to their own presenting concerns, and when they feel that they themselves are capable of achieving the same successes demonstrated by the models (Campbell & Smith, 2003). Participant feedback suggested that the *Body-for-LIFE: Success Stories 1* (Phillips & Asiano, 1999) video-segment met these criteria.

What's more, the Heavy weight participants, those believed to be the hardest to reach, were the individuals who demonstrated the greatest increase in weight loss self-efficacy from pre-test to follow-up, when compared to the Moderate weight participants in the same treatment-homework condition. The reviewing of the modelled success stories was enough to encourage even these individuals, allowing them to feel more confident in their own ability to succeed in the same way the models had.

On a more practical level, these findings may hold implications for policy measures aimed at overweight and obese individuals in the general population. Seeing that advertising measures in the past aimed at issues like smoking cessation have greatly helped to reduce the incidence of smoking in North America, there may be room for similar interventions aimed at weight loss. Television commercials shown on a repeated basis, might serve to mimic the effects

of take-home videos, posters placed in shopping malls or grocery stores, or labels on food items reinforcing the success stories of average "others." If these types of interventions can be used to reach overweight or obese individuals where they are in their everyday routines, it may be all that is needed to move some of them from a pre-contemplation stage to a stage where they feel more confident in their ability to take action.

Limitations of the Study

Before putting implications into practice however, there are limitations to the current research that later replications might look to improve upon. With approximately just one third of the participant sample falling into the obese/overweight BMI range and with only nine of these participants considered obese, the project under-represented the population it had been meaning to target. In fact, the percentage of obese and overweight participants in the study was less than that reported in Canadian or American National obesity statistics. Future research would be expected to use only obese and overweight participants, so the results can be better generalized to these populations.

There may also be some difficulty generalizing the results to obese and overweight individuals in the general population who have no intent to change their behaviour. To speak again in the context of the TTM (Prochaska & DiClemente, 1983), there may those who are fixed in the pre-contemplation stage. That is, they may have no intent to change their behaviour because 1) they do not recognize that they have a problem, 2) they deny having a problem, or 3) they are unwilling to change. That participants volunteered to take part in a research project looking at ways to improve health (not considering the $50 draw, or offer of course credit for student participation) suggests that they could have been more motivated than obese and

overweight individuals who would not volunteer to take part in this type of research for the reasons mentioned above.

As there was potential for a more highly motivated obese or overweight participant, an estimate of participants' "stage of change" was included as part of the background questions completed before the IPAQ and WEL measures. Participants were asked to respond to the question: "Are you trying to improve your health at this time in your life?" Possible responses ranged from 1 (No, it is not at all a priority) to 7 (Yes, it is my highest priority). While this was only a rough estimate of participants' willingness to improve health, the relatively high mean score (M = 4.84) suggests that the group was fairly motivated on the whole.

In contrast however, participants in the video take-home conditions appeared less than enthusiastic to review their respective videos at home on their own time. Of course, it was difficult to regulate how often participants reviewed the take-home videos. As some were more consistent then others with the task, it is hard to determine how this may have affected weight loss self-efficacy scores for those in the motivational-homework and control-homework conditions. Simply having the *opportunity* to review the motivational videos, regardless of how often they were actually reviewed, seemed enough to increase participants beliefs in their ability to lose weight, when compared to those watching the videos at the initial video workshop alone.

There was also some concern about the limitations of the instruments used in the project. With a shortage of true weight loss self-efficacy instruments available, the WEL was one of the few existing measures used to gauge individuals' beliefs in their ability to lose weight. Having said this, the scale's items focus primarily on the dieting aspect of weight loss. As most contemporary research considers obesity multiply determined, and weight loss to involve a combination of factors, diet being just one, the WEL may place too strong an emphasis on the

dieting aspect while neglecting other weight loss concerns. Even with the added exercise and genetic items, the measure may have fallen short of capturing the multi-dimensionality of the construct.

The International Physical Activity Questionnaire, S7S, used to gauge the exercise activity of participants, was also not without its limitations. Again, the questionnaire asked only about the time spent being physically active in the last seven days. An obvious weakness is that an unusual week, whether it involves more or less physical activity than normal, can be taken to represent average physical activity across longer periods of time. For example, student exams, work deadlines, or recent injuries may have caused some participants to report lower than normal levels of physical activity during the follow-up week, when in reality they may have been far more physically active over the balance of the two months. In the same way, some participants may have reported higher than average physical activity levels. An instrument taking into account physical activity over a longer period could have provided a more accurate picture of how participants had been exercising throughout the two-months between pre-test and follow-up tests.

Conclusion

Certainly, the primary goal of the current research was to demonstrate that weight loss self-efficacy can be increased for individuals before their own behavioural weight loss efforts. This proved to be the case, indicating that it may be possible to motivate segments of the overweight and obese populations who may be reluctant to take initial action. Unlike past research that has attempted to increase weight loss self-efficacy by first having participants experience mastery with regard to exercise or dieting behaviours, the current findings demonstrate that overweight and obese participants can feel more confident about their ability to

lose weight simply by seeing the modelled successes of other individuals like themselves. Again, the implications here are important because many overweight or obese individuals may initially lack the confidence to ever take part in a behavioural weight loss program.

However, there is still room for further research. Physical activity did not increase along with the increases in weight loss self-efficacy for those watching the motivational videos. This result was somewhat unexpected. While a heightened sense of self-efficacy can provide health benefits in itself, it was anticipated that this would translate into measurable increases in weight loss behaviour. Nonetheless, the absence of increased physical activity appears to provide further support for the project's primary hypotheses. Weight loss self-efficacy continued to increase over the two months before participants had made any attempts through exercise to lose weight. With increased pre-treatment self-efficacy relating to weight loss, and post-treatment self-efficacy contributing to maintenance of that weight loss, strengthening these beliefs, for those who may lack the initial confidence, is an important step that may prove highly beneficial, whether behaviour change occurs immediately, or over the longer term weight loss process.

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APPENDIX A

Background Questions

Directions: please fill in the blanks or check the correct answer

Age: ___ (years)

Gender: □ Male □ Female

Ethnicity: □ Asian Descent □ Caucasian □ African descent □ Middle Eastern

□ Indo-Canadian □ Hispanic □ First Nations □ Other (please describe)_____

Year in University: □ 1st yr. □ 2nd yr. □ 3rd yr. □ 4th yr. or over

Health Status:

Height: ___ (inches or meters) Weight: ___ (lbs. or kgs.)

Hours spent engaging in physical activity per week: ___ hrs.

Do you participate in any competitive sports? □ Yes □ No

Are you currently on a diet? □ Yes □ No

Have you ever dieted? □ Yes □ No Current Illnesses: (please describe)

Currently taking medication (not vitamins) for health needs? □ Yes □ No

Are you trying to improve your health at this time in your life? (please circle)

1 2 3 4 5 6 7

No, it is not at all a priority Yes, it is my highest priority

What are you doing to improve your health at this time in your life? (please describe)

APPENDIX B

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

   _____ **days per week**

   ☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____ **hours per day**

   _____ **minutes per day**

   ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

   _____ **days per week**

   ☐

No moderate physical activities → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

Scoring: Total MET minute scores are computed by summing Walking MET minutes, Moderate MET minutes, and Vigorous MET minutes.
Sub-scale scores are computed as:

Walking MET minutes: 3.3 x (item 6) x (item 5)
Moderate MET minutes: 4.0 x (item 4) x (item 3)
Vigorous MET minutes: 8.0 x (item 2) x (item 1)

Values used for missing data:

Item 1: 2
Item 2: 60 min.
Item 3: 5
Item 4: 25 min.
Item 5: 2
Item 6: 10 min.

APPENDIX C

Weight Efficacy Life-course Questionnaire

Directions: Please circle the number that best describes how confident you are that the statement is true of you.

1. I can resist eating when I am anxious (nervous)

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

2. I can control my eating on the weekends.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

3. I can resist eating even when I have to say "no" to others.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

4. I can resist eating when I feel physically run down.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

5. I can resist eating when I am watching TV.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

6. I can resist eating when I am depressed (or down).

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

7. I can resist eating when there are many different kinds of foods available.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

8. I can resist eating even when I feel it's impolite to refuse a second helping.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

9. I can resist eating even when I have a headache.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

10. I can resist eating when I am reading.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

11. I can resist eating when I am angry (or irritable).

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

12. I can resist eating even when I am at a party.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

13. I can resist eating even when others are pressuring me to eat.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

14. I can resist eating when I am in pain.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

15. I can resist eating just before going to bed.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

16. I can resist eating when I have experienced failure.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

17. I can resist eating even when high-calorie foods are available.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

18. I can resist eating even when I think others will be upset if I don't eat.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

19. I can resist eating when I feel uncomfortable.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

20. I can resist eating when I am happy.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

Scoring: Mean WEL total scores are computed by summing all items and dividing by the total number of items.
Sub-scale scores are computed by summing the four items for each of the five sub-scales and dividing by four:

Negative Emotions (1, 6, 11, 16),
Availability (2, 7, 12, 17),
Social Pressure (3, 8, 13, 18),
Physical Discomfort (4, 9, 14, 19),
Positive Activities (5, 10, 15, 20).

APPENDIX D

Weight Efficacy Life-course Questionnaire with Added Items

1. I can resist eating when I am watching television.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

2. I can control my physique through regular weight training.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

3. I can resist eating when there are many different kinds of foods available.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

4. I can resist eating when I am happy.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

5. I can resist eating just before going to bed.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

6. I can resist eating even when I have a headache.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

7. I can resist eating when I am reading.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

8. I can resist eating when I am in pain.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

9. I can resist eating even when others are pressuring me to eat.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

10. I can resist eating when I am angry (or irritable).

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

11. I can resist eating when I am anxious (nervous).

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

12. I can resist eating when I feel uncomfortable.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

13. I can resist eating even when I feel it's impolite to refuse a second helping.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

14. I can control my eating on weekends.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

15. I can control weight gain, even without monitoring my diet, because I stay slim naturally.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

16. I can control my level of fitness by engaging in vigorous exercise at least three times a week.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

17. I can resist eating when I am depressed (or down).

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

18. I can resist eating when I have experienced failure.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

19. I can resist eating even when I have to say "no" to others.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

20. I can control my weight easily, even without exercising, because I have a high metabolism.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

21. I can resist eating even when high-calorie foods are available.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

22. I can resist eating even when I am at a party.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

23. I can resist eating when I feel physically run down.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

24. I can resist eating even when I think others will be upset if I don't eat.

0 1 2 3 4 5 6 7 8 9
(not confident) (very confident)

Scoring: Mean WEL total scores are computed by summing all items and dividing by the total number of items.
Sub-scale scores are computed by summing the items for each of the seven sub-scales and dividing by the number of items in the sub-scale:

Negative Emotions: (10, 11, 17, 18)
Availability: (3, 14, 21, 22)
Social Pressure: (9, 13, 19, 24)
Physical Discomfort: (6, 8, 12, 23)
Positive Activities: (1, 4, 5, 7)
Exercise: (2, 16)
Genetics: (15, 20)

APPENDIX E

Principle Component Analysis for WEL with added Exercise and Genetic Items

Item No.s	Factor loading					
	1	2	3	4	5	6
WEL 10 [a]	.91	--	--	--	--	--
WEL 11 [a]	.90	--	--	--	--	--
WEL 17 [a]	.61	--	.22	--	--	--
WEL 18 [a]	.65	--	--	--	--	--
WEL 3 [b]	--	.79	--	--	--	--
WEL 14 [b]	--	.47	.23	.26	--	.25
WEL 21 [b]	--	.68	--	--	--	--
WEL 22 [b]	--	.82	-.21	--	--	--
WEL 9 [c]	.60	.38	-.21	--	-.26	--
WEL 13 [c]	--	-.39	--	1.06	--	--
WEL 19 [c]	.21	.37	--	.45	--	--
WEL 24 [c]	--	.26	--	.77	--	--
WEL 6 [d]	--	--	.74	--	--	--
WEL 8 [d]	.64	--	--	--	--	--
WEL 12 [d]	.84	--	--	--	--	--
WEL 23 [d]	.48	--	.29	--	--	--
WEL 1 [e]	--	.59	.24	--	--	--
WEL 4 [e]	--	.83	--	--	--	--
WEL 5 [e]	--	.26	.77	--	--	--
WEL 7 [e]	--	--	.65	--	-.25	.29
WEL 2 [f]	.29	--	--	-.25	--	.87

WEL 16[f]	-.27	--	--	--	--	.91
WEL 15[g]	--	--	--	--	.94	--
WEL 20[g]	--	--	--	--	.93	--

Note. Principal Component Analysis: Pattern Matrix.

Sub-scales: [a]Negative Emotions, [b]Availability, [c]Social Pressure, [d]Physical Discomfort, [e]Positive Activities, [f]Added Exercise Items, and [g]Added Genetics Items.

APPENDIX F

Video Viewing Instructions Script for Treatment Participants

"The video that you are about to watch is a motivational segment documenting the success stories of a couple, who began feeling as though they were out of shape, and through proper diet and exercise were able to work toward excellent health. They were participants in a fitness competition and made their transformation over the course of 12 weeks. The segment is about 20-minutes long. Feel free to just relax and enjoy the video."

APPENDIX G

Video Viewing Instructions Script for Control Participants

"Research has shown that relaxation strategies are a helpful way to reduce stress and to improve overall health. You may have heard about relaxation videos that use footage from nature as a way to induce relaxation. The video that you are about to watch is a segment just like this. It is footage taken from Tofino and loops the ocean surf crashing against the shore. What I want you to do for the next twenty minutes then, is to simply try and relax and match your breathing to the pattern of the waves or whatever else you find helpful. Just let yourself become as relaxed as you can. The video is about twenty minutes long, so just relax and enjoy."

APPENDIX H

Videotape Questions for the Take-Home (or on-line) Packet

"How much do you remember of the video?"

1	2	3	4	5	6	7
recall nothing at all						complete detail

"What did you think about the quality of the video?"

1	2	3	4	5	6	7
poor quality						excellent quality

"Did you enjoy the video?"

1	2	3	4	5	6	7
the video was not at all enjoyable						the video was highly enjoyable