The Effects of Relapse Prevention Training on Exercise Adherence

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Western Michigan University

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THE EFFECTS OF RELAPSE PREVENTION TRAINING ON EXERCISE ADHERENCE

by

Sandra Beaty

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THE EFFECTS OF RELAPSE PREVENTION TRAINING ON EXERCISE ADHERENCE

Sandra Beaty, Ph.D.
Western Michigan University, 1990

Behavioral techniques have proven effective in the acquisition and maintenance of new behaviors. However, health related behaviors, such as exercise, pose a special problem for the field of behavior change in that they require long-term lifestyle changes. This study assessed the effectiveness of relapse prevention training on exercise adherence within the framework of a formal exercise program. There were 20 subjects in the experimental group and 20 subjects in the control group. Both groups met for three, one-hour sessions weekly for eight consecutive weeks. Exercise class attendance was recorded by the instructor. In addition, the Physical Activity Index (PAI, n.d., available from YMCA, Kalamazoo, Michigan), a self-reported overall fitness rating scale, was administered as a pre-test, at two week intervals throughout the program, and at two post-test periods to both groups. The critical difference between the two groups lay in the experimental group receiving the relapse prevention training component during the first 14 sessions of the 24 session program, which included didactic presentations and hand-outs. The remaining 10 sessions were exercise sessions without the didactic component.

The findings from this study indicated that there was significantly greater attendance for the experimental group than for the control group. There was a
significant correlation between attendance and last week of the program attended, with the experimental group staying in the program longer than the control group. There was a stable trend in attendance for the experimental group through session 14, after which there was a downward trend in attendance. The control group had a downward trend in attendance throughout the program. The PAI scores were significantly higher for the experimental group than for the control group. Secondary issues of the use of quizzes, the generalization of results, the use of naturally occurring groups, and the cost-effectiveness of this intervention were also discussed. It was concluded that relapse prevention training was an effective component to a successful exercise adherence program.
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The effects of relapse prevention training on exercise adherence

Beaty, Sandra Kay, Ph.D.

Western Michigan University, 1990

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CHAPTER I

INTRODUCTION

Background of the Problem

Psychologists have long been concerned with the acquisition of new behaviors and their maintenance over time. Behavioral techniques have proven effective in many areas; however, health-related behaviors (e.g., diet and weight control, physical fitness, and the cessation of addictive behaviors) pose a special problem for the field of behavior change. They present particularly challenging demands because they require long-term lifestyle changes and, in addition, they often have both psychological and physiological addictive components. Many of the addictive behaviors, such as smoking, alcohol and cocaine use, with continued usage become powerful reinforcers and the cessation of the usage of these substances leads to rapid aversive consequences, referred to as withdrawal symptoms. Although the exercise habit may not be physiologically addicting like these other behaviors, it appears to have long-term psychologically addictive-like properties and shares many similarities with other health-related behaviors. The exercise habit is often difficult to establish; however, once established, exercisers report feelings of unease, irritability, and depression when unable to exercise for a period of time. These symptoms are similar to those experienced during withdrawal from addictive substances. Exercise, like many health-related

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behaviors, is probably associated with reinforcing long-term consequences, such as weight control, physical fitness, and feeling good, but also produces punishing consequences on an immediate basis, such as muscle soreness, fatigue, and time away from other, preferred activities. Exercise relapse curves appear similar to the negatively accelerated curve found for such addictions as smoking, alcohol and cocaine use. That is, the majority of relapses occur during the first several months, followed by continued deterioration through nine months to one year, and an eventual leveling off of the dropout rate between 55% and 75% (Martin & Dubbert, 1982a). In other words, of all individuals beginning an exercise regime, only 25% to 45% will still be exercising at the end of the first year.

A review of the exercise literature indicates that evaluation of exercise adherence research is complicated by unusually high attrition rates in all the studies examined (Andrew et al., 1981; Desharnais, Bouillon & Godin, 1986; Gale, Eckhoff, Mogel & Rodnick, 1984; Kriska, Bayles, Cauley & Laporte, 1986; Massie & Shephard, 1971; Oldridge, 1979; Stern & Cleary, 1981; Wilfley & Kunce, 1986). The initially high dropout rates may be attributed to the immediate aversive effects of exercising and, presumably, have nothing to do with the experimental designs of researchers. Many subjects, consequently, do not experience the experimental condition designed to improve adherence. Thus, the effects of specific strategies on exercise adherence have yet to be adequately tested in an experimental analysis. In addition, it may be premature to try maintenance strategies before subjects have committed themselves to a program so they can begin to experience the positive effects of exercising. Experimental
research efforts need to focus on keeping subjects in the exercise program.

Martin and Dubbert (1984) reviewed the literature which dealt with behavioral management strategies for improving exercise adherence, which included shaping, stimulus control and reinforcement, behavioral contracting, cognitive self-control strategies, generalization training, reinforcement fading, and relapse prevention. They addressed two areas, acquisition (while in a formal program) and maintenance, and concluded that the primary goal during the first 8 to 12 weeks should be to establish the habit of exercise and not physical conditioning which is achieved over time by those who continue to exercise. Generalization training is important in the maintenance of exercise behavior. The authors suggested that formal exercise sessions should be gradually faded before program termination, thereby preparing the individual to exercise in the environment in which the behavior is to be maintained.

This recommendation is based on the assumption that individuals will not be involved in an ongoing formal exercise program. This assumption is made by a number of authors who express a similar view that there needs to be a switch from programmed exercise acquisition to unstructured maintenance (Kau & Fischer, 1974; Martin & Dubbert, 1984; Wysocki, Hall, Iwata & Riordan, 1979). The advisability of such a switch for all subjects is questionable; it might be more realistic to teach that formal exercise is an ongoing lifestyle change, and incorporate it into the subject's daily routine. Given the high drop-out rate while involved in an exercise program and the even higher relapse rate when exercising on their own following termination of the formal program, it may be unrealistic...
to expect individuals to maintain the newly developed behavior on their own without the social support and reinforcement of the group setting.

In addition to concerns regarding the high drop-out rate while involved in the formal program and the lack of generalization of exercise behavior outside the formal program setting, several other issues emerge when attempting to analyze the exercise adherence literature. One methodological issue has been the lack of a control group for comparison purposes (Keefe & Blumenthal, 1980; Wysocki et al., 1979). There has also been a general lack of replicated findings; this makes it difficult to credit any observed changes solely to the intervention employed in the study. In addition, there was a lack of consistency in the definition of exercise adherence used in the various studies, making comparisons between studies difficult.

Most adherence research has relied on a descriptive, rather than an experimental, level of analysis. Dishman (1982a), in a review of the exercise adherence literature, noted that the predominant research strategy in intervention studies has examined group effects without a control comparison or has involved individual case reports. He suggested a paradigm for the facilitation of exercise adherence which would incorporate: initial identification of the dropout-prone individual; subsequent determination of influence within the exercise setting to which this individual might be sensitive; and appropriate manipulation of these situational factors to enhance the likelihood of adherence.

It is difficult to compare the various exercise adherence studies due to the differing definitions of adherence employed in the studies. This researcher
concur with Martin and Dubbert (1982b) who proposed that exercise adherence be defined as the percentage of overall adherence, i.e., the observed adherence of an individual compared with a preset criterion for ideal performance (e.g., an ideal standard of three times a week).

In summary, methodological issues such as the lack of comparison control groups, the lack of replicated findings, the lack of a consistent definition of adherence, and the reliance on self-reported data are of concern when attempting to analyze the exercise adherence literature. Future researchers should attempt to alleviate these concerns by using research designs which include control groups, a consistent definition of exercise adherence, and objective as well as subjective measures of adherence.

From a review of the literature, experimental research efforts to improve exercise adherence can be classified in three general categories: (1) environmental modification to facilitate adherence, such as using telephone calls as prompts (Wankel & Thompson, 1977; Wankel, Yardley & Graham, 1985); (2) manipulation of reinforcement schedules, such as providing immediate feedback during the exercise session (Allen & Iwata, 1980; Kau & Fisher, 1974; Martin et al., 1984); and (3) fostering self-control (Belisle, Roskies & Levesque, 1987; King & Frederiksen, 1984; Martin et al., 1984). In this third approach, the exercisers themselves are taught to manipulate and control antecedents and consequences associated with exercise adherence, primarily by becoming aware of and learning the specific skills needed to change exercise-related cognitions and behaviors. All three approaches have provided positive results in terms of improved exercise
adherence; however, there are few follow-up data to indicate whether individuals continue to exercise, either on their own or in another formal program, following the termination of the experimental program.

The relapse-prevention model developed by Marlatt and Gordon (1980) directly addresses the problem of maintenance of newly acquired health-related behaviors. Developed initially to aid in the treatment of addictive behaviors (e.g., alcoholism, smoking), it focuses on helping the individual acquire coping strategies that will both reduce the risk of an initial lapse from the desired behavior and, equally important, prevent any lapse from escalating into a total relapse. The problem of lapses and relapses is considered an important part of the learning required for successful behavior change and maintenance.

Relapse prevention training was first described by Marlatt and Gordon (1980), who suggested that an individual's ability to maintain a behavioral pattern is influenced by his or her ability to cognitively and behaviorally cope with lapses back to the unwanted behavior. They propose the early training of individuals in cognitive strategies (e.g., cognitive restructuring of thoughts concerning personal failure) and behavioral methods (e.g., preplanning of alternative ways of engaging in behavior during periods when lapse is likely) of coping with lapse situations as one way of maintaining the target behavior. Marlatt and Gordon (1980) and Condiotte and Lichtenstein (1981) have applied this model to behavior change and maintenance involving reduction of unwanted behaviors (e.g., problem drinking, smoking); it appears that such a model could be readily applied to behavior change programs involving the increase of desired behaviors, such as
Some aspects of the model apply to any lapse from desired behavior change (e.g., smoking cessation, alcohol or drug abstinence). A lapse is defined as any discrete violation of an imposed rule or set of rules governing the rate or pattern of consumption behaviors. The criterion of abstinence, the most stringent and absolute rule one can adopt in this regard, is violated by a single occurrence of the target behavior. The model posits a sequence of five factors or stages that culminate in an increased probability of relapse. First, the person encounters a high-risk situation. These are situations that are often associated with lapses and that challenge an individual's sense of control over the behavior and self-efficacy (e.g., thoughts regarding the individual's ability to maintain the desired behavior change). Second, in the face of a high-risk situation, the person either emits an ineffective coping response or fails to emit a coping response. The person may not recognize the need for such a response or she or he may possess inadequate coping skills. After failing to attempt to cope with the high-risk situation, decreased efficacy expectations and increased positive outcome expectations for the effects of lapsing may ensue. The additive effect of the high-risk situation, lack of coping response, and alteration in expectations may result in the fourth phase of the model: initial lapse. The chain of lapsing can then accelerate in the final phase of the model, leading to a relapse back to the unwanted behavior. A relapse is defined retrospectively by looking at the behavior over time and reflects a pattern of lapses with no occurrences of the desired behavior. An abstinence violation effect and the perceived effects of the substance or event can combine
to increase greatly the probability of continued lapsing. These perceived effects can include the initial drug effects of nicotine, alcohol or cocaine, or the extra time one has when not exercising. The abstinence violation effect consists of the occurrence of cognitive dissonance, which is a negative emotional state resulting from the discrepancy between behavior and cognitions. This dissonant state is presumed to motivate changes in cognitions or behavior to reduce the discrepancy, such as increased lapsing with concomitant changes in perceptions. An important component of the abstinence violation effect is to attribute the lapse to a personal failing or weakness, as opposed to attributing it to external or situational causes.

Although the Marlatt and Gordon model (1980) was developed to deal with the reduction of unwanted behaviors such as excessive alcohol and smoking consumption, it could be expanded to include those cases in which the individual is attempting to start a new behavior pattern rather than stopping an already ongoing behavior, such as initiating a regular program of exercise. In these cases, a lapse would be defined as a failure to engage in the target behavior.

Review of the Relapse Prevention Training Exercise Research

There are many possible reasons for dropping out of an exercise program. Goodrick, Hartung, Warren and Hoepfel (1984) surveyed 77 graduates of an adult fitness program between 6 and 12 months after completion of the 8 week program. They assessed current exercise involvement and perceived barriers to regular exercise. Of the 77 individuals, 53% were not exercising regularly. Most
nonexercisers (56%) attributed their lapses to a lack of time. Feelings of tiredness or lack of energy were the second most frequently cited reasons for quitting. Life stressors such as changes in job or marital status, or a change in residence were the third most frequently cited reasons (24%).

When it comes to treatment intervention procedures, programs are generally deficient in their neglect of anticipating and planning for the probability of a lapse with their clients. Only three exercise adherence research programs have identified relapse prevention training techniques as part of their experimental design (Belisle et al., 1987; King & Frederiksen, 1984; Martin et al., 1984). There appears a consensus among exercise adherence researchers that to talk about a lapse is tantamount to giving one permission to indulge in the unwanted behavior; nonetheless, the research compels one to examine the high dropout rate that occurs by the end of the first year in all exercise programs. In examining long-term behavior change, it becomes apparent that at some point in time a lapse is likely to occur. It follows that teaching individuals how to cope with a lapse so that it does not escalate into a total relapse may improve adherence to the newly acquired desirable behavior.

Martin et al. (1984) conducted a series of studies which attempted to identify behavioral and cognitive procedures that would enhance adherence to a three day per week exercise program consisting of walking/jogging in healthy, sedentary adults. In one of these studies, relapse prevention training was used. It consisted of cognitive strategies, such as the discussion of the realistic probability of adherence lapses, identifying factors that may increase the
likelihood of a lapse, and the abstinence violation effect. Following discussions
of these factors, which were conducted by group leaders, examples were elicited
from group members and they were encouraged to problem solve together. At
week nine, subjects tried a planned lapse (not running for an entire week).
Subjects were instructed to use the problem solving procedures they had been
taught to start running on their own following the planned lapse. Unfortunately,
methodological problems, such as new staff unfamiliar with the program and not
following the procedures, resulted in inconclusive results.

King and Frederiksen (1984) investigated two low-cost methods for
increasing the number of participant-controlled jogging episodes over a five-week
period: group social support and a brief relapse prevention training procedure.
The relapse prevention procedure consisted of systematically preparing individuals
for the possibility of an intermittent lapse, defined as missing a planned exercise
period. These authors observed that as little as one lapse back to the unwanted
behavior (in this case, inactivity) led the individual to drop out of the regimen
entirely. At an intervention session instructions on appropriate jogging behavior
were either presented alone, combined with relapse prevention training, combined
with strategies designed to foster group social support, or presented in
conjunction with both of these interventions. Subjects were 52 college women,
who were randomly assigned to one of the four experimental conditions.
Cooper's 12-minute test (Cooper, 1968), which requires the subject to travel
(walking or running) as far as he or she can in 12 minutes and gives a reliable
estimate of aerobic capacity, was administered as a pre- and post-test. In the
group plus relapse condition, subjects participated in team-building exercises which were designed to increase cohesiveness and familiarity within groups. Subjects also received a description of the runner's relapse effect, based upon Marlatt and Gordon's (1980) abstinence violation effect, and were told how it could influence exercise maintenance. Each participant was given written vignettes describing instances (e.g., exam week, vacation) when a lapse would be probable. Cognitive and behavioral coping strategies (e.g., modifying negative thoughts regarding personal failure and self-blame when a lapse occurs; promptly rescheduling the missed exercise episode) were subsequently rehearsed both individually and with the group as a whole. In the group-only condition, the subjects received the group support manipulation as described above. In the relapse-only condition subjects were instructed to jog alone during the study. They received information on relapse in the same manner described for the group plus relapse condition. In the control condition, participants were requested to jog alone; no relapse prevention information was given. During the five weeks of the study, subjects recorded when each jogging episode took place. Results showed that relapse prevention training alone and social support alone resulted in the initiation of nearly double the number of jogging episodes relative to the number initiated in the control or group plus relapse condition. The group plus relapse condition scored lower on group cohesiveness scores than did the group-only participants. A three-month follow-up was scheduled when the subjects completed a questionnaire evaluating their exercise behavior during the previous two-month period. Eighty-three percent of the subjects in the relapse only
condition reported that they were still jogging, which was significantly better than the other three conditions. The fitness data also suggested an improved fitness level with increased reports of jogging episodes.

The authors suggested using naturally occurring groups (e.g., friends, co-workers, family members) to lessen potentially negative effects, such as lack of group support and identity, arising from using non-cohesive exercise groups. It is possible that the team-building exercises that were intended to increase cohesiveness and familiarity within the group plus relapse condition served mainly to confound the results by introducing an extraneous variable, i.e., group cohesiveness, in addition to the relapse prevention intervention being assessed. The experimental design, and subsequent data, would have been less confounding had the experimenters simply added the relapse prevention training component to the group condition.

Belisle et al. (1987) tested the efficacy of relapse-prevention training in increasing attendance during an exercise program and exercise adherence for 12 weeks following termination of the formal program. There were 593 subjects who participated in 10 week exercise groups (jogging, aerobic dance, and pre-ski training). All groups met weekly for two one-hour sessions, with participants encouraged to exercise on their own for a third weekly session. The relapse prevention training intervention, designed to increase awareness of obstacles to exercise and to develop appropriate techniques for coping with them, was delivered by group leaders within the context of the regular program. The control group received the regular exercise program without the relapse training
component. Attendance at group sessions was recorded by the instructors. Only 42.6% of the total sample continued until the last week of the program. Results indicated a small but consistent superiority of adherence in the experimental condition compared to the control condition. Adherence to physical exercise during the three-month follow-up was based on telephone calls to all program registrants every two weeks. Participants in the experimental condition reported significantly more exercise periods than did those in the control condition. The authors concluded that the low cost of this intervention makes even small gains cost effective. Short-term exercise programs without relapse prevention training have not achieved long-lasting exercise habits except among a small percentage of participants. It remains to be seen whether longer-term exercise programs with relapse prevention training can do as well or better.

The high dropout rate in exercise programs, and the even higher relapse rate following termination of the formal program, need to be directly addressed. Relapse prevention training may provide a means of addressing these issues by dealing directly with the problem of behavioral lapses. It is an intervention which has had promising results in reducing relapse in several health-related behaviors, and may also be useful in preventing relapse in exercise behavior.

Although relapse prevention training was initially designed to maintain a reduction in unwanted behaviors, the above mentioned studies demonstrate that it also is applicable to the increase of positive behaviors, such as exercise. A review of the literature indicated that research in this area is limited and that results of the studies have been difficult to interpret due to certain
methodological problems. Further research is needed to adequately assess the effectiveness of this intervention on exercise adherence.

This researcher believes that several components of existing relapse prevention strategies emerge that can be successfully incorporated in an exercise program. The first step to take in the prevention of relapse is to train the client to recognize those high-risk situations which are likely to increase the likelihood of relapse. These situations could range from general areas such as feeling pressured with family or work demands, to specific situations such as forgetting to bring one’s exercise clothes to the gym or being asked to join co-workers for a drink at the same time the exercise class is held. Self-monitoring procedures provide the best method of identifying these situations. If the individual has never learned appropriate coping responses to deal with high-risk situations, emphasis should be on teaching the requisite skills involved. These could include time management skills, as well as basic assertiveness training in teaching individuals to refuse unfair requests others may make and to express their own needs in an honest, open manner. Use of a problem-solving approach as a component of a relapse prevention program is recommended to increase the individual’s self-efficacy in dealing with numerous problems of life, any one of which may be capable of precipitating a relapse. Individuals would be taught to generate and explore alternative solutions to problems, while maintaining their commitment to overall fitness via attendance at exercise class. Cognitive restructuring skills would also be taught to prepare the individual to cope with the guilt and sense of failure often associated with the abstinence violation effect.
The individual would be taught to look upon the lapse (missing an exercise class) as a single, independent event, something that can be avoided in the future by the use of an appropriate coping response. Instead of passively concluding that all is lost and that nothing can be done if a lapse occurs, the individual can be taught to interpret the lapse as an opportunity to intervene and initiate an effective self-control response.

This researcher suggests using cognitive strategies with didactic techniques in a relapse prevention training component to deal with perceptions of time pressure, lack of energy, and life stressors. It would be emphasized that increased physical fitness is normally associated with increased perceptions of energy. Participants would be taught that exercise intensity and duration should be self-regulated based on perceived exertion. Relapse prevention for problems related to life stressors would emphasize the stress-reducing and antidepressant potential of regular exercise (Greist, Eischens, Klein & Faris, 1979; Ledwidge, 1980; Morgan, 1979).

The purpose of this study is to assess the effects of relapse prevention training on exercise adherence within the framework of a formal exercise program.

Hypotheses

1. Subjects receiving relapse prevention training will demonstrate a significantly greater adherence to the exercise sessions, as measured by number of exercise sessions attended, than those subjects not receiving relapse prevention
training.

2. Exercise adherence will be positively correlated with improved scores on the Physical Activity Index (n.d., available from YMCA, Kalamazoo, Michigan) for both experimental and control groups.
CHAPTER II

METHOD

The purpose of this study was to assess the effectiveness of relapse prevention training on exercise adherence within the framework of a formal exercise program. It was hypothesized that relapse prevention training would lead to a significantly greater adherence to the exercise sessions as measured by the number of exercise sessions attended. It was also hypothesized that exercise adherence would be positively correlated with improved scores on the Physical Activity Index (PAI, n.d., available from YMCA, Kalamazoo, Michigan) for both experimental and control groups.

Subjects

Subjects were recruited from the staff at the Kalamazoo (Michigan) Regional Psychiatric Hospital (KRPH) through notices in the employee weekly newsletter and posters displayed on departmental bulletin boards (see Appendix A). Due to restrictions on gym availability and time constraints encountered in trying to offer the exercise program to employees working various hours, subjects were not randomly assigned to the experimental and control groups. The experimental and control groups were conducted at different times. There were 20 subjects in the control condition and 20 subjects in the experimental condition.
A pre-training demographic questionnaire (developed by the researcher; see Appendix B) was completed by each participant and was used to determine the degree of equivalency between each of the experimental and control groups, respectively.

There were 19 females and 1 male in the experimental condition. Three of the subjects were cigarette smokers. Seventeen had previously participated in an aerobic exercise program. The age range was between 27 to 58 years of age, with an average age of 39.8 years. Fourteen of the subjects were overweight. The range of overweight was between 9 to 90 pounds, with an average overweight of 24.6 pounds.

There were also 19 females and 1 male in the control condition. Two of the subjects were cigarette smokers. Nineteen had previously participated in an aerobic exercise program. The age range was between 28 to 59 years of age, with an average age of 40.7 years. Eleven of the subjects were overweight as determined by a height-weight ratio formula that is standardized in the field of exercise. The range of overweight was between 10 to 50 pounds, with an average overweight of 14.8 pounds (see Table 1).

Subjects were required to pre-register for the program by paying $35.00 for the entire 24 exercise sessions which went to cover the cost of the exercise program.

The treatment of the participants was in accordance with the ethical standards of the American Psychological Association (Principle 9, Research with Human Participants, APA, 1981), and with the Human Subjects Institutional
Table 1

Demographic Questionnaire
Composition of Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female 19</td>
<td>Female 19</td>
</tr>
<tr>
<td></td>
<td>Male 1</td>
<td>Male 1</td>
</tr>
<tr>
<td>Cigarette Smokers</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Prior Aerobic Participation</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Average Age in Years</td>
<td>39.8</td>
<td>40.7</td>
</tr>
<tr>
<td>Age Range in Years</td>
<td>27-58</td>
<td>28-59</td>
</tr>
<tr>
<td>Overweight Subjects</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>Average Overweight in Pounds</td>
<td>24.6</td>
<td>14.8</td>
</tr>
<tr>
<td>Overweight Range in Pounds</td>
<td>9-90</td>
<td>10-50</td>
</tr>
</tbody>
</table>

Review Board, Western Michigan University (see Appendix C). Individuals were asked to sign a form prior to participation in the exercise program releasing KRPH, the Kalamazoo, Michigan, Young Men's Christian Association (YMCA), and Western Michigan University (WMU) from liability for any injury they might
incur as a result of participation in the program (see Appendix D). They were asked to sign a consent form which described the conditions of the study (see Appendix E). All participants were encouraged to have a medical examination prior to the start of the program. In addition, participants were administered the Physical Activity Readiness Questionnaire (PARQ, n.d., available from YMCA, Kalamazoo, Michigan; see Appendix F) at the beginning of the first session. This is a brief screening tool to assess the individual’s physical condition and alert the instructor to any physical conditions (e.g., heart disease, asthma) which might contraindicate exercise participation. No subjects reported any physical problems which would exclude them from the study.

Materials and Setting

The exercise program was held in the gymnasium at KRPH. This room was conducive to an aerobic exercise program; it was spacious, had wooden floors which cushioned the impact of aerobic exercise, and windows which opened and large ceiling fans which provided adequate cooling.

The Kalamazoo (Michigan) YMCA trained and provided an exercise instructor who was certified in cardiopulmonary resuscitation (CPR). The exercise instructor conducted a fitness-conditioning program that followed the guidelines of the National YMCA, the American College of Sports Medicine (1978, 1980), and the Institute for Aerobic Research (Cooper, 1968, 1970, 1972). This program consisted of warm-up exercises, aerobic exercises, muscle strengthening exercises, and cool-down exercises. The YMCA provided materials
used as part of the class, e.g., floor mats and rubber exercise bands. The YMCA also provided supervision and liability coverage for the instructor while teaching the program.

Procedure

The program consisted of 24 exercise sessions. Sessions were held for one hour, three times a week lasting for a total of eight weeks and following the format developed by the YMCA. Each session consisted of 10 minutes of warm-up exercises, followed by 20 minutes of aerobic exercises, followed by 20 minutes of muscle strengthening and conditioning exercises, followed by 10 minutes of cool-down exercises. Both the experimental group and the control group adhered to the above format. The critical difference between the two groups lay in the experimental group receiving the relapse prevention training component during the first 14 sessions of the 24 session program, which included didactic presentations and hand-outs. The remaining 10 sessions were full exercise sessions.

The relapse prevention training component was presented to the experimental group at the beginning of each session and lasted approximately five minutes for the first 14 sessions. The relapse prevention training component was conducted by this writer and incorporated strategies designed to teach the experimental subjects how to adhere to the exercise program. These strategies included cognitive and behavioral techniques for relapse prevention. In addition to the brief didactic component at the beginning of the sessions, subjects were
given hand-outs that corresponded to the material being discussed.

The relapse prevention training component was grouped into several themes. The first theme (sessions 1-4), included factors that interfere with exercise behavior, such as perceived barriers to exercise, muscle soreness, feelings of tiredness and lack of energy, and time constraints. The second theme (sessions 5-11), included instruction in Marlatt and Gordon's (1980) theory of relapse with a step-by-step analysis of how the theory applied to the real-life situation of maintaining exercise adherence. A part of Marlatt and Gordon's (1980) theory, the abstinence violation effect, was modified to fit the current research with an emphasis on adherence, rather than abstinence. Consequently, it was renamed the "adherence violation effect." This section included instructing the subjects in self-monitoring procedures and recognizing high-risk situations and factors which are likely to increase the likelihood of a lapse. The third, and final, theme (sessions 12 to 14) dealt with the physical and psychological benefits of exercise, and the role of exercise in weight control (see Appendix H).

The experimental group was given quizzes (see Appendix I) at the mid-point and end of the training component to assess knowledge of the content presented. These were brief 7-item quizzes, with true or false and multiple choice items, and they were devised by this author for this research.

Dependent Variables

Individual attendance data were recorded by the instructor for subjects in both groups at the beginning of each of the 24 sessions. Participants were also
required to place a check mark next to their names on a sign-up sheet upon entering the gym.

The PAI (see Appendix G) was administered to both groups at two-week intervals, beginning with the first week and continuing throughout the eight-week program. It was also administered at two- and four-weeks following termination of the formal program. The PAI is a brief self-report measure that assesses the frequency, intensity, and duration of current exercise level. Each individual was assigned a numerical fitness classification that corresponded to a fitness level, as determined by multiplying the frequency score by the intensity score by the duration score.
CHAPTER III

RESULTS

The purpose of this study was to assess the effectiveness of relapse prevention training on exercise adherence within the framework of a formal exercise program. A control group was included for comparison purposes. It was hypothesized that relapse prevention training would lead to a significantly greater adherence to the exercise sessions as measured by number of exercise sessions attended. It was also hypothesized that exercise adherence would be positively correlated with improved scores on the Physical Activity Index (PAI, n.d., available from YMCA, Kalamazoo, Michigan) for both the experimental and control groups. Statistical analyses of the data were conducted using the Statistical Analysis System (SAS, 1990) for the regression analysis and the Minitab System (1989) for the remaining analyses.

Demographic Data

Since subjects were not randomly assigned to the experimental and control conditions, the demographic data questionnaire was administered to all subjects to determine the equivalency of the groups. It can be concluded from a visual inspection of the questionnaire data that the groups were equivalent in regard to gender, smoking status, and prior aerobic exercise involvement. The subject
variables of age and overweight required further analysis to determine whether they were equivalent for the experimental and control groups. A check of the equality of variances for the age variable was conducted using the nonparametric Fligner-Killeen test ($p = .56$), and it was concluded that the variances for the experimental and control were the same. The obtained mean age for the experimental group was 39.75 years, with a standard deviation of 8.23. The obtained mean age for the control group was 40.65, with a standard deviation of 8.57. A two-sample $t$ test was conducted and the difference between groups was not found to be significant at the .05 level of significance ($p = .74$, $t = -.34$, $df = 38$); therefore, it was concluded that the means were the same for both groups. The experimental and control groups were equivalent with respect to age. To further substantiate these $t$ test results the Mann-Whitney test was conducted with the age data which also supported the conclusion that the experimental and control groups were equal with respect to age ($p = .92$).

A check of the equality of variances for the subject variable of overweight was also conducted using the Fligner-Killeen test ($p = .13$) and it was concluded that the variances for the experimental and control groups were the same. The obtained mean overweight for the experimental group was 24.6 pounds, with a standard deviation of 26.8. The obtained mean overweight for the control group was 14.8 pounds, with a standard deviation of 16.1. A two-sample $t$ test was conducted and the difference between groups was not found to be significant at the .05 level of significance ($p = .17$, $t = 1.41$, $df = 38$). To further substantiate these results the Mann-Whitney test was conducted with the weight data.
results of this nonparametric test support the conclusion that the experimental and control groups were equal with respect to weight ($p = .30$). Based on the above analysis, it was concluded that the experimental and control groups were equivalent in regard to composition for the demographic variables assessed. Once the equality between groups had been established, it was possible to proceed with the analysis of the outcome data for the experimental and control groups to determine if there were significant differences between groups that could be attributed to the experimental procedure.

**Attendance Data**

Attendance at the 24 exercise sessions for both the experimental and control group was recorded by the instructor at the beginning of each session. In addition, subjects were requested to write their names on a sign-in sheet each session (see Figure 1). These two measures of attendance were in agreement for each session. A regression analysis was conducted to determine the slope of the attendance data, whether there was a stable, upward or downward trend in attendance over time for the experimental and control groups. It was concluded that there was no upward or downward trend in attendance at the .05 level of significance for the experimental group before session 14 ($p = .6846$). After session 14 there was a downward trend in attendance that was significant at the .05 level ($p = .0005$). There was a downward trend in attendance for the control group that was significant at the .05 level both before and after session 14 ($p = .0008$).
Figure 1. Number of Subjects Attending Exercise Sessions.
The Fligner-Kileen test was conducted to determine the equality of variances for the experimental and control groups and it was concluded that the variances were equal for the two groups (p = .46). The obtained attendance mean for the experimental group was 14.45 sessions, with a standard deviation of 5.54. On session 14 the control group had no subjects in attendance. Since it was assumed that these data had nothing to do with the design of the research, this zero point was eliminated from the analysis. Inclusion would have artificially lowered the control scores. The obtained attendance mean for the control group was 8.60 sessions, with a standard deviation of 6.19. A two-sample t test of the equality of two means was conducted and the difference between groups was found to be significant at the .05 level of significance (p = .0016, t = 3.15, df = 38). It was concluded that the mean level of attendance for the experimental group was greater than that for the control group. To further substantiate these results the Mann-Whitney test was conducted with the attendance data. The results support the above conclusion that the experimental group had significantly greater attendance than the control group (p = .0042).

A statistical analysis was also conducted to determine whether the experimental group stayed in the program longer than the control group. The Fligner-Kileen test was conducted and it was concluded that the variances were not equal (p = .005). A two-sample t test that does not use a pooled estimate of a common variance was then conducted. The mean number of weeks completed for the experimental group was 7.05, with a standard deviation of 1.43. The mean number of weeks completed for the control group was 5.15, with a
standard deviation of 2.87. The difference was found to be significant at the .05 level of significance ($p = .0067$, $t = 2.65$, $df = 27$) and it was concluded that the experimental group stayed in the program longer than the control group.

A Pearson correlation analysis was conducted to determine whether there was a correlation between total attendance and the last week of the program attended. The correlation for both groups combined, experimental plus control conditions, was found to be significant at the .05 level ($r = .867$). A correlation analysis was also conducted separately for each group and it was concluded that there was a significant correlation between total attendance and last week of the program attended for both the experimental group ($r = .767$) and the control group ($r = .915$). Fifty-five percent of the experimental group and 45% of the control group were still attending the exercise program during week eight, the final week of the program.

**Physical Activity Index Scores Data**

In addition to the analysis of the attendance data, a statistical analysis was conducted with the PAI scores, which yielded several sets of data. The PAI scores reflected a general level of fitness score that was obtained by multiplying the reported values for frequency of exercise by intensity of exercise by duration of exercise for each two-week time period. This index was administered as a pre-test, at two-week intervals during the eight-week program, and at two, two-week intervals as a post-test, with a total of seven administrations.

A multivariate analysis of variance (MANOVA) was performed on the PAI...
scores for the experimental and control groups. Based on the results of this analysis, it was concluded that there was a significant difference between groups at the .05 level \( p = .028, F = 5.20, df = 1,222 \), and it was concluded that the PAI scores for the experimental group were higher than the PAI scores for the control group (see Figure 2).

Further analysis was conducted to determine whether the PAI scores changed over time; it was concluded that they significantly varied across time for both the experimental and control groups \( p = .0001 \). In addition, there was a similar pattern of change for both the experimental and control groups with the highest PAI scores reported for periods two and three, which corresponded to the first four weeks of the program. The experimental group means for these two, two-week periods were 65.95 and 68.25, respectively. The control group means for these periods were 57.15 and 42.75. The PAI scores were moderate over the last four weeks of the program; experimental group means for periods four and five were 64.30 and 52.10, control group means were 39.00 and 42.10. The lowest PAI scores were obtained for the pre- and post-test periods. The experimental group pre-test mean was 45.15 and the control group pre-test mean was 36.40. The post-test means for the experimental group were 43.22 and 51.44, for periods 6 and 7 respectively. The control group means for these two consecutive time periods were 30.26 and 32.26, respectively. It was also concluded that there was no significant interaction effect between group and time period \( p = .1816 \).

The PAI was broken down into its various categories and MANOVAs were conducted using each of the variables: frequency, intensity, and duration. It was
Figure 2. Changes in Physical Activity Index Over Time.
concluded that the PAI frequency scores did not differ significantly at the .05 level between the experimental and control groups ($p = .085, F = 3.13, df = 1, 222$). The PAI frequency scores did vary significantly across time for both groups ($p = .0001, F = 4.89, df = 6, 222$). There was no significant interaction effect between group and time period ($p = .09, F = 4.89, df = 6, 222$). Using Bonferonni pairwise comparisons, the frequency of exercise as reported on the PAI was found to be significantly higher at the .05 level for periods two, three, and four, which represented weeks one through six of the program ($t = 3.07, df = 222$). The data reflected an initial peak during the first six weeks of the program, then gradually dropped off to pre-test levels (see Figure 3). This pattern was similar to that found for the overall PAI scores over time.

It was concluded from a MANOVA that the intensity of exercise as reported on the PAI was significantly greater at the .05 level for the experimental group than for the control group ($p = .034, F = 4.83, df = 1, 222$). It was further concluded that the PAI intensity scores varied significantly over time ($p = .0001, F = 5.94, df = 6, 222$). No significant interaction effect between group and time period was found for this variable ($p = .103, F = 5.94, df = 6, 222$). The PAI intensity scores over time varied in the same pattern as did the scores for frequency (see Figure 4).

The PAI scores for duration of exercise periods were also analyzed using a MANOVA. The duration scores did not differ significantly between the experimental and control groups (see Figure 5). They did vary significantly across time ($p = .001, F = 8.45, df = 6, 222$). No interaction effect between group and time
Mean Rank for Frequency of Exercise

Figure 3. Mean Frequency of Exercise Over Time.
Figure 4. Mean Intensity of Exercise Over Time.

<table>
<thead>
<tr>
<th>Period 1 (Pre Test)</th>
<th>Period 2</th>
<th>Period 3</th>
<th>Period 4</th>
<th>Period 5</th>
<th>Period 6</th>
<th>Period 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Breathing</td>
<td>Moderate Breathing</td>
<td>Moderately Heavy Breathing</td>
<td>Heavy Breathing</td>
<td>Intermediate Breathing</td>
<td>Heavy Breathing</td>
<td>Sustained Heavy Breathing</td>
</tr>
</tbody>
</table>

Mean Rank for Intensity of Exercise

Two Week Time Periods
Figure 5. Mean Duration of Exercise Over Time.
period was found at the .05 level of significance ($p = .792, F = .52, df = 6, 222$).

Out of class exercise activity was also compared for the experimental and control groups. These exercise periods were calculated by subtracting exercise class sessions attended from the PAI frequency rating for each two week period during the eight week program. During the first two weeks of the exercise program, the experimental groups out of class exercise episodes mean was 2.55, with a standard deviation of 2.70. The control group mean for exercising out of class during this period was 1.50, with a standard deviation of 2.63. It was concluded that there was no significant difference between groups at the .05 level ($p = .22, t = 1.25, df = 38$). For weeks three and four of the exercise program the experimental group mean for out of class exercise was 1.80, with a standard deviation of 2.04. The control group mean was 1.40, with a standard deviation of 1.79. It was concluded that there was no significant difference between groups at the .05 level ($p = .51, t = .65, df = 38$). For weeks five and six of the program, the experimental group mean was 1.40, with a standard deviation of 1.73. The control group mean was 1.85, with a standard deviation of 1.90. No significant difference was found at the .05 level ($p = .43, t = .78, df = 38$). For the last two weeks of the program, the experimental group mean was 1.50, with a standard deviation of 1.60. The control group mean was 1.95, with a standard deviation of 2.33. No significant difference was found at the .05 level ($p = .48, t = .71, df = 38$, see Table 2). These results lend support to the conclusion that the difference in frequency of exercise between the experimental and control groups was due to program attendance and not simply a difference in out of class exercise. 

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## Table 2

### Summary of Data Analysis

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Statistical Analysis</th>
<th>Level of Significance</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group Attendance Sessions 1-14</td>
<td>Regression Analysis</td>
<td>.05</td>
<td>p = .6846</td>
</tr>
<tr>
<td>Experimental Group Attendance Sessions 15-24</td>
<td>Regression Analysis</td>
<td>.05</td>
<td>p = .0005</td>
</tr>
<tr>
<td>Control Group Attendance Sessions 1-24</td>
<td>Regression Analysis</td>
<td>.05</td>
<td>p = .0008</td>
</tr>
<tr>
<td>Experimental vs. Control Group Mean Attendance</td>
<td>Two-Sample t test</td>
<td>.05</td>
<td>p = .0016</td>
</tr>
<tr>
<td>Experimental vs. Control Group Length in Program</td>
<td>Two-Sample t test</td>
<td>.05</td>
<td>p = .0067</td>
</tr>
<tr>
<td>Experimental vs. Control Group Total Attendance and Last Week of Program Attended</td>
<td>Pearson Correlation Analysis</td>
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<td>r = .867</td>
</tr>
<tr>
<td>Experimental Group Attendance and Last Week of Program Attended</td>
<td>Pearson Correlation Analysis</td>
<td>.05</td>
<td>r = .767</td>
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<tr>
<td>Control Group Attendance and Last Week of Program Attended</td>
<td>Pearson Correlation Analysis</td>
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<td>r = .915</td>
</tr>
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</table>
Table 2--Continued

<table>
<thead>
<tr>
<th>Dependent Variable</th>
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<th>p value</th>
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<td>Experimental vs. Control Group PAI Varied Over Time</td>
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<td>.05</td>
<td>p = .0001</td>
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<tr>
<td>Experimental vs. Control Group Interaction Effect</td>
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<td>.05</td>
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<td>Between Group and Time Period</td>
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<td>p = .085</td>
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<tr>
<td>Experimental vs. Control Group PAI Frequency Scores</td>
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<td>p = .034</td>
</tr>
<tr>
<td>Experimental vs. Control Group PAI Intensity Scores</td>
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<td>.05</td>
<td>p = .086</td>
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<tr>
<td>Experimental vs. Control Group PAI Duration Scores</td>
<td>MANOVA</td>
<td>.05</td>
<td>p = .086</td>
</tr>
<tr>
<td>Experimental vs. Control Group Out of Class Exercise:</td>
<td>Two-Sample t test</td>
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</tr>
<tr>
<td>Weeks 1-2</td>
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<td></td>
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<tr>
<td>Weeks 3-4</td>
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<td></td>
</tr>
<tr>
<td>Weeks 5-6</td>
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<tr>
<td>Weeks 7-8</td>
<td></td>
<td>p = .48</td>
<td></td>
</tr>
</tbody>
</table>

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exercise episodes.

Quiz Data

Short quizzes (see Appendix I) on the content of the material presented in the relapse training component were administered to the experimental group at sessions seven and fourteen to determine if the subjects comprehended the material presented to them. There was a total of seven points possible for each quiz. The mean score on the first quiz was 6.52 and the mean score on the second quiz was 6.68. These scores reflect adequate comprehension of the material presented. A t test was conducted and no significant difference was found between these scores (p = .58) at the .05 level. It was concluded that comprehension, as measured by quiz scores, was equal for both quizzes.
CHAPTER IV

DISCUSSION

The purpose of this study was to assess the effectiveness of relapse prevention training on exercise adherence within the framework of a formal exercise program. The first hypothesis of this study was that subjects receiving relapse prevention training would demonstrate a significantly greater adherence to the exercise sessions, as measured by number of exercise sessions attended, than those subjects not receiving relapse prevention training. To test this hypothesis, attendance at exercise sessions during the eight-week program was recorded both by the instructor and by each participant. The second hypothesis was that exercise adherence would be positively correlated with improved scores on the Physical Activity Index (PAI, n.d., available from YMCA, Kalamazoo, Michigan) for both experimental and control groups. To test this hypothesis the PAI was administered as a pre-test, at two-week intervals during the eight-week program, and as a post-test at two- and four-week periods following termination of the program. These data were analyzed regarding statistically significant group differences.

Based on the conclusions drawn from the statistical analysis, the first hypothesis was accepted. There was significantly greater attendance for the experimental group than for the control group. In addition, there was a
significant correlation between attendance and the last week of the program attended, with the experimental group staying in the program longer than the control group. There was a stable trend in attendance for the experimental group until session 14, after which there was a downward trend in attendance. The control group had a downward trend in attendance both before and continuing after session 14.

The second hypothesis was also accepted based on the conclusions drawn from a statistical analysis of the data. The PAI scores were significantly higher for the experimental group than the control group, and they changed significantly over time for both groups. The data follow the same pattern as the attendance data in that the highest PAI scores were obtained during the first four weeks of the program (sessions 1 through 12), scores were moderate during the last four weeks of the program (sessions 13 through 24), and scores were lowest during the pre- and post-test periods. Further analysis of the PAI broken down into its three components, frequency, intensity, and duration, was conducted and it was concluded that the PAI scores significantly varied across time for each component. The pattern was similar to that obtained for the attendance and overall PAI scores: weeks 1 through 6 were the highest, weeks 7 and 8 were moderate, and the pre- and post-test periods were the lowest on each component.

There was also a significant difference between the experimental and control groups on the PAI intensity component, indicating that the experimental group reported to have engaged in more intense activities than did the control group.

In a review of the exercise adherence literature preceding the present
research, several problem areas became apparent. These included the high drop-out rate early in the formal exercise program, the lack of control group for comparison purposes, the lack of consistency in defining adherence, and the reliance on self-reported data. These problems in the existing research make both replication of studies and comparisons between studies difficult. This researcher attempted to decrease these problems by using a research design which included a control group for comparison purposes, a consistent definition of exercise adherence, and objective as well as self-reported measures of adherence.

The relapse prevention training component in the present study was administered for the first 14 sessions of the 24 session program. It was concluded from a statistical analysis of the data that the experimental group attendance was stable for those first 14 sessions, and that there was a downward trend in attendance for the remaining 10 sessions. Since attendance was stable during the relapse prevention training component and the downward trend coincided with the end of the training component, this researcher concluded that it would be beneficial for continued adherence to administer the training component at each session throughout the program.

Only three of the exercise adherence studies reviewed incorporated a relapse prevention training component. King and Frederiksen (1984) conducted a study in which a one-session relapse prevention training component was included in the experimental condition, which was further divided into individual and group components. These researchers found that subjects in the group plus relapse prevention training component exercised significantly less than the individual plus
relapse prevention training or the group control conditions.

Martin et al. (1984) conducted a community based exercise program with a relapse prevention training component; however, the length of the training component was not reported. These researchers found no difference in attendance between the experimental and control groups; however, they suggested that the lack of significant findings could be the result of procedural problems such as a change in the instructor, a change in the place the exercise was conducted, and a control group instructor who did not follow the specified group format.

Belisle et al. (1987) conducted an exercise program where the relapse prevention training component was administered for 18 of the 20 sessions. They found a small but consistent superiority of attendance in the experimental condition compared to the control condition.

Martin and Dubbert (1982a), in a review of exercise adherence studies, described a negatively accelerated curve for exercise adherence data. They found that the majority of the relapses occurred during the first several months with only 25% to 45% of those who began an exercise regimen still exercising at the end of the first year. The critical period identified for dropouts was the first few program sessions (Dishman & Ickes, 1981).

The results of the present study do not completely support the above findings. The present study had stable attendance for the experimental group through session 14 while the relapse prevention training component was being administered, and a negatively accelerated trend only for the remaining
10 sessions with no relapse prevention training component. The current data reflect the negatively accelerated trend only when the relapse prevention training component was terminated, which points out the necessity of continuing the intervention throughout the program. For the experimental condition 55% were still attending during the last week of the program and for the control group 45% were still attending during the last week.

The results of the study by Belisle et al. (1987) supported the findings of the previous research in that there was a negatively accelerating trend in their exercise adherence data beginning during week one and only 42.6% of program participants continued exercising until the last week of the 20 session program. Although the studies by King and Frederiksen (1984) and Martin et al. (1984) both described a negatively accelerated trend in attendance data for the experimental groups, they did not give percentages for those subjects attending at the end of the formal programs.

The present research design incorporated a procedure, quizzes (see Appendix I), to assess the subjects' comprehension of the didactic material presented during sessions 1 through 14. The decision to administer quizzes was based on the belief that exercise adherence could be influenced by the level of understanding of the instructions presented during the training component. This procedure can be viewed as a potentially confounding factor when used along with the relapse prevention training. To this researcher's knowledge, this part of the design is not found in the previous research. Although the intent was to assess the subjects' comprehension of the information presented, this researcher

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was also apprehensive about the effects of test-taking.

Subjects in the experimental group of the present study were administered two short quizzes, one at the mid-point and one at the end of the training component, to test for comprehension of the relapse prevention material presented to them. In the present case it did not appear that testing was counterproductive; however, this researcher wishes to caution the reader to be careful in regard to testing. Several subjects voiced complaints about being tested and one subject refused to take the test. The complaints, however, did not appear to interfere with attendance. Given the experimental group mean-age of 39.75 and the fact that many subjects did not have more than a high school education (thus, not an extended history of test-taking behavior), it may be that testing is an aversive stimulus that could negatively affect attendance. To assess the effects of testing on attendance, future researchers would need to modify the design of the experiment and conduct two experimental groups, one group with a testing component and one without a testing component, and compare the attendance data between these groups.

The exercise adherence results of the present study were considerably more favorable than those of the previous researchers. In addition, this researcher believes these results expand the applicability to the general population in that the subjects of the present study were more representative of the general population on several subject variables than were the subjects of previous researchers. The mean age in the present study was 39.75 years for the experimental group and 40.65 years for the control group. The mean number of pounds overweight for
the experimental group was 24.6 and for the control group was 14.8. Subjects were not excluded from the study due to smoking status. In addition, all subjects were employed on a full-time basis.

King and Frederiksen's (1984) study was conducted with non-smoking college women, 18 to 20 years of age, serving as subjects. Belisle et al. (1987) exercise research was conducted with students and university faculty, with an average age of 29 years. The average age of the participants in the Martin et al. (1984) study was 36.7 years. Although in this last study subjects were recruited from the community, the exercise program itself was conducted at a university, which may have had an influence on those individuals who volunteered as subjects. The above selection of subjects may limit the generalization of the results to the general population. In addition, both King and Frederiksen (1984), and Martin et al. (1984) relied solely on self-reported data as the measure of exercise attendance.

The main thrust of the present research was to test the efficacy of the relapse prevention training component with the intent of establishing a program that would reflect a recognition of deficiencies of earlier relapse prevention training research. Following the suggestion made by King and Frederiksen (1984) that whenever possible naturally occurring groups of subjects should be used, this study used employees of KRPH who were offered the program on the hospital grounds immediately following the work day. Thus, the program was made easily accessible to participants and the response-cost was decreased. One additional benefit of the exercise program was that it facilitated social contact among the
various disciplines employed at KRPH. The exercise groups included support staff, resident care aides, nurses, social workers, psychologists, and psychiatrists. Although all were employed at KRPH, there is little socializing outside of the work setting among the various disciplines. Group cohesiveness was not assessed during this study; however, it was noted that many participants expressed positive thoughts about getting to know a wide variety of KRPH employees on a more social, non-working basis.

An ancillary consideration in any exercise adherence training program is the cost of its implementation. Although not part of the experimental test of the major hypotheses concerning relapse prevention training, an analysis of the cost-benefit ratio of this intervention lends further support for a positive view of its efficacy. The experimental group involved an average of five minutes of professional time per session for 14 sessions, for a total of 70 minutes of professional time. This relapse prevention training component reached 20 individuals, which represents a total expenditure of approximately four minutes per individual in the program. Assuming a billing of professional time at $70.00 an hour, the cost of the relapse prevention training component would be approximately $5.00 per recipient. In addition, the extent of professional involvement and consequent cost per participant could be further reduced by teaching exercise instructors the skills needed to implement the relapse prevention training procedure. Given the minimal cost of this intervention and the positive results of this study, relapse prevention training appears to be a viable component to successful exercise adherence programs.
Relapse prevention training appears to have promise for increasing early exercise adherence, a necessary step in establishing longer-term maintenance. If researchers are to significantly impact upon the exercise behavior of the general population, those researchers must focus some of their efforts upon the development of low-cost, easily administered approaches. The present study is a step in that direction.
Appendix A

Advertisement to Recruit Subjects
Co-Ed Fitness
Conditioning Class

Sponsored by the YMCA in conjunction with the doctoral clinical research program in the department of Psychology, Western Michigan University.

Primary investigator: Sandra Beaty, M.A.
Psychology Department, KRPH

Improve your flexibility, muscle strength and cardiopulmonary endurance with this class featuring 20-25 minutes of aerobic work and a toning routine. Skilled, enthusiastic instruction and high energy music will get you on the fitness track.

WHEN: Classes begin ______ and last for 8 weeks. Classes meet on Mondays, Wednesdays, and Thursdays from 4:45 to 5:45 pm.

WHERE: Classes are held in the Tower Theater

INSTRUCTOR: Sandy Blair

COST: $35 for entire 24 session program or $2 per session on a drop-in basis. (We need 10 full time pre-registered participants to offer the class.)

REGISTER: By phoning Sandra Beaty at 8-7445
Appendix B

Demographic Data Questionnaire
CO-ED FITNESS CONDITIONING CLASS

Please answer the following:

1. Gender: _____ Male  _____ Female

2. Are you a smoker? _____ Yes  _____ No

3. What is your height? _____

4. What is your current weight? _____

5. What is your age? _____

6. Have you ever participated in an aerobic exercise program before? _____ Yes  _____ No

Thank you for your cooperation and your interest in this program.
Appendix C

Approval Letter From the Human Subjects
Institutional Review Board
Date: March 28, 1990
To: Sandra Beaty
From: Mary Ann Bunda, Chair

This letter will serve as confirmation that your research protocol, "Effect of Relapse Prevention Training on Exercise Adherence", has been approved as expedited by the HSIRB. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the approval application.

You must seek reapproval for any change in this design. You must also seek reapproval if the project extends beyond the termination date.

The Board wishes you success in the pursuit of your research goals.

xc: C. Koronakos, Psychology

HSIRB Project Number 90-03-12

Approval Termination March 28, 1991
Appendix D

Liability Release Form
WAIVER

Although all precautions are taken to make it as safe as possible, the program listed below, like all exercise and fitness programs, carries a certain risk of physical injury. Before participating in this or any other physical fitness or exercise program it is advised that you consult your physician.

By signing below, I understand the above statement and take full responsibility for any resulting injury to myself. By signing this, I also agree to release Kalamazoo Regional Psychiatric Hospital, KRPH staff, Department of Mental Health, State of Michigan, Western Michigan University, YMCA, and YMCA staff of any liability for injury resulting from participation in this program.

____________________
Signed: Date:

PROGRAM
Appendix E

Consent Form
Consent Form

Exercise Program Participant;

I, Sandra Beaty, am a doctoral student in the Clinical Psychology Program at Western Michigan University. I am conducting my dissertation research on exercise adherence using the co-ed exercise program at Kalamazoo Regional Psychiatric Hospital. This study involves a standard aerobic exercise program taught by a YMCA instructor plus a brief cognitive component presented each session by this researcher designed to increase exercise adherence. This component consists of lectures lasting three to five minutes, given at the beginning of each exercise session, where topics relevant to exercise adherence will be presented. It will include topics such as the health benefits of exercise, identifying situations that are likely to lead to missing scheduled exercise sessions (a lapse), and coping with lapses so that they do not escalate into a total relapse (stopping exercising). Throughout the program the instructor will model both low- and high-impact exercises and you will be free to choose your own level of activity. You will be asked to complete very brief exercise questionnaires at two-week intervals throughout the study and a brief questionnaire on the training content at the end of four and eight weeks. These data are confidential.

Although precautions are taken to make this exercise program as safe as possible, all exercise and fitness programs carry a certain risk to physical injury. Before participating in this or any other physical fitness or exercise program it is advised that you consult your physician. If you have not engaged in aerobic exercise during the past month, some muscle soreness may be experienced. Exercise has many health benefits. It improves flexibility, muscle strength and cardiopulmonary endurance.

Your confidentiality will be maintained both during the study and the reporting of the results by assigning and referring to each participant by a number rather than by name. Only I will have access to the names of participants. If the findings are communicated professionally in any publication, participant names will not be used.

Prior to the study you will be given a brief questionnaire to screen for any physical problems that may contraindicate participation in an aerobic exercise program. This form will be shared with the YMCA instructor. Participants who meet the physical criteria will be included in the study. If any negative outcome such as injury during a session occurs, you will be assisted in obtaining prompt medical attention. You can choose not to participate in this study or drop out of the study at any time without incurring any negative consequences. You may choose to participate in the aerobics class, but not in the research, without penalty.

You will be contacted by me at two and four week intervals after the program ends and will be given a brief questionnaire assessing current exercise
involvement. If you would like information regarding the results of this study, please contact me at 87445 following termination of the program.

I have read this document, understand the contents, and agree to participate in the program described.

______________________________  ________________
signature                        date
Appendix F

Physical Activity Readiness Questionnaire
Physical Activity Readiness Questionnaire (PARQ)

Circle your response to each question. If you answer "YES", please explain.

1) Has your doctor ever told you that you have heart trouble?  
   Yes  No

2) Do you frequently have pains in your heart and/or your chest?  
   Yes  No

3) Do you frequently feel dizzy or have spells of severe dizziness?  
   Yes  No

4) Has a doctor ever told you that your blood pressure was too high?  
   Yes  No

5) Do you have any bone or joint condition such as arthritis, that might be aggravated or made worse by exercise?  
   Yes  No

6) Is there a good physical reason (not mentioned) why you could not do an exercise program, even if you wanted to?  
   Yes  No

7) Are you over the age of 65 and not accustomed to regular exercise?  
   Yes  No
Appendix G

Physical Activity Index
Physical Activity Index

Calculate activity index by multiplying rating for each activity.
(Index = Frequency \times Intensity \times Time)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>4</td>
<td>3 to 5 times a week</td>
</tr>
<tr>
<td>3</td>
<td>1 to 2 times a week</td>
</tr>
<tr>
<td>2</td>
<td>Few times a month</td>
</tr>
<tr>
<td>1</td>
<td>Less than once a month</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Sustained heavy breathing and perspiration (aerobics)</td>
</tr>
<tr>
<td>4</td>
<td>Intermittent heavy breathing and perspiration (tennis)</td>
</tr>
<tr>
<td>3</td>
<td>Moderately heavy (recreational sports and cycling)</td>
</tr>
<tr>
<td>2</td>
<td>Moderate (volleyball and softball)</td>
</tr>
<tr>
<td>1</td>
<td>Light (fishing and walking)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Over 30 minutes</td>
</tr>
<tr>
<td>3</td>
<td>20 to 30 minutes</td>
</tr>
<tr>
<td>2</td>
<td>10 to 20 minutes</td>
</tr>
<tr>
<td>1</td>
<td>Under 10 minutes</td>
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**Evaluation and Fitness Category**

<table>
<thead>
<tr>
<th>Score</th>
<th>Evaluation</th>
<th>Recommended Program Level</th>
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</thead>
<tbody>
<tr>
<td>100</td>
<td>Very Active</td>
<td>Advanced Training</td>
</tr>
<tr>
<td>60-80</td>
<td>Active</td>
<td>Advanced</td>
</tr>
<tr>
<td>40-60</td>
<td>Acceptable</td>
<td>Intermediate</td>
</tr>
<tr>
<td>20-40</td>
<td>Inactive</td>
<td>Beginning</td>
</tr>
<tr>
<td>Under 20</td>
<td>Sedentary</td>
<td>Introductory</td>
</tr>
</tbody>
</table>
Appendix H

Relapse Prevention Training Component
PLEASE NOTE

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65-94

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Appendix I

Quizzes
QUIZ 1

1. True or False. Acute muscle soreness may occur during exercise and is characterized by a burning sensation. When this occurs one should stop the movement, allow the muscle to rest a few minutes, then resume exercise.

2. To decrease the chances of developing delayed onset muscle soreness, which occurs one to two days after exercise and is characterized by stiffness and soreness, which of the following should be avoided in class?
   a. jerky movements   b. static stretches
   c. bouncy movements   d. jumping jacks

3. Which of the following statements are correct?
   a. Increased physical fitness is normally associated with increased perceptions of energy.
   b. In order to gain in fitness, one must experience some pain.
   c. Exercise intensity should be self-regulated based on perceived exertion, perceived changes in breathing, or heart rate.

4. Aerobic exercise need only take up what percent of one’s total hours?
   a. 2%   b. 5%   c. 10%

5. Which of the following components does the Adherence Violation Effect involve?
   a. a negative emotional state resulting from the discrepancy between behavior and thoughts.
   b. a personal attribution effect, self-blame.
   c. a projection of blame onto others or external circumstances.

6. True or False. In the presence of a high-risk situation, a coping response leads to increased self-efficacy and a decreased likelihood of relapse.

7. Which of the following social and environmental factors are likely to increase the likelihood of a lapse?
   a. lack of social support
   b. an unfriendly aerobics instructor
   c. change of job or residence
   d. exercising alone
Answers to Quiz 1

1. True
2. a and c
3. a and c
4. a
5. a and b
6. True
7. a, c, d
1. Which of the following is an effective method of recording your exercise behavior?
   a. Use an exercise log and record your behavior as it occurs.
   b. Use a calendar and record your behavior at the end of the week.

2. How should one interpret a lapse (missing a planned exercise session)? (check all that apply)
   a. Look at the lapse as a single, independent event.
   b. Conclude that nothing can be done to change it, now or in the future.
   c. Look at the lapse as an opportunity to intervene.

3. When a lapse occurs one should attribute the lapse to:
   a. personal weakness
   b. external and/or situational causes.

4. Which of the following are effective ways of preplanning to engage in exercise?
   a. Keep exercise clothes in the car or office.
   b. Feel confident that you are in control of the behavior.
   c. Review coping responses.
   d. Make a firm commitment early in the day to yourself to attend class that day.

5. True or False. Cardiopulmonary strengthening, decreased cholesterol, and decreased blood pressure are some of the health benefits of exercise.

6. True or False. Aerobic exercise is likely to lead to decreased anxiety and depression.

7. True or False. Although exercise tones up muscles thus making one look better, it does not play a significant role in a successful weight loss program.
Answers Quiz 2

1. a
2. a, c
3. b
4. a, c, d
5. T
6. T
7. F
BIBLIOGRAPHY


Physical Activity Readiness Questionnaire. (n.d.). Questionnaire in use at the Kalamazoo, Michigan, YMCA.
Physical Activity Index. (n.d.). Questionnaire in use at the Kalamazoo, Michigan, YMCA.


