IMPROVING PHYSICAL ACTIVITY ADHERENCE: THE EFFECTS OF SELF-CONTROL STRATEGIES, TELEPHONE PROMPTING USING LIFESTYLE PHYSICAL ACTIVITY

by

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ABSTRACT

Increasing individual's physical activity in our country is a primary health promotion and disease prevention concern. Yet, much of the population remains sedentary and thus, at increased risk for several diseases such as hypertension, coronary heart disease and hyperlipidemia. Unfortunately, programs promoting physical activity have had limited success in increasing activity and even less success in maintaining a program over time.

The "Exercise for Everyone" program was designed to assess the effectiveness of behavior change strategies developed for maintenance on physical activity using individuals recruited through a community setting. Any type of moderate physical activity (e.g., vacuuming, gardening, walking, swimming etc.) was considered appropriate and encouraged. The researcher used the following behavior change strategies: telephone prompting, and self-control strategies: self-monitoring, participant set goals, self-reinforcement, self feedback and problem-solving strategies. In this study, frequency of contact was varied from no contact, to once per every week, to once per every third week over 16 weeks and faded in the last four weeks. All participants were asked to self-monitor their physical activity, and all participants received either an information only class or a self-control strategies class. Survival analysis using five months of data points and using the criteria of first week of activity missed equaled

"death" indicated an effect of greater adherence for individuals participating in a strategies class versus an information only class (46% vs. 14%), but not for the effect of frequency of contact (no contact, 33%; low contact, 31%; high contact, 30%) over all 18 weeks of the program. The results suggest the efficacy of a low cost class promoting self-control strategies for behavior change for adherence to an activity program and potentially for other health related behaviors.

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Increasing individual's physical activity in our country is a primary health promotion and disease prevention concern (Department of Health and Human Services, 1990). Yet, much of the population remains sedentary and thus, at increased risk for several diseases such as hypertension, coronary heart disease and hyperlipidemia. Moreover, it is becoming apparent that level of fitness is an independent risk factor for CHD and some forms of cancer (Blair et al., 1989).

Physical activity research typically suggests the use of guidelines set forth by the American College of Sports Medicine (ACSM, 1990) to promote physical fitness gains and risk factor reductions. However, recent evidence (including epidemiological research) suggests the health protection benefits of guidelines less rigorous than those suggested by the ACSM and the goals for the nation, set by the Department of Health and Human Services (1990). Unfortunately, programs promoting physical activity have had limited success in meeting even minimum goals. Examination of these studies suggests more exacting applications of behavioral and cognitive-behavioral strategies within a conceptual framework, including specific strategies aimed toward maintenance issues to initiate and maintain the behavior of physical activity.

Guidelines for Physical Activity

Physical activity studies have generally examined the intensity, frequency, and duration of exercise. In 1975, the American College of Sports Medicine (ACSM) was the first scientific organization to publish an official recommendation for exercise prescription. The ACSM modified these statements in response to increased knowledge

of physical activity and physical fitness. Their present form includes recommendations for aerobic activity, flexibility and strength training (See Table 1) (ACSM, 1990).

Insert Table 1 about here.

The ACSM recommends a moderate exercise intensity between 40-60% of maximal capacity (VO_2 max: maximal aerobic power or maximal oxygen uptake). Importantly, the response to exercise training is directly dependent on the total energy expended and not necessarily just intensity. So, if there exists a minimum intensity threshold (the intensity where maximal health benefits occur) it may vary depending upon the duration of the exercise session, the initial fitness level of the individual, the length of the training period and certainly other individual characteristics (ACSM, 1990). However, epidemiological evidence shows a graded association between physical fitness and mortality from cardiovascular causes and fitness is typically associated with the intensity of the activity performed (Sandvik, Erikssen, Thaulow, Erikssen, Mundal, & Rodahl, 1993).

The ACSM recommends a duration of 20-60 minutes of continuous aerobic activity for each exercise session (ACSM, 1990). They recognize a relationship between intensity and duration and their effects on fitness change. For example, individuals can perform a low intensity activity longer than a high intensity activity and have the same effect on improvement in aerobic power (Blair, Kohl, Gordan, & Paffenbarger, 1992). However, the rate of caloric expenditure past a threshold probably determines ultimate fitness change, but total energy expenditure on a consistent basis produces some moderate health benefits.

The ACSM recommends a frequency of exercise training three to five days per week (ACSM, 1990). Studies show only minimal change in fitness when exercise is

performed less than three days per week (unless the exercise is very strenuous). Importantly, exercising greater than five days per week does not equate to greater improvement in fitness than training five days per week. In sum, the ACSM (1990) recommends physical activity performed at an intensity of at least 40-60% maximal capacity, for at least 20 minutes, at least three days per week.

Epidemiology of Physical Activity

Investigators have increasingly recognized physical activity as an important preventive health-related behavior as the evidence supporting the many benefits of regular physical activity continues to mount. Participation in physical activity is important for the prevention and management of coronary heart disease (CHD) (Powell, Thompson, Casperson, & Kendrick, 1987), hypertension (Siscovick, LaPorte, & Newman, 1985), noninsulin-dependent diabetes mellitus (Siscovick et al., 1985), osteoporosis (Siscovick et al., 1985), obesity and weight loss or weight control (Blair, Jacobs, & Powell, 1985). Other benefits derived from regular physical activity include lower rates of stroke (Paffenbarger & Hyde, 1984) and possibly colon cancer (Powell, Casperson, Koplan, & Ford, 1989). In addition, regular physical activity aids in prolonging the functional independence of aging individuals and enhances their quality of life (Katz, Branch, Branson, Papsidero, Beck, & Greer, 1983). Further, individuals who are physically active live longer than those who are inactive (Paffenbarger, Hyde, Wing, & Hsieh, 1986). Participation in regular physical activity also appears beneficial for mental health (Taylor, Sallis, & Needle, 1985). Unfortunately, the number of adults who engage in physical activity resulting in health benefits is low. In fact, Caspersen, Christenson, and Pollard (1986) estimated less than 10 percent of the U. S. adult population exercises at the level recommended by the ACSM.

Prevalence

When epidemiologists use the strict definition of physical activity prescribed by the American College of Sports Medicine (1990) (exercising 3 times per week, at least 30 minutes per session, at least 60 - 80% of maximum heart rate) less than 10% of all adults are physically active to the extent necessary to reduce their risk of disease (Caspersen, Christenson, & Pollard, 1986). Thus, approximately 90% of individuals do not engage in enough physical activity to produce health or fitness benefits. Importantly, the prevalence of physical inactivity is much greater than the prevalence of other risk factors for disease. For example, researchers estimate approximately 30% of the population smokes (Dishman, 1988), 10% to 40% are hypertensive (Kannel and Sorlie, 1979), while 80% - 90% are physically inactive (Blair, 1988). Thus, physical inactivity represents one of the most significant public health concerns, perhaps even greater than hypertension and smoking.

Relative Risk

In a recent prospective study, Blair, Kohl, Paffenbarger, Clark, Cooper, & Gibbons (1989) assessed physical fitness and risk of all-cause mortality (the proportion of deaths from all causes relative to the whole population) in a large community population using a prospective study design. They found 17.1% of men and 19.3% of women fell into the low fitness category. When compared to the highest fitness category, the low fitness category was associated with relative risks for all cause mortality of 3.44 and 4.65 for men and women, respectively. This means the risk of death for those in the lowest fitness category is three to four times greater than those in the highest fitness category. Thus, increasing an individual's physical activity level can result in a lower risk of death.

Population Attributable Risk, Years per life lost and Quality of life

Paffenbarger et al., (1986) calculated the population attributable risk (the number of excess cases of disease in a population that can be contributed to a particular risk behavior) for all-cause mortality for physical inactivity to be 16%, compared with 6% for hypertension, 22% for cigarette smoking, and 5% for positive family history of early parental death. Blair et al., (1989) found inclusion in a lowest fit quintile was associated with population attributable risks of 9% in men and 15% in women. Again, these estimates were similar to or higher than estimates for other risk factors, such as, cigarette smoking 2.1% for men and 2.7% for women, hypertension, 2.4% for women, 4.6% for men and hyperlipidemia, 11.2% for men and 7.1% for women.

Blair et al. (1989) found great risk reduction even if individuals increased their activity only minimally. That is, when the lowest fit group is compared with the next higher fit group the relative risk declined 3.44 to 1.37 and 4.65 to 2.42 for men and women respectively. This is important as most individuals are able to increase their activity to the level necessary to achieve risk reduction (e.g., walking at a brisk pace a few days per week or vacuuming more vigorously). In addition, Blair et al., (1989) estimated physically active people live two years longer than sedentary people and have greater productivity in daily tasks (USDHHS, 1990). Further, participating in physical activity consistently helps maintenance of functional independence for older adults (Evans & Rosenberg, 1991; Fiatarone, Marks, Ryan, Meredith, Lipsitz, & Evans, 1990). Thus, physical activity performed even moderately results in significant health and quality of life benefits.

Summary

The prevalence, relative risk and population-attributable risk estimates for physical inactivity indicate a significant public health concern comparable to cigarette

smoking, hypertension, hyperlipidemia and obesity. Importantly, the prevalence of physical inactivity increases with advancing age (Casperson, Christenson, & Pollard, 1989). In addition, not only are risks for chronic disease reduced with regular physical activity, but quality of life and protection against disability improve. Thus, there is an important need for effective interventions to increase physical activity.

Goals for the Nation

The U. S. Government's goals for the nation recognized the need for continued development of successful physical activity programs (USDHHS, 1991). The Goals for the Nation indicated four goals directly related to increasing physical activity (See Table 2).

Insert Table 2 about here.

One goal recommends increasing to at least 30% the proportion of individuals aged six and older who engage regularly, ideally daily, in light to moderate physical activity for at least 30 minutes per day. This objective defined physical activity as any bodily movement produced by skeletal muscles resulting in caloric expenditure (Caspersen, Powell, & Christenson, 1986). This type of activity is the equivalent of a sustained walk, but includes any activity producing increased caloric expenditure (e.g., cleaning house, gardening). This is an important point because it means individuals can engage in any sustained activity, at their convenience and at a preferred intensity.

The second goal is to increase to at least 20%, the proportion of individuals aged 18 and older and to at least 75% the proportion of individuals aged six through 17 who engage in vigorous physical activity promoting cardiorespiratory fitness three or more days per week for 20 or more minutes per occasion. Vigorous physical activity aids cardiorespiratory fitness to a greater extent than light to moderate physical activity (Blair

et al., 1989). In addition, these higher levels of fitness help individuals perform daily tasks and leisure activities more easily. These fitness levels are reached by various combinations of frequency, duration and intensity of aerobic activities. Still, a recent study has shown modest health protective effects from engaging in light to moderate physical activity (Duncan, Gordon, & Scott, 1991).

The third goal is to reduce to no more than 15% the proportion of individuals aged six and older who engage in no leisure-time physical activity. While the protective effect of physical activity occurs for both occupational and leisure-time physical activity, the amount of physical activity at work and outside work has steadily declined (National Health Interview Survey, 1985). As most individuals hold somewhat sedentary jobs, leisure-time activity is especially important. Presently, approximately 24% of individuals in the U. S. over 18 years old report no leisure-time physical activity.

The fourth goal is to increase to at least 40%, the proportion of individuals aged six and older who regularly perform physical activities enhancing and maintaining muscular strength, muscular endurance, and flexibility. Participation in such activities as vacuuming, yardwork, gardening, walking a flight of stairs and other lifestyle activities serves to satisfy this objective. Increasing muscular strength, endurance and flexibility aids the performance of everyday tasks, thus increasing quality of life.

Summary

These goals for the nation exist because of the increasing evidence of the multiple health benefits and health protection benefits of regular physical activity. The ACSM guidelines were developed to encourage regular participation in physical activity to promote fitness benefits. However, even with programs encouraging the national goals and ACSM guidelines, Americans have not reached designated levels of activity. In fact, the National Heath Interview Survey (1985) reported only 8% of the men and 7% of the women were exercising at the level suggested in the 1990 objectives for the Nation.

Furthermore, promotion programs designed to meet these goals have met with limited success. The public health need for successful physical activity promotion programs is evident. Unfortunately, the success of prior programs in increasing and maintaining physical activity has been limited.

Conclusions from past reviews of physical activity research

Two main types of prior research on exercise have been most prominent. The first line of research has focused on the determinants of exercise behavior. That is, identifying specific factors (e.g., SES, gender, weight) associated with participation and adherence to an exercise program. The second line of research has entailed assessing the efficacy of behavior change strategies on exercise adoption and adherence. Although the two lines of research vary in both methodology and goals, they both identified social support for exercise as an important variable in the prediction of long-term exercise behaviors.

Determinants of Exercise Behavior

Dishman (1985) and Sallis and Hovell (1990) reviewed the research on the determinants of exercise behavior. These reviews provided information on the determinants both positively and negatively related to adherenceto an exercise program (see Table 3). In addition, Dishman (1985) provided the determinants a researcher could most easily and directly modify or manipulate within a physical activity program: self-efficacy and social support. Thus, their research provides necessary information in designing a physical activity promotion program.

Insert Table 3 about here.

Sallis and Hovell (1990) assessed the relationship among 24 potential determinants and the frequency exercise. Again, self-efficacy and social support

consistently had a high correlation with exercise frequency. Smoking and being over-weight were negatively correlated with vigorous activity. When relapse from a program and determinants were correlated, they found injury as an adult, level of education, and history of exercise were the most significant determinants for relapse.

Sallis, Hovell, Hofstetter, Faucher, Elder, Blanchard, Caspersen, Powell, & Christenson (1989) assessed gender differences in the prediction of vigorous activity adoption. The predictors for men were age, self-efficacy for exercise, home equipment, neighborhood environment, convenience of facilities, benefits of exercise, and physical activity history. The predictors for women were education, self-efficacy, friend support, family support, exercise models, alcohol consumption, smoking and physical activity history. Thus, they found gender specific determinants were important for exercise adoption.

Dishman, Sallis, and Orenstein (1985) reviewed 72 physical activity promotion studies to assess the determinants predictive of exercise behavior. He found similar predictors to Sallis et al., (1991) for exercise adoption (e.g., social support, self-efficacy, equipment availability and exercise history) and similar negative predictors (e.g., blue-collar occupation, low income level, high risk for coronary heart disease, smoking, being over-weight, disruptions in routine, mood disturbances, and perceived discomfort of physical activity). Most importantly, Dishman reported determinants related to specific behavior change techniques as important factors in exercise adoption and maintenance.

Dishman reported behavior change techniques such as prompting, self-monitoring, feedback, goal-setting, and behavior contingent lotteries were important predictors of program adherence. Dishman indicated these determinants are important as they are easily manipulated by the researcher, whereas other determinants (e.g., occupation, past exercise history) are not. Furthermore, Dishman indicated, although smoking status and weight can be changed, they are as difficult or more difficult than

exercise behavior to change. Thus, Dishman recommended researchers address those determinants most easily manipulated (e.g., behavior change techniques).

Summary

The findings from the determinants of exercise research indicated important predictors of exercise behavior (see Table 3). Furthermore, physical activity program design can be guided by those determinants seen as more modifiable. Thus, by manipulating behavior change techniques (e.g., prompting, feedback, goal-setting, self-monitoring and problem solving techniques and perceived benefits of exercise) researchers should be able to increase physical activity adoption and most importantly, maintenance rates.

Behavior change strategies

Past research examining initiation strategies and maintenance strategies for physical activity programs show mixed results (See Table 4). Typically, studies show good adoption/initiation effects, but poor or no maintenance effects. Dishman (1991) stated applications of behavior change or cognitive-behavior change techniques show initial increases in frequency or time spent in physical activity. However, most studies showed no evidence of increased fitness for risk reduction or therapeutic outcomes. Further, Dishman (1991) reported the generalizability of increased physical activity to maintenance has not been tested or has not occurred for greater than three months when follow-up was reported.

Insert Table 4 about here.

Glasgow and Terborg (1988) argued that adoption or initiation strategies are strong when examining worksite health promotion programs. Similar to Dishman (1991) they also found long-term adherence difficult. Godin and Shephard (1983) also found

programs often have an immediate impact with poor long term effects. However, they believed that while the immediate impact is promising, the effect may be the result of a "halo effect" and not due to the program. That is, participants might be adhering to the program initially, to please the investigator, with this effect tapering over time. They also found poor long term effects and few studies showing benefits for greater than one to two years. However, the studies they examined rarely conducted follow-ups.

King, Blair, Bild, Dishman, Dubbert, Marcus, Oldridge, Paffenbarger, Powell, & Yeager (1992) also suggest models typically applied in the physical activity arena must be further evaluated for their uniqueness or redundancy to allow further understanding of their specific importance and effectiveness for behavior change. They agree the Relapse Prevention Model and the Transtheoretical Model have provided useful tools for increasing physical activity. However, they suggest the Relapse Prevention Model for increasing physical activity may require modification and the Transtheoretical Model, at best, has provided information on participants' readiness for change. Thus, researchers agree that physical activity promotion programs succeed in initially increasing physical activity and that maintenance of physical activity is either not attempted by most programs, or when attempted, not successful.

Further compounding the mixed outcomes in this literature is the inconclusiveness of program results. In general, the results of studies are unclear for a variety of reasons. Dishman (1991) reported the nature of exercise research limits confident conclusions about increases in physical activity. For instance, typically, there is no direct measure of physical activity or fitness, so validity is unclear. Glascow and Terborg (1988) suggested future programs needed to use consistent outcome measures, appropriate levels of analysis (e.g., if programs are implemented in an organization with a comparison organization, measurement needs to occur on an organizational level) and evaluation of non-participants to remedy the confusion. Godin and Shephard (1983) suggested using

standardized methods and materials for exercise research to address the issue of inconsistent measurements across studies. Researchers agreed that outcome measures are widely different, non-participants are rarely evaluated and methods are not standardized. Thus, even encouraging findings of increased physical activity may prove unreliable and not valid as studies cannot be compared and results are inconclusive.

Past Reviewers' recommendations

To remedy the inconclusiveness of past programs, researchers proposed the use of newly developed models plus consistent outcome measures (See Table 2). Dishman (1991) proposed use of the Relapse Prevention Model (Marlatt & Gordon, 1985) to address maintenance issues and the Transtheoretical Model (Prochaska & DiClemente, 1983) to address the stage of change an individual might be experiencing. Dishman (1991) noted future research should use the vast literature already accrued on determinants of physical activity to match participants to programs. Glasgow and Terborg (1988) suggested the use of motivational and organizational factors to foster greater participation and adherence (e.g., self-motivation, Dishman, Sallis, & Orenstein, 1985). In addition, they suggested use of the Transtheoretical Model and stages of change (Prochaska & DiClemente, 1983) and of consistent outcome measures. Godin and Shephard (1983) emphasized the design of standardized methods and material for use on a large scale. King et al., (1992) listed nine recommendations for future research (see table 2) including exploration of the determinants and methods of changing individual patterns of physical activity, examination of the stages of physical activity behavior, contrasting effectiveness of theoretical models of behavior change, and evaluation of physical activity assessment techniques. Thus, researchers agree procedures are necessary to address maintenance issues and they typically propose the Relapse Prevention Model and/or the Transtheoretical Model. All researchers believe

consistency and standardization in program development and outcome measures is essential.

New recommendations

The research reviewed to this point proposed the use of models such as the Relapse Prevention Model and the Transtheoretical Model to address maintenance and adherence issues. Rather than applying and researching the effect of new programs such as Relapse Prevention and the Transtheoretical Model, this investigator believes there should be more focus on appropriate applications of behavioral and cognitive-behavioral techniques for initiation/adoption and maintenance of activity.

The need for examination of how behavioral and cognitive-behavioral techniques have been used is necessary. This point has been mentioned but not stressed (Godin & Shephard, 1983: Iverson, Fielding, Crow, & Christenson, 1985). This is important as applications of new models to programs with already inconclusive results and inconsistent outcome measures only make the results more inconclusive and inconsistent. That is, applying new models and techniques without set procedures limits comparison of program efficacy and effectiveness across studies.

The issue of poor maintenance has been addressed by all researchers reviewed. What is not mentioned is the lack of incorporation of maintenance strategies into the entire physical activity promotion program, that is, examination of program integrity and fidelity for maintenance. For example, just stating a certain behavioral technique is a "maintenance strategy" (e.g., Relapse Prevention) does not address how the strategy promotes maintenance. Often the strategy is applied as the program is ending, thus not allowing for incorporation into the individual's behavioral repertoire. Thus, a more appropriate application of maintenance strategies is necessary.

Other program issues not mentioned in the reviews are equally important. For instance, programs need to address individual needs. For instance, a swimming program

does not meet the needs of someone who is afraid of water. Also, an individual may want to exercise, may have the time to exercise, but does not enjoy nor desire the mode of activity being offered. Thus, individual needs and preferences requires further examination. In addition, the effects of the length of an exercise program needs greater attention. Kazdin (1993) suggested maintenance increases when program length increases.

Next, programs define "success" differently, which influences the interpretation of program outcomes and comparability across studies. For example, one study may define "success" as maintaining any exercise level each week, while another may define success as exercising four times per week. Lastly, most exercise programs did not use the behavioral strategy of shaping appropriately, if at all. For example, most programs prescribe the ACSM guidelines for exercise at a program's start which, for most sedentary participants is a difficult goal, thus promoting initial failure. Thus, incorporating goals set by the participant to promote success (e.g., matching the goal to the participant's initial level of activity) and then gradually increasing their goals as they acheived their initial goal would promote proper use of shaping.

Thus, there exists many issues needing examination before researchers delve into application of new models and techniques to an already inconsistent and confusing literature. Also, the application of prior program interventions need examination to clarify the results of behavioral and cognitive behavioral programs and the use of outcome measures.

A brief review of the literature reveals behavior change strategies that have been somewhat effective in increasing physical activity. These strategies are: self-monitoring, prompting, goal-setting, feedback and problem-solving. However, while these strategies have been used to increase initiation of physical activity, they have not shown much effect, if any, on maintenance of physical activity. It is hypothesized, these strategies

show potential for maintenance of physical activity, when program development combines initiation strategies with those designed for maintenance of behavior change.

Prompting. Kazdin (1993) defined prompting as behavior initiation through antecedent events. A prompt is delivered immediately before the opportunity for the behavior.

Brownell, Stunkard & Albrum (1980), used posted prompts at escalator/stair choice points in a variety of community settings and showed an increase in the use of stairs. After removal of the prompts, the increase in stair use maintained at one month, but fell after three months. Thus, use of posted prompts showed good effects for initiation if present, but poor continued behavior when removed.

Other researchers have used telephone prompts to increase exercise. Telephone prompts increased attendance and maintenance at a health club (Wankel & Thompson, 1977) and adherence to a home-based program (Acquista et al., 1988). King, Taylor, Haskell and DeBusk (1988) found the addition of weekly phone calls to a home based intervention had good effects for adoption of physical activity and for fitness levels.

These authors used stimulus control and prompting strategies appropriately for initiation but not for maintenance. Kazdin (1993), stated ideally, a program would continue to use the initial cues and then develop other cues to prompt the behavior (e.g., gradually moving toward using environmental or social cues as prompts for the behavior). Importantly, the prompt needs to be specific and within close temporal and spacial proximity to the target behavior. For instance, rather than the experimenter calling the exerciser, a friend or spouse could prompt physical activity. A posted cartoon could be used. For example, a cartoon posted on the back of the remote control, on the television dial, on the refrigerator or on the dashboard of the car could prompt physical activity at an activity/sedentary choice point. Thus, prompting could potentially be effective for maintenance of physical activity.

Goal-setting. Kazdin (1993) defined goal-setting as specification of a behavior or set of behaviors to be performed at a specified period of time. Bandura (1986) stated goal-setting is most effective when individuals set challenging but achievable goals.

Through several studies, Martin et al., (1984) assessed the differential effects of individual goal-setting. One study examined the effect of distance goals (i.e., distance to walk) versus time goals (i.e., time to walk). Adherence required class attendance plus a third day run outside of class. Results show greater adherence for time goals (76.4%) than for distance goals (67.3%). At three month follow-up, time goals and distance goals showed similar maintenance (23% vs. 29%).

The next study examined distance goals (because they were more convenient to administer) within a fixed-goal (i.e., consistent goal over time) or a flexible-goal condition (i.e., goal changes over time). Flexible goal-setting showed a greater effect (83.7%) than fixed goal-setting (67.8%). In addition, the flexible goal-setting condition showed the lowest dropout rate (0%).

The next study examined the effect of distal (mileage goals set at the beginning and middle of program) versus proximal (new mileage goals set each week) goal-setting with a flexible-distance goal. Results indicated greater adherence for the distal goal setting condition (83%) than for the proximal goal-setting condition (71%). The investigators found a more pronounced effect at follow-up: distal (67%) and proximal (33%). This result is interesting as behavior modification techniques for initiation stress continual reinforcement and proximal goal-setting for continued success. However, this study showed greater short-term and long-term effects for a distal goal. Perhaps, initiation with distal goals generalized better for longer term adherence than initiation with proximal goals.

Several conclusions were drawn from the goal-setting studies reviewed. First, when individuals set their goals effects were stronger. Second, while time goals were

effective initially, results did not hold for maintenance. Third, distance goals were more convenient to administer and thus, more practical while showing only slightly less adherence rates than time goals. Fourth, flexible, distal goals showed greater initiation and maintenance rates than fixed or proximal goals. Thus, use of goal-setting strategies can increase initiation and maintenance rate, but these studies only examined maintenance for three months and longer study is necessary for confident conclusions about maintenance.

Feedback. Kazdin (1993) defined feedback as information about performance. Feedback is more potent when given for an explicitly defined performance criterion (e.g., physical activity goal). Research shows feedback to be less effective when applied alone than in combination with other reinforcers (Kazdin, 1989).

Juneau et al., (1987) provided a portable heart rate monitor that emitted a tone when the exerciser's heart rate increased or decreased from prescribed levels. This home-based program involved self-monitoring of activity levels. Individuals were prescribed exercise five days per week. Results showed a fitness increase measure by increase in VO_2 max for both men and women by 12 weeks and continued fitness for 24 weeks. Adherence rates for men were 90% and adherence for women were 75%. In addition, they found greater fitness gains corresponded with greater adherence to the program. Another study involving portable heart rate monitors (Rogers et al., 1987) showed VO_2 max increases of 14% in men and 10% in women (95% achieved during the first 12 weeks) with high adherence to the heart rate prescription compared to controls.

These programs involved an explicit performance goal (heart rate prescription) and immediate feedback (when heart rate increased or decreased outside the prescription). This exemplifies an ideal application of feedback. Adherence levels were higher than most studies (e.g., 90% vs. 50%). Unfortunately, the studies provide no follow-up information about maintenance effects.

Martin et al., (1984) systematically assessed group versus individual feedback in a series of studies. They encouraged individuals to participate in pairs or small groups. Investigators defined group feedback as information about performance given at the end of a group session and individual feedback as praise twice per exercise session. Individual feedback showed a greater effect on adherence than did group feedback (77.2% versus 65.8%). At three month follow-up both individual and group feedback showed decreased adherence, yet the individual feedback condition decreased significantly less than the group feedback condition (54% and 17%, respectively).

Weber and Wertheim (1989) compared three conditions: 1) standard treatment (fitness exam, encouragement and assessment); 2) self monitoring plus goal-setting; and 3) self-monitoring, goal-setting plus individual positive feedback. Approximately 78% of participants completed at least four weeks of the program in both the self-monitoring and the self-monitoring plus feedback group, with 42% completing at least 10 weeks. Unexpectedly, self-monitoring alone had a greater effect on attendance than self-monitoring plus additional feedback (possibly because additional feedback had no added value on the effect of self-monitoring).

In sum, when feedback was explicit and immediate, adherence was high. Individual feedback showed better initiation and three month maintenance effects compared with group feedback. Thus, feedback, when appropriately used, and applied with a specific performance criterion (e.g., goal-setting) can be effective in increasing and maintaining exercise.

Problem solving techniques

Cost-benefits. Cost-benefit analysis can be defined as any procedure designed to examine the positive aspects and the negative aspects associated with behavior change. Besides the many benefits of exercise (e.g., reduced risk of CHD, cancer and obesity) there are many costs to an activity program designed to increase exercise (e.g., sore

muscles, time-commitment). Often, the costs are much more salient to the individual than the benefits, especially since the costs tend to be encountered immediately, with the benefits far away. Programs typically do not attempt to increase the benefits or decrease the costs associated with physical activity increases. If a program does not fit into an individual's lifestyle, they probably will have difficulty adopting the change and even more difficulty maintaining the change. In addition, Prochaska et al., (1994) have found that when an individual assess their pros > cons (e.g., benefits greater than costs) they move from contemplation to preparation (i.e., from thinking about performing a behavior to preparing to perform). Some programs have attempted to assess the costs and benefits by use of a decision-balance sheet (Hoyt & Janis, 1975, Wankel, Yardley, & Graham, 1985).

Decision-balance sheets. The decision-balance sheet categorizes anticipated gains (benefits) and anticipated losses (costs) into four major types of consequences; 1) utilitarian gains or losses to self; 2) utilitarian gains or losses for significant others; 3) approval or disapproval from significant others; and 4) self-approval or disapproval (Hoyt & Janis, 1975). This process involves having individuals consider all information relative to making a decision (e.g., positive consequences, negative consequences), then on a balance-sheet grid (with the four headings listed above describing the four major types of decisional consequences) fill in the pros and cons for selected decisions (e.g., time-commitment to exercise).

Two of the studies reviewed used decision-balance sheets (Hoyt & Janis, 1975; Wankel, Yardley, & Graham, 1985). Both studies found a significant increase on program adherence when the decision balance sheet was used. The method required little specialized training and only about 20 minutes per participant. Wankel (1984) has found decision-balance sheet effective in a variety of other settings (university-based fitness class, commercial fitness center and community-based fitness class).

Despite the efficacy of decision-balance sheet interventions, some limitations should be noted. First, both studies were less than two months in duration and did not allow assessment of effects beyond initial attendance. Thus, while the balance-sheet procedure showed initial effects, long term usage and maintenance effects are unknown. Second, the magnitude of the positive effects was not large, perhaps reflecting methodological factors (e.g., definition of adherence, intensity of intervention). Thus, while the decision-balance sheet method appeared to have some success, more research is needed to draw definite conclusions.

Other studies attempted to assess costs and benefits by use of problem-solving strategies (Meyer et al., 1980) and identification of costs and benefits (Daltroy, 1985). Studies using these techniques showed modest increases in physical activity and modest gains in maintenance. The use of problem-solving procedures in one study focused these strategies on maintenance (Meyer et al., 1980). This study showed no significant results. Daltroy (1985) applied identification of benefits and drawbacks to increase adoption and maintenance and found significant increases in attendance (controlling variables related to the exposure of the intervention). But, investigators showed a 50% dropout by week 12, suggesting this method may not have adequately addressed maintenance issues.

Thus, when investigators implemented cost-benefit procedures, they showed mixed results. Some showed greater initial adoption with poor maintenance and others showed little effect. Two issues may explain these inconsistencies. First, cost-benefit analyses performed at the start of a program may be different from analyses performed midway through or after a program. For instance, items or events identified initially as costly may be resolved with new unexpected costs occurring after program initiation (i.e., walking shoes are initially costly, sore muscles and injuries occur later). Second, focusing on the initial benefits of exercise may initiate program entry, but once realized, these benefits lose their reinforcing quality. For instance, identifying better sleep at night

after regular activity may be experienced for a few weeks as a wonderful benefit and a reason to continue exercising. But, after a few weeks the better sleep becomes usual and no longer an identifiable benefit and no longer reinforcing.

Given its flaws, cost-benefit analyses can still affect increases in physical activity. However, assessment should occur throughout the program to allow for shifts in costs and benefits and to allow for programmed planning to increase the benefits and reduce the costs. Further assessment should continue throughout a program to address maintenance costs and benefits of physical activity.

Self-Monitoring

Most exercise researchers have used some form of self-monitoring strategies to increase exercise adherence. As stated previously, Weber and Wertheim (1989) combined self monitoring with goal-setting and feedback and found 78% of participants in a gym setting completed at least four weeks of the program. They also found self-monitoring alone had a greater effect on attendance than self-monitoring plus additional feedback.

Other researchers have found combining self-monitoring with other behavior change strategies increased physical activity in a variety of settings including; worksite (Durbeck et al., 1972) physician's office (Epstein et al., 1980) home-based (King, Taylor, Haskell, & DeBusk, 1988) and cardiac rehabilitation programs (Oldridge & Jones, 1983). Thus, self-monitoring is shown to be a simple and effective strategy to increase physical activity. However, no effects for maintenance of activity are noted.

Self-monitoring as data

Self-monitoring can be used not only as a behavior change strategy but as an outcome measure as well. That is, the exerciser's recording of their activity can serve as the actual frequency and amount of activity for data purposes. This raises the question of self-monitoring of physical activity's validity and reliability. Researchers have raised

concerns with using self-monitoring as an outcome measure in different areas of research. For example, Geller (1981) examined the accuracy of self-reports for energy conservation projects and found large discrepancies between the self-reports and actual behavioral observations. As a result he suggested using the actual energy bill rather to serve as a behavioral check of the user's self-report.

However, and in contrast, Ainsworth, Jacobs, and Leon (1992) assessed the validity and reliability of self-reported physical activity. They examined the participant's activity self-report with a maximal treadmill test and body composition. They found the participant's self-report was validated by the physiological tests. Other researchers examined the reliability of a seven-day exercise recall (Sallis, Buono, Roby, Micale, & Nelson, 1992). They found test re-test reliability ranging from .77 to .93 concluding the recall was reliable. In sum, use of self-monitoring as a way to capture participants reported physical activity habits seems appropriate.

Maintenance

Initiation/adoption of physical activity through behavioral or cognitive behavioral strategies has shown good results (Epstein et al., 1980; Gettman et al., 1982; Hoyt & Janis, 1975; King & Frederikson, 1984; Martin et al., 1984). However, maintenance of this behavior change has shown poor results (Martin et al., 1984; Meyer et al., 1980; Reid & Morgan, 1979). When physical activity promotion programs are examined it is apparent they are designed to increase rather than maintain activity. The strategies used are designed for initiation, not maintenance (e.g., frequent reinforcement, continual feedback). Kazdin (1993) suggested response maintenance and transfer of training as appropriate strategies for maintenance. He defined response maintenance as the extension of behavior change over time and transfer of training as the extension of behavior change to new situations and new settings (See Table 5). Unfortunately,

response maintenance and transfer of training are not often used in physical activity promotion programs.

Insert Table 5 about here.

One strategy to promote maintenance is gradually removing or fading the contingencies. Ideally, withdrawing reinforcers gradually, leads to complete elimination of the initial reinforcer without a return of behavior change to baseline (Kazdin, 1989). For example, an individual who is vacuuming for exercise and receiving an encouraging phone call each week initially, then receives a phone call biweekly, then once a month, bi-monthly, once a year, then no phone calls, but continues to exercise. This procedure prepares participants for normal conditions (i.e., conditions under which they must normally perform the behavior).

Use of self-control procedures and cognitively-based procedures are also potential maintenance strategies. Kazdin (1993) stated self-control training involves teaching individuals to control their own behavior through the use of self-reinforcement, self-monitoring, and self-evaluation (along or together). This training aides in the transition from externally managed programs to environmentally managed programs. Kazdin (1993) defined cognitively based procedures as self-instruction training and problem-solving skills training; specialized forms of self-control strategies. Developing self-control strategies allows individuals to develop skills that can be applied across settings and situations. For example, walking program participants can be taught to self-monitor their walking, reward themselves frequently initially and then fade their reinforcement over time based on self-evaluation (e.g., goal-setting and feedback). In addition, participants can be taught to generate problem situations (e.g., walking while on vacation

or while the children are sick), plan a solution and then practice carrying out the plan (e.g., walk while on vacation).

Lifestyle physical activity

One of the most important decisions in conducting physical activity research is what type of physical activity to promote. As stated before, some of the barriers to performing physical activity are the perceived discomfort of the activity, the time allowed for activity, and access to facilities (Dishman, 1982). As such, individuals should be allowed to choose the activity they feel "fits best" with their lifestyle. Recent studies suggest the activity need not be what individuals typically think constitutes exercise (e.g., jogging, aerobics classes, stairmasters). Rather, lifestyle activities such as gardening, vacuuming, walking and choosing stairs over the elevator can result in health related improvements if performed consistently over time. In fact, it may prove easier to maintain an activity that "fits" into one's lifestyle, rather than activity which requires an individual to "make time." Thus, individuals should choose the activity they believe they can perform (i.e., self-efficacy) overtime, that they will enjoy, and that can produce health-benefits if performed consistently over time.

The Center for Disease Control recently published a report emphasizing the importance and the health benefits achieved by lifestyle activity (USDHHS, 1993). In addition, Rippe, Ward, Porcari, and Freedson (1988) reviewed the physical and psychological benefits of low to moderate intensity exercise. They found physical activity at this level had several health benefits including: decrease in cholesterol level (Goldberg & Elliot, 1987), control of hypertension through lower blood pressure (Blackburn, 1986), increases in VO_{2max} (Dehn & Bruce, 1972), control of weight loss through decreased appetite (Rippe et al., 1985), and increases in overall mood state (Porcari et al., 1988). Furthermore, Rippe, Ward, Porcari and Freedson (1988) indicated walking is an ideal target behavior for people with varying medical conditions including:

diabetes (Laws & Reaven, 1991), pregnancy (Kashiwa & Rippe, 1987), and cardiac rehabilitation (Rippe, Maher, & Ockene, 1985).

Lifestyle activity has several other benefits for increased maintenance of activity. There can be no cost associated with the individual's choice (e.g., choosing to take the stairs over the elevator, walking, gardening). There is no need for expensive facilities, membership fees, or equipment. In addition, individuals can choose to look for opportunities to engage in lifestyle activity within their day and thus, may continue to engage in activity when away from home, away on business or on vacation. Thus, they have the ability to maintain their exercise program even when their schedule or location varies. Further, lifestyle activity allows the individual choice and variety in their activity program which may alleviate some of the boredom of routine programs that correlates with exercise drop-out (Dishman, 1982)

Conclusions

Research on the effects of physical activity on health has repeatedly shown its benefits. Furthermore, inactivity is clearly an independent risk factor for disease and its population attributable risk is high. So strong is this evidence that both the United States Department of Health and Human Services and the American College of Sports Medicine have forwarded goals and recommendations for physical activity. Yet, the percentage of the US population who exercise regularly is very low, approximately 10%-20%.

A review of the determinants of exercise literature suggested the use of behavior change techniques was important for long term adherence. Furthermore, a review of the behavioral strategies used in the exercise area indicated several conclusions: 1) telephone prompting can be effective, 2) individual feedback can also be effective, 3) goal-setting, specifically, individualized, flexible, distal goals, can increase adherence, 4) self-monitoring can both increase adherence and offer outcome data, 5) lifestyle activity may relate to long-term maintenance while providing health benefits. Thus, a physical activity

program incorporating these self-control and prompting strategies with lifestyle activity should be more effective than a program without them.

Purpose of this Study

The "Exercise for Everyone" program was designed to assess the effectiveness of behavior change strategies developed for maintenance on the physical activity of individuals recruited through a community setting. Any type of moderate physical activity (e.g., vacuuming, gardening, walking, swimming etc.) was considered appropriate and encouraged. The researcher used the following behavior change strategies: telephone prompting, and self-control strategies: self-monitoring, participant set goals, self-reinforcement, self feedback and problem-solving strategies. In this study, frequency of contact was varied from no contact, to once per week, to once per every third week over 16 weeks and faded in the last four weeks. All participants were asked to self-monitor their physical activity, but some participants had an information only class and others were taught self-control strategies. The researcher hypothesized more frequent contact and learning self-control strategies would be effective for increasing and maintaining physical activity.

Method

Pilot Study

Subjects. Participants were recruited through a local physician's office. The physician wrote a letter which was be sent to potential participants ages 18 to 100 (see appendix A). The physician screened potential participants for risk of coronary heart disease and arthritis. The letter encouraged interested participants to call the project director for more information. Fifty letters were sent to determine the response rate and interest level. All interested participants who called the research office were asked to attend an initial 30 minute meeting to determine their further interest in participation. Callers were told the program was designed to increase physical activity and maintenance of physical activity within a home-based program. Any initial questions they had were addressed on the phone.

Results. Out of the 50 letters sent only four individuals responded. Of those four only two indicated further interest in the project. As such, this method of subject recruitment was abandoned and another method shown to be successful in a recent community trial (Lombard, Lombard, & Winett, 1993) was implemented.

Study

Recruitment

Fliers. Fliers announcing the "Exercise for Everyone" program were placed in all buildings around a large Southeastern University campus. The fliers contained information about the free program and a number to call for more information. The fliers were well designed and were posted for 8 weeks (see Appendix B).

Newspaper. A campus newspaper for faculty and staff at the university, printed a notice about the availability of the "Exercise for Everyone" program. The notice mentioned the program and contained a phone number for further information.

Participants

The author recruited 103 women and 16 men from through the fliers and newspaper notice. Average age was 37.01. Average height was 66.01 inches. Average weight was 157 lbs. Average Body Mass Index (BMI) was 25.70 kg/m^2 (see Results for means by gender). All participants were given informed consent forms and questionnaires (including the PARQ for screening) to fill-out (See Appendices D, E, F and G). The author contacted any participants who did not meet the PARQ requirements and asked them to get a release from a physician before beginning. No participants needed to contact their physician.

The author defined participation in the study as the continued sending in of physical activity logs each week. If participants missed three weeks of sending in their logs and/or indicated they were not willing to send in their logs, they were no longer considered part of the program and were removed from the remaining portion of the study and the data set. These participants were considered to be program "misfits". It is unknown whether these prior participants continued exercising without the program or simply stopped exercising, thus the decision not to include their data in the final data set was made. Subjects who were not active, but still sent in their logs indicating they were not active, were still considered participants throughout the study.

Design

The program design was a 2 x 3 (see Figure 1). The two independent variables were self-control strategies and frequency of contact. The two cells for self-control strategies involved either receiving self-control strategies (self-monitoring, self set goals and feedback, self-reinforcement and problem-solving) or no self-control strategies (attend a class and receive pamphlets about physical activity). The three cells for frequency of contact were a high contact condition (once a week for eight weeks, then bi-

weekly for one month and once per month for one month), a low contact condition (once every third week for three months and once per month for one month) and a no contact condition.

Insert Figure 1 about here.

Initial contact. All participants who called for more information were told the program was designed to help individuals increase and maintain a physical activity program within a home-based setting and would include an initial ten minute contact, attendance at a one hour "exercise seminar" and 16 weeks of self-monitoring of their physical activity. If they were interested, participants were asked to set an initial contact meeting for approximately ten minutes. At this meeting, participants completed an informed consent and then both a screening and an informational survey (see Appendixes C, D, E and F). After completing the surveys, the researcher gave the participant two weekly activity logs (See Appendix G) and asked the participant to complete them with their current level of physical activity over the next two weeks and to send the form in through campus mail to the researcher (logs were preprinted with the campus mailing address to facilitate data collection). Participants were informed they would receive a phone call after the first log was received to schedule their "exercise seminar".

Informational Surveys. All participants completed a stages of change survey (See Appendix F), and an exercise history survey (See Appendix E) at the initial meeting. The researcher used this information for individualization of treatment and for comparison with performance.

Exercise logs. All participants completed an exercise log each week (see Appendix G). On these logs, participants indicated the day, duration (in minutes), and mode of physical activity. If a participant did not exercise on a given day, the participant left that section

blank. Participants were instructed to mail in their logs even when they did not exercise at all during the week.

Exercise Seminars.

No strategies condition. At the seminar, individuals in this condition received information concerning how they completed their physical activity logs, reminders to send in the logs weekly and pamphlets with information about the benefits of physical activity purchased from the American Heart Association entitled "Exercise and Your Heart", "Walking for a Healthy Heart" and "'E' is for Exercise". (American Heart Association, 1992). Discussion about any concerns or difficulties the individuals experienced during their two week baseline period were discussed. Any further questions the individuals had were answered at this time. The duration of the seminar was approximately one hour. Each seminar consisted of approximately five participants.

Self-control strategies condition. At the seminar, individuals in this condition received information concerning how they completed their physical activity logs, reminders to send in logs weekly, pamphlets with information about the benefits of physical activity purchased from the American Heart Association entitled "Exercise and Your Heart", "Walking for a Healthy Heart" and "'E' is for Exercise" (American Heart Association, 1992) and instruction in self-control strategies. The specific strategies used taught were: self-monitoring, self-goal-setting and feedback, self-reinforcement and problem-solving. Participants also received periodic mailings in the form of a newsletter highlighting different strategies and a question and answer column (See Appendices H and I).

Self-monitoring. Participants were taught to graphically chart their progress for goal-setting, feedback and self-reinforcement purposes (See Appendix J). This provided continual self-monitoring in addition to the weekly activity logs and allowed the participants to visually see their progress and upcoming goals.

Exercise goals. Participants were encouraged to engage in *any* type of physical activity that fits within their lifestyle. Thus, individuals could choose to vacuum, garden, walk flights of stairs, jog, swim etc. They were taught to set distal goals (monthly) and proximal goals (weekly) that were hard but achievable and to shape their proximal goals to reach their distal goals.

Self-reinforcement and feedback. Participants were taught to examine their exercise graphs to determine criterion goals for self-reinforcement. Participants brainstormed during the meeting to determine possible reinforcers and how to administer them when goals are met. Further, individuals were taught to base their reinforcers on their graphic feedback shown on their exercise graphs.

Problem solving. Participants were taught problem solving strategies designed to promote adherence to physical activity. For example, individuals identified costs and benefits for exercising and problem solved how to increase the benefits and modify the costs (See Appendix K). These participants were sent problem solving worksheets to reevaluate their barriers to physical activity at eight weeks into the program.

All strategies were taught during the second meeting. Participants were given exercise logs for self-monitoring and graphs for charting their progress and recording feedback and reinforcement. Participants were taken through a sample week and shown how to chart progress, set a goal and reinforce themselves based on self-feedback. Further, participants were each required to brainstorm one potential barrier to physical activity and apply their newly acquired problem solving skills to that problem. These tasks helped determine mastery of the skills. Participants who had difficulty with these skills received further instruction until they mastered the strategies. Participants were informed that questions about any of the strategies can be answered by calling the project director at any time during the program. The duration of this meeting was approximately one hour. Each seminar consisted of approximately five participants.

Reliability of seminar information

Research assistants attended seminars randomly to check the accuracy of the material presented in each seminar. In each case the research assistants were blind to the content of the seminar. Of the 26 seminars held, research assistants attended 16. Using a checklist, the assistants were instructed to place a mark by each topic covered. The assistants were blind to the condition of the seminar being conducted. For the "Education only" seminar 21 topics were taught and for the "Strategies group" 38 topics were taught. Reliability was determined by dividing the number of topics taught by the number to be taught plus the number not taught. The reliability for the content of the seminars was 0.95.

Mode of activity. All participants were asked to choose one activity that "fits best" with their lifestyle. That is, the were instructed to "make activity part of your lifestyle." Any activity resulting in caloric expenditure and involving the skeletal muscles was acceptable. Participants were told they did not have to perform their activity all in one session. That is, they could choose to take a five minute walk five times throughout the day to total a 25 minute activity period. Or, if they desired they could choose to perform their activity in one session. The goal was to adapt physical activity to the individual's individual lifestyle.

Telephone prompts.

No contact condition. Individuals in this condition received no contact after their exercise seminar. If they called for information, their questions and needs were addressed and their calls were noted for comparison to calls in other conditions.

Low frequency condition. Individuals in this condition received phone contact once every three weeks for the first three months fading to once a month for one month. The telephone call lasted approximately five to 10 minutes and was designed to prompt individuals to return their exercise logs, assess if they have any comments or concerns,

and to offer assistance if necessary (e.g., needing more log forms, request to speak with the director).

High frequency condition. Individuals in this condition received phone contact once a week for two months fading to once every two weeks for one month and then once a month for one month. The telephone call lasted approximately five to 10 minutes and was designed to prompt individuals to return their exercise logs, assess if they have any comments of concerns, and to offer assistance if necessary.

Random Assignment. Once the initial contact was made and screening materials completed the researcher randomly assigned individuals to condition. As the contacts were ongoing and seminars held in a staged fashion, individuals were randomized on a continuing basis. Based on information received at the initial meeting individuals were randomly stratified based on their age (18-39, 40-65, 66+) and gender (male, female) to the six conditions: two strategies conditions (no strategies and self-control strategies) and three contact conditions (no contact, low contact and high contact). In total 119 were assigned to condition and 96 actually attended the exercise seminar. If a participant was not able to attend the exercise seminar, they were sent the booklets from the American Heart Association, 16 blank weekly log forms and were encouraged to still participate if they desired. Thus, 23 initial participants (i.e., signed consent forms and completed questionnaires) were initially excluded from the data set.

Telephone Appointments. To facilitate the phone conversations, during the first phone contact, the researcher scheduled a phone contact time with each participant. The researcher suggested the participants call her if they knew in advance they would not be able to receive the call at their scheduled time. This procedure worked well and individuals were able to be contacted unless they were on vacation. Individuals were unable to be contacted on 35 out of the 544 potential occasions.

Duration. The study consisted of four phases (see Figure 2 for the time line). The first phase lasted for four months. During this phase all participants received the intervention appropriate to their condition. The second, third and fourth phase of this study were follow-up phases. During each of these follow-up phases, the researcher asked the participants to complete two weekly physical activity logs and to send them to the program director by their usual method. Follow-up 1 occurred one month after termination of the intervention (six months). Follow-up 2, will occur six months after the first follow-up and follow-up 3 will occur six months after the second follow-up. As agreed, follow-up 1 meets the criteria for the dissertation. Follow-up 2 and follow-up 3 will be conducted to show the maintenance effects for eventual publication of the study.

Reliability

Phone contacts. For each phone contact, the researcher or research assistant, completed a phone contact sheet (see Appendix L). On these sheets, the researcher listed the participant called, the research assistant's name, the date and duration of the call. The contact sheet contained specific items to be discussed during the call. Research assistants were rotated through all conditions and were blind to the exercise seminar the participants attended.

The researcher conducted reliability tests on the phone callers' content both before the program and three other times during the program. The researcher had the phone callers perform staged calls initially to assess the percentage of information they were correctly reviewing from the phone contact forms. The content of the phone calls was the same for both strategies and no strategies conditions. The duration of the call was recorded to determine if differences between conditions exist. Research assistants were requested to ask questions and write questions, comments and concerns expressed by participants during the phone calls. In addition, research assistants were rated for the "confidence and professionalism of their call". That is, research assistants were trained

for both content of call and for delivering the call in a professional and confident manner. For the staged calls a number of predetermined questions and comments were expressed. The reliability for the researchers asking questions and writing of these questions and comments were calculated by dividing the number of items given and written correctly by the predetermined number. The researcher only allowed research assistants with a reliability of .95 to conduct calls. However, this criteria was unnecessary as during the four assessments the four research assistants received reliability's of 1.00 consistently.

Measures

Weekly Logs. Each week participants completed a "Physical Activity Log" and sent it through campus mail or U.S. Mail to the researcher. During their initial contact and again during their exercise seminar the researcher trained the participant on how to correctly complete their logs. Each time a participant performed physical activity they entered the date of the activity, the mode of the activity and the duration of the activity (in minutes).

To facilitate the sending in of weekly logs, the researcher took two measures. First, the logs were preprinted with the mailing address so the participant needed to just fold and place the log in campus mail. Second, the researcher prompted participants with phone calls when needed. A participant would receive a call when logs had not been received in a continuous three week period.

Major Dependent Measures.

There were four major dependent measures: 1) number of days per week the participant performed physical activity over the 16 week intervention period, and the two week follow-up period 2) total duration per week of physical activity over the 16 week intervention period (minutes) and the follow-up period, 3) number of weeks over the 16 week intervention period and follow-up period physical activity was performed at least three times for greater than or equal to 30 minutes (ACSM guidelines for frequency and

duration) and 4) number of weeks active over the course of the 16 week intervention and two week follow-up.

For the first dependent measure, the researcher calculated the number of days per week the participant performed physical activity from the physical activity logs. This information was entered in a repeated measures format, using week as a time variable, to test for trends.

The second measure was calculated by adding across days per week, the amount of time, in minutes, the participants performed physical activity. This information was also entered in a repeated measure format using week as the time variable.

The third measure was calculated by noting each week the participant engaged in physical activity at least twice for twenty minutes or more. The researcher used this measure to conduct survival analysis to compare groups.

The fourth measure was the number of weeks each participant was physically active. The researcher calculated this value by noting each week whether a participant was active or not active. That is, active was defined as performing any physical activity within the week and not active was defined as no activity in a given week.

Survival Analysis Measures

Survival analysis has been used to statistically compare the rates at which participants leave a data set (death) across different treatment conditions. Typically, this statistical procedure has been used with studies examining the actual survival or life due to different treatments. However, survival analysis can be used to compare the "survival" rate for any event over time. Thus, leaving an exercise program can be considered a "death" of exercise behavior. As drop-out rates for exercise programs are high (e.g., 60-80% drop out after three months; Dishman, 1982), examining drop-out rates are important. Thus, a test specifically examining the "life" or "death" of participants is most

appropriate. Use of survival analyses allows the researcher to compare the effect of different treatment conditions on participant drop-out.

Typically when survival analyses are applied the participant or patient once "dropped-out" (e.g., died) they do not return to the data set. However, when using this technique for a behavior like physical activity, the participant can return after they have "dropped-out" (e.g., leave for three week vacation and then return and begin exercising). As such, this data set does not meet the traditional requirements for survival analyses. Consequently, it was necessary to perform non-parametric survival analysis (SURVIVAL, SPSS, 1990). To perform this test, "dead" needed to be defined and then the actual number of weeks the participant "remained alive" until they met this definition was entered. If a participant did not meet the definition of "dead", the number of weeks in the study, 18, was entered.

Based on the use of this test in prior physical activity research (Lombard, 1993) the researcher used three different definitions of "dead": Dead1, Dead2 and Dead3. "Dead1" was defined as the first week a participant did not perform physical activity. For example, if a participant was active during weeks one through nine and then did not exercise during week 10, but returned to exercise weeks 12-18 they were viewed as "dead" week 10 and a 10 was entered for this participant. "Dead2" was defined as the week following a period of having not exercised for three weeks. For example, if a participant exercised weeks one to seven, missed weeks eight to 11, they were entered as dying week 11 and an 11 was entered for them. "Dead3" was defined as the week after the last week a participant exercised. For example, if a participant exercised weeks three to five, missed week six then exercised weeks seven through nine, but did not exercise after week nine they were considered "dead" in week 10 and a 10 was entered for them. These definitions of "dead" allowed the researcher to examine the "survival" or maintenance of physical activity in a variety of ways.

Results

Demographics

Initial sample. There were 118 participants in the initial sample: 15 in the no contact/information class; 15 in the low contact/information class; 15 in the high contact/information class; 17 in the no contact/strategies class; 17 in the low contact/strategies class; 17 in the high contact/strategies class and 22 who did not attend any class. Table 6 summarizes the demographic information of the entire initial sample by treatment condition (see Table 6). There were 102 women and 16 men. Ages ranged from 18 to 61 with an average age of 36.63 ($s^2 = 9.86$). For men the average age was 37.94 and for women the average age was 36.42. Participants weight ranged from 97 to 268 pounds with an average of 159.21 ($s^2 = 32.67$) (men, x= 179.81; women, x=155.98). Participants height ranged from 60 to 76 inches with a mean of 65.75 ($s^2 = 3.14$)(men, 70.06; women, 65.21). Their scores on the readiness for exercise behavior change ranged from 1 to 5 (precontemplation to maintenance) with an average of 3.6 (between preparation for action stage to action stage)(men, 3.69; women, 3.54). The overall number of smokers in the program was 8.

Insert Table 6 about here.

Final sample. There were 74 participants in the final sample (see Table 7 for N in each condition), 64 women and 10 men. Twenty-three participants were eliminated from the data set because they did not attend either class (information or strategies). There were 22 participants eliminated from the data set because their data had three or more missing weeks of data. Of these 22 participants, six dropped out due to medical concerns (e.g., complicated pregnancy, back problems, foot surgery) (two, info class/low contact; three, strategies class/no contact; one strategies class/low contact), four stated they could

no longer participate due to an unexpected move (one, info class/low contact; one, info class/high contact; one, strategies class/no contact; one, strategies class/low contact) and 11 indicated they had not necessarily stopped exercising but they were not willing to continue sending in data (five, info class/no contact; one, info class/high contact; two, strategies class/no contact; one, strategies class/low contact; two, strategies class/high contact). The participants eliminated from the final sample differ from the rest of the sample in that three were smokers and six were men. That is, proportionately a greater number of men and smokers were not included in the final sample. In addition, the mean level of readiness for exercise change was 4.00, compared to a mean of 3.6 for the overall sample.

Insert Table 7 about here.

Table 7 summarizes the demographic information of the final data sample used for analyses (see Table 7). Ages ranged from 21 to 61 with an average age of 37.03 (s^2 = 10.50). The mean age for women was 36.72 (s^2=10.26) and for men was 39.00 (s^2 =12.34). Participants' weight ranged from 97 to 215 pounds with an average of 152 (s^2 = 26.81). The mean weight for women was 154.42 lbs. (s^2 =25.64) and for men was 174.40 lbs. (s^2 =29.05). Their height ranged from 60 to 74 inches (s^2 = 3.19). The mean height for women was 65.55 inches (s^2 =2.93) and for men was 69.90 inches (s^2 =2.13). Their scores on the readiness for exercise behavior change ranged from 1 to 5 (precontemplation to maintenance) with an average of 3.61 (between preparation for action stage to action stage). The mean score for women on readiness for change was 3.63 (s^2 =.95) and for men was 3.50 (s^2 =.97). The overall number of smokers in the final sample was five.

Repeated Measures Anovas (RMANOVA). RMANOVA's were performed on all dependent measures: number days/week active, total minutes/week active, average minutes/week active, whether active or not in a week, and whether ACSM criteria for frequency and duration were met during a given week. The RMANOVA's were performed across the 18 weeks of the program (weeks 1-16 including follow-up weeks 21 and 22) to compare for differences between groups. In addition, RMANOVA's were performed to compare differences among the follow-up weeks. The analyses were performed comparing differences for condition, type of class (information versus strategies), frequency of contact (high, low or no), and whether contacted or not (high + low versus no).

Significance was found for the effect of class on all dependent measures. There were no significant effects found for frequency of contact on any measure (see Table 8).

Number days active per week. The first major dependent measure was the number of days a participant performed activity each week. Significance was found when testing for differences on "class" (information versus strategies, see Table 9). There was a significant difference between those who participated in the strategies class versus those who participated in the information only class ($F(1,72)=6.11$, $p<.05$). There was also a significant effect for weeks ($F(17,1224)=10.17$, $p<.01$) and for the class x weeks interaction ($F(17,1224)=2.87$, $p<01$). In addition, a significant effect of class was found when follow-up weeks were compared ($F(1,72)=26.39$, $p<.01$)(see Table 10). There was not a significant effect for class during follow-up weeks for weeks ($F(1,72)=1.14$, $p=.29$) nor for the class x weeks interaction ($F(1,72)=.90$, $p=.35$).

The researcher conducted RMANOVA to test for differences on condition (comparison of all six conditions, see Table 11). There was no significant difference

between the conditions ($F(5,68)=1.96$, $p=.10$). There was a significant effect for weeks ($F(17,1156)=10.60$, $p<.01$) and the condition x weeks interaction ($F(85,1156)=2.01$, $p=.04$). For follow-up (see Table 12) a significant effect for condition was found ($F(5,68)=5.21$, $p<.01$). Significance was not found for weeks ($F(1,68)=1.15$, $p=.29$) or the condition x weeks interaction ($F(5,68)=1.12$, $p=.36$).

RMANOVA's were conducted to test for differences on frequency of contact (high versus low versus no, see Table 13). There was a not a significant difference between the contact groups ($F(2,71)=1.12$, $p=.33$). There was a significant effect for weeks ($F(17,1207)=10.21$, $p<.01$) and the frequency x weeks interaction ($F(34,1207)=2.09$, $p=.03$). Similarly, significance for frequency of contact was not found for follow-up ($F(2,71)=.13$, $p=.88$). Nor was significance found for the effect of weeks ($F(1,71)=1.16$, $p=.28$) or the frequency x weeks interaction ($F(2,71)=.84$, $p=.21$) (See Table 14).

The researcher created a variable "contact" (whether the participant received contact, see Table 15) by combining the high and low contact conditions and compared this to the no contact condition. No significance was found for contact ($F(1,72)=.96$, $p=.33$). However, significance was found for the effect of weeks ($F(17,1224)=3.19$ $p<.01$ and for the interaction of contact and weeks ($F(17,1224)=3.19$, $p<.01$). Also, no significance was found for any of the follow-up measures (See Table 16): contact ($F(1,72)=.08$, $p=.78$), effect of weeks ($F(1,72)=1.13$, $p=.29$) and the contact x weeks interaction ($F(1,72)=.006$ $p=.9367$).

Thus, there was a significant difference for number of days active each week for the effect of class over all weeks and during follow-up. During weeks 1-16 including follow-up participants in the strategies class performed an average of one day per week of activity more ($x = 3.9$) versus those in the information class ($x = 3.0$). The results are more striking at follow-up with those in the strategies class performing twice as many

days active (x = 3.8, strategies; x = 1.4, information). There was no effect for frequency of contact on days active with all conditions performing similarly across all weeks (x = 3.2, no contact; x = 3.3, low contact; x = 3.8, high contact) and within the follow-up weeks (x = 2.5, no contact; x = 2.8, low contact; x = 2.5, high contact).

Insert Tables 9, 10, 11, 12, 13, 14, 15, & 16 about here.

Total minutes per week active. The second major dependent measure was the total number of minutes active each week. RMANOVA's were conducted using the independent variables: condition, class, frequency of contact and contact. The only significant difference was found for the effect of class (information only class versus strategies class, see Table 17) ($F_{1,72}$=5.97, p<.05). Significance was also found on this measure for weeks ($F_{17,1224}$=2.70, p<.05) and the class by weeks interaction ($F_{17,1224}$=1.71, p=.04). Significance was also found for the follow-up weeks (see Table 18) for class ($F_{1,72}$=14.45, p=.03). No significant difference was found for the effect of weeks ($F_{1,72}$=.39 p=.53) or for the class x weeks interaction ($F_{1,72}$=1.34, p=.25) during the follow-up weeks.

RMANOVA's were also conducted for the variable condition (see Table 19). No significant difference although there was a trend ($F_{5,68}$=1.653 p=.16). Significance was found on this measure for weeks ($F_{17,1156}$=2.78, p<.01) and the condition by weeks interaction ($F_{85,1156}$=1.57, p<.01). Significance was found for the follow-up weeks (see Table 20) for condition ($F_{5,68}$=3.37, p<.01). No significant effect was found for the effect of weeks ($F_{1,68}$=.39 p=.54) or for the condition x weeks interaction ($F_{5,68}$=1.02, p=.41) during the follow-up weeks.

No significance was found for the variable frequency of contact (high versus low versus no, see Table 21) using RMANOVA ($F_{2,17}$=.14, p=.82). However, there were

significant effects for weeks ($F_{17,1207}$=2.73, p<.01) and for the frequency x weeks interaction ($F_{34,1207}$=1.78, p<.01). In addition, no significant difference was found for frequency of contact during the follow-up weeks (see Table 22): frequency of contact ($F_{2,71}$=.82, p=.44); effect of weeks($F_{1,71}$=.39, p=.54) and frequency x weeks interaction ($F_{2,71}$=.80, p=.45).

The researcher conducted RMANOVA to test for differences on contact (high + low) or no contact (see Table 23). There was no significant difference between the contact groups ($F_{1,72}$=.25, p=.62). There was a significant effect for weeks ($F_{17,1224}$=2.70, p<.01 and for the contact x weeks interaction ($F_{17,1224}$=1.80, p<.05. However, there were no significant differences for any variable during the follow-up weeks (see Table 24): contact group ($F_{1,72}$=.76 p=.39); effect of weeks ($F_{1,72}$=.39, p=.53) and contact x weeks interaction ($F_{1,72}$=1.19, p=.28).

In sum, individuals participating in the strategies class performed an average total of 69 minutes per week more than individuals participating in the information class (x = 216, strategies class vs. x = 147, information class). For follow-up the significant difference was even more apparent with individuals in the strategies condition performing, on average, three times as many minutes as those in the information condition (x = 204, strategies vs. x = 77, information). For weeks one through 16 including follow-up individuals performed similarly across all contact conditions (x = 171 min/wk, no contact; x = 185 min/wk, low contact; x = 190 min/wk, high contact). Interestingly, although not significant, during follow-up individuals in the low contact condition performed more total minutes per week than those in either the no contact or high contact condition (x= 119, no contact; x= 175, low contact; x= 134, high contact).

Insert Tables 17, 18, 19, 20, 21, 22, 23, & 24 about here.

Average minutes per week active. The third major dependent measure was the average number of minutes a participant performed activity each week. Significance was found when testing for differences on "class" (information versus strategies, see Table 25). There was a significant difference between those who participated in the strategies class versus those who participated in the information only class ($F(1,72)=7.16$ $p<.01$). There was trend toward significance for weeks ($F(17,1224)=1.56$, $p=.07$) and for the class x weeks interaction ($F(17,1224)=1.6$, $p=.06$). In addition, a significant effect of class was found when follow-up weeks were compared ($F(1,72)=10.37$, $p<.01$)(see Table 26). There was not a significant effect for class during follow-up weeks for weeks ($F(1,72)=.90$ $p=.35$) nor for the class x weeks interaction ($F(1,72)=.09$, $p=.77$).

The researcher conducted RMANOVA to test for differences on condition (comparison of all six conditions, see Table 27). There was a significant difference between the conditions ($F(5,68)=2.41$, $p<.05$). There was a trend toward a significant effect for weeks ($F(17,1156)=1.58$, $p=.06$) and a significant effect for the condition x weeks interaction ($F(85,1156)=1.37$, $p<.05$). For follow-up (see Table 28) a significant effect for condition was found ($F(5,68)=3.06$, $p<.05$). Significance was not found for weeks ($F(1,68)=.87$, $p=.36$) or the condition x weeks interaction ($F(5,68)=.38$ $p=.86$).

RMANOVA's were conducted to test for differences on frequency of contact (high versus low versus no, see Table 29). There was a not a significant difference between the contact groups ($F(2,71)=.43$ $p=.65$). There was not a significant effect for weeks ($F(17,1207)=1.6$, $p=.07$) but significance was found for the frequency x weeks interaction ($F(34,1207)=1.47$, $p<.05$). Similarly, significance for frequency of contact

was not found for follow-up ($F(2,71)=1.43$ $p=.25$). Nor was significance found for the effect of weeks ($F(1,71)=.23$ $p=.35$) or the frequency x weeks interaction ($F(2,71)=.23$, $p=.80$) (See Table 30).

Next, the researcher conducted RMANOVAs for the variable "contact" (whether the participant received contact, see Table 31) by combining the high and low contact conditions and compared this to the no contact condition. No significance was found for contact ($F(1,72)=.71$, $p=.40$). However, significance was found for the effect of weeks ($F(17,1224)=1.56$ $p<.05$) and for the interaction of contact and weeks ($F(17,1224)=1.84$, $p<.05$). Also, no significance was found for any of the follow-up measures (See Table 32): contact ($F(1,72)=1.68$, $p=.20$, effect of weeks ($F(1,72)=.90$, $p=.35$) and the contact x weeks interaction ($F(1,72)=.46$ $p=.50$).

Thus, individuals participating in the strategies class performed, on average, 16 minutes/day (rounded to nearest minute) more activity than individuals participating in the information class across all weeks of the program ($x= 49$, strategies class vs $x = 33$, information class). In addition, at follow-up individuals in the strategies condition performed twice as much activity than individuals in the information condition ($x = 48$, strategies vs. $x = 22$, information). Of note, the strategies condition had similar minutes/day at follow-up as during entire course of the program indicating continued performance of activity over weeks ($x = 49$, program, $x= 48$, follow-up). In addition, no effect was found for frequency of contact indicating similar performance in average minutes/day of activity across all weeks ($x=37$, no contact; $x=45$, low contact; $x = 34$, high contact) and during follow-up ($x=27$, no contact, $x = 45$ low contact, $x = 34$, high contact).

Insert Tables 25, 26, 27, 28, 29, 30, 31, & 32 about here.

Active or not active. The fourth major dependent measure was whether the participant was active in a week or not active. The variable "active" was created by entering a "1" if the participant performed any activity in a week and a "0" was entered if no activity was performed. RMANOVA's were again conducted using the independent variables: condition, class, frequency of contact and contact. For this variable significant difference was found for the effect of class (information only class versus strategies class, see Table 33)($F_{1,72}=12.58$, $p<.01$). Significance was also found on this measure for weeks ($F_{17,1224}=9.96$, $p<.01$) and the class by weeks interaction ($F_{17,1224}=5.361$, $p<.01$). Significance was also found for the follow-up weeks (see Table 34) for class ($F_{1,72}=35.07$, $p<.01$). No significant difference (but a trend toward significant) was found for the effect of weeks ($F_{1,72}=3.06$ $p=.08$) or for the class x weeks interaction ($F_{1,72}=.46$, $p=.50$) during the follow-up weeks.

RMANOVA's were also conducted for the variable condition (see Table 35). A significant difference was found ($F_{5,68}=4.74$, $p<.01$). Significance was found on this measure for weeks ($F_{17,1156}=10.32$, $p<.01$) and the condition by weeks interaction ($F_{85,1156}=2.43$, $p<.01$). Significance was also found for the follow-up weeks (see Table 36) for condition ($F_{5,68}=7.80$, $p<.01$). No significance was found for the effect of weeks ($F_{1,68}=3.01$ $p=.09$) or for the condition x weeks interaction ($F_{5,68}=.63$, $p=.68$) during the follow-up weeks.

No significant effect was found for the variable frequency of contact (high versus low versus no, see Table 37) using RMANOVA ($F_{2,17}=1.76$, $p=.30$). However, there were significant effects for weeks ($F_{17,1207}=9.62$, $p<.01$) and for the frequency x

weeks interaction ($F(34,1207)=1.85$, $p<.01$). In addition, no significant difference was found for frequency of contact during the follow-up weeks (see Table 38): frequency of contact ($F(2,71)=.52$, $p=.59$); effect of weeks($F(1,71)=3.08$, $p=.08$) and frequency x weeks interaction ($F(2,71)=.94$, $p=.40$).

The researcher conducted RMANOVA to test for differences on contact (high + low) or no contact (see Table 39). There was no significant difference between the contact groups ($F(1,72)=2.07$, $p=.15$). There was a significant effect for weeks ($F(17,1224)=9.67$, $p<.01$ and for the contact x weeks interaction ($F(17,1224)=3.13$, $p<.01$). However, there were no significant differences for any variable during the follow-up weeks (see Table 39): contact group ($F(1,72)=.84$ $p=.36$); effect of weeks ($F(1,72)=3.04$, $p=.09$) and contact x weeks interaction ($F(1,72)=.04$, $p=.85$).

In sum, of individuals participating in the strategies class 22% more were active in a given week than individuals participating in the information class across all weeks of the program (x= 87%, strategies class vs x = 65%, information class). In addition, at follow-up of individuals in the strategies condition 55% more were active than individuals in the information condition (x = 89%, strategies vs. x = 34%, information). Of note, the strategies condition had similar minutes/day at follow-up as during entire course of the program indicating continued performance of activity over weeks (x = 49, program, x= 48, follow-up).

Insert Tables 33, 34, 35, 36, 37, 38, 39, & 40 about here.

ACSM guidelines for frequency and duration. The fifth major dependent measure was whether a participant met the ACSM guidelines for frequency (at least three days/week) and duration (at least 30 minutes) in a given week. A "1" was entered for each week a participant met the guidelines and a "0" was entered for each week the goals

were not met. Significance was again found when testing for differences on "class" (information versus strategies, see Table 41, Figure 3). There was a significant difference between those who participated in the strategies class versus those who participated in the information only class ($F(1,72)=9.05$ $p<.01$). There was a significant effect for weeks ($F(17,1224)=4.54$, $p<.01$) and for the class x weeks interaction ($F(17,1224)=3.15$, $p<.01$). In addition, a significant effect for class was found when follow-up weeks were compared ($F(1,72)=30.01$, $p<.01$)(see Table 42). There was no significant effect for class during follow-up weeks for weeks ($F(1,72)=0$ $p=1.0$). There was no significant difference for the class x weeks interaction ($F(1,72)=1.81$, $p=.12$).

The researcher conducted RMANOVA to test for differences on condition (comparison of all six conditions, see Table 43, Figure 4). There was a significant difference between the conditions ($F(5,68)=2.69$, $p<.05$). There was a significant effect for weeks ($F(17,1156)=4.58$, $p<.01$) and a significant effect for the condition x weeks interaction ($F(85,1156)=1.58$ $p<.01$). For follow-up (see Table 44) a significant effect for condition was found ($F(5,68)=6.18$, $p<.01$). Significance was not found for weeks ($F(1,68)=0$, $p=1.0$) or the condition x weeks interaction ($F(5,68)=1.81$ $p=.12$).

RMANOVA's were conducted to test for differences on frequency of contact (high versus low versus no, see Table 45, Figure 5). There was not a significant difference between the contact groups ($F(2,71)=1.41$, $p=.25$). There was a significant effect for weeks ($F(17,1207)=4.44$, $p<.01$) but no significant effect for the frequency x weeks interaction ($F(34,1207)=1.27$, $p=.14$). Similarly, significance for frequency of contact was not found for follow-up ($F(2,71)=.43$, $p=.65$). Nor was significance found for the effect of weeks ($F(1,71)=0$ $p=1.0$) but the frequency x weeks interaction was significant ($F(2,71)=3.30$ $p=.04$) (See Table 46).

Next, the researcher conducted RMANOVAs for the variable "contact" (whether the participant received contact, see Table 47, Figure 6) by combining the high and low

contact conditions and compared this to the no contact condition. No significance was found for contact ($F(1,72)=1.05$, $p=.31$). However, significance was found for the effect of weeks ($F(17,1224)=4.44$ $p<.01$) but not for the interaction of contact x weeks ($F(17,1224)=1.46$, $p=.10$). Also, no significance was found for any of the follow-up measures (See Table 48): contact ($F(1,72)=.33$, $p=.57$, effect of weeks ($F(1,72)=0$, $p=1.0$) and the contact x weeks interaction ($F(1,72)=0$, $p=1.0$).

In sum, a greater percentage of individuals who participated in the strategies class (71%) met their ACSM guidelines for frequency (three or more times per week) and duration (greater than 30 minutes per session) than did those who participated in the information class (52%) during all weeks of the program. The difference was even greater for the follow-up weeks where, on average, 77% of individuals participating in the strategies class met their ACSM goals and only 26% of those in the information condition met their goals. Again, no significant difference was found for frequency of contact across all weeks (57%, no contact; 59%, low contact; 70% high contact) and during follow-up (48%, no contact; 60%, low contact; 50%, high contact).

Insert Tables 41, 42, 43, 44, 45, 46, 47, & 48

and Figures 3, 4, 5, & 6 about here.

Intent to treat

Data was analyzed using RMANOVA for the dependent measure ACSM guidelines including the 11 participants whose data was excluded from the data set due to non-compliance with the program (e.g., did not send in logs). These participants were included as "dropout" and included as if they were program failures and therefore not performing activity.

For this variable significant difference was found for the effect of class (information only class versus strategies class)($F(1,83)=13.53$, $p<.01$). Significance was also found on this measure for weeks ($F(17,1411)=9.82$, $p<.0001$) and the class by weeks interaction ($F(17,1411)=6.83$ $p<.01$). Significance was also found for the follow-up weeks for class ($F(1,83)=9.07$, $p<.01$). No significant difference was found for the effect of weeks ($F(1,83)=.09$ $p=1.0$) or for the class x weeks interaction ($F(1,83)=.05$, $p=.16$) during the follow-up weeks.

RMANOVA's were also conducted for the variable condition. A significant difference was found ($F(5,79)=5.45$, $p<.05$). Significance was found on this measure for weeks ($F(17,1343)=.58$, $p<.01$) and the condition by weeks interaction ($F(85,1343=2.43$, $p<.01$). Significance was also found for the follow-up weeks for condition ($F(5,79)=2.04$, $p<.01$). No significance was found for the effect of weeks ($F(1,79)=.08$ $p=1.0$) or for the condition x weeks interaction ($F(5,79)=.05$, $p=.11$) during the follow-up weeks.

When the "dropouts" are included significant is found for the effect of frequency of contact (high versus low versus no) using RMANOVA ($F(2,82)=3.15$, $p<.05$). There were significant effects for weeks ($F(17,1394)=4.34$, $p<.01$), but not for the frequency x weeks interaction ($F(34,1394)=1.25$, $p=.15$). However, no significant difference was found for frequency of contact during the follow-up weeks, except for the frequency x weeks interaction: frequency of contact ($F(2,82)=.54$, $p=.31$); effect of weeks($F(1,82)=0$, $p=1.0$) and frequency x weeks interaction ($F(2,82)=3.52$, $p=.03$).

The researcher conducted RMANOVA to test for differences on contact (high + low) or no contact . There was significant difference between the contact groups ($F(1,83)=10.10$, $p<.05$). There was a significant effect for weeks ($F(17,1411)=4.33$, $p<.01$), but not for the contact x weeks interaction ($F(17,1411)=1.36$, $p=.15$). However, there were no significant differences for any variable during the follow-up weeks:

contact group ($F(1,83)=1.92$, $p=.17$); effect of weeks ($F(1,83)=0$, $p=1.0$) and contact x weeks interaction ($F(1,83)=0$, $p=1.0$).

Thus, when individuals who failed to turned in logs are included in the data set, significance is found not only for the effect of class but also for frequency of contact. In sum, of individuals participating in the strategies class 19% more met their ACSM goals for frequency and duration across all weeks than individuals participating in the information class (63%, strategies class vs 44%, information class). In addition, at follow-up of individuals in the strategies condition 46% more were active than individuals in the information condition (68%, strategies vs. 22%, information). In addition, individuals varied significantly in meeting ACSM goals when frequency of contact is examined: no contact, 43%; low contact, 55%; high contact, 65%. However, when follow-up is compared, across contact groups, a greater percentage of individuals in the low contact group met ACSM guidelines: no contact, 36%; low contact, 55%, high contact 47%.

No contact comparison

RMANOVA was used to examine differences between the information class/no contact condition and the strategies class/no contact condition using ACSM guidelines as the dependent measure. Significance was found for condition ($F(1,19)=5.46$, $p<.05$) and for weeks ($F(15,285)=2.58$, $p<.01$), but not for the condition x weeks interaction ($F(15,285)=1.03$, $p=.42$) across all weeks. In addition, significance was found for the effect of condition during follow-up ($F(1,19)=14.26$, $p<.01$), but not for the effect of weeks ($F(1,19)=0$, $p=1.0$) or the condition x weeks interaction ($F(1,19)=2.01$, $p=.17$). This indicates that when the data is collapsed over all weeks, the effect of class remains, but not when looked at across weeks. In addition, these results indicate 70% of individuals participating in the class with no contact met their ACSM goals for frequency and duration compared to 44% of those in the information class with no contact during all

weeks of the program. During follow-up 77% of those participating in the strategies class/no contact condition met their goals compared to 15% of those in the information class/no contact condition.

Survival Analyses.

Dead 1. The researcher conducted the nonparametric analysis SURVIVAL on the dependent variable "Dead 1." The different stratification variables were; class, frequency of contact, contact, and stage (see Table 49). There was a significant difference between the survival curves for class (LEE-DESU(LD)$_{(1)}$=5.76, p<.05). There was no significant difference for frequency (LD$_{(2)}$=1.34, p=.51), contact (LD$_{(1)}$=1.29, p=.26), and stage (LD$_{(4)}$=4.29, p=.37). Figures 3-5 show the survival curves and hazard functions for these tests (except for stage). These figures show that when program "death" is defined as the first week a participant did not perform activity, 46.2% of individuals in the strategies condition "survived" or adhered to their physical activity program over the 18 weeks of the program compared to 14.3% of individuals in the information condition. In addition, there was no difference in the percentage of individuals "surviving" among the frequency of contact conditions: 33.3%, no contact; 31.0% low contact; 29.6% high contact.

Insert Table 49 & Figures 7, 8, & 9 about here.

Dead 2. The researcher conducted the nonparametric analysis SURVIVAL on the dependent variable "Dead 2." The different stratification variables were; class, frequency of contact, contact, and stage (see Table 50). There was a significant difference between the survival curves for class (LD$_{(1)}$=5.52 p<.05). Again, no significant difference was found for frequency (LD$_{(2)}$=3.03, p=.22), contact (LD$_{(1)}$=1.59, p=.21), and stage (LD$_{(4)}$=1.90, p=.75). Figures 10-12 show the survival curves and hazard functions for

these tests (except for stage). The figures demonstrate when death is defined as the week following a three week period of no exercise, adherence rates are notably higher, but still only significantly different between class conditions. That is, of individuals participating in the strategies class 82.1% "survived" versus 54.3% of those in the information class. For the frequency of contact conditions survival rates were 57.1%, 65.4% and 81.5% among the no, low and high frequency conditions respectively.

Insert Table 50 & Figures 10, 11, & 12 about here.

Dead 3. The researcher conducted the nonparametric analysis SURVIVAL on the dependent variable "Dead 3." The different stratification variables were; class, frequency of contact, contact, and stage (see Table 51). There was a significant difference between the survival curves for class ($LD_{(1)}=17.43$ $p<.01$). No significant difference was found for frequency ($LD_{(2)}=.52$, $p=.77$), contact ($LD_{(2)}=.45$, $p=.50$), and stage ($LD_{(4)}=1.14$, $p=.89$). Figures 13-15 show the survival curves and hazard functions for these tests (except for stage). These figures show that when death is defined as the absolute last week a participant performed physical activity individuals participating in the strategies class survived significantly longer than those in the information class (89.7% vs. 40.0%). Similar to previous results, there was no significant difference in survival rates among the frequency of contact conditions (61.9%, no contact; 69.2%, low contact; 59.3% high contact).

Insert Table 51 & Figures 13, 14, & 15 about here.

Conclusions

These results are consistent throughout dependent measures tested showing an effect for participation in a strategies class versus an information class and no significant effect for frequency of contact. The overall results are not seen as being influenced by differential dropout by condition. That is, although more participants remained in the more intensive (e.g., strategies/contact) conditions than in less intensive (e.g., info/no contact) conditions, the effect would actually have been enhanced if the "dropouts" were included in the final data set, as seen in the ACSM data including the dropouts. If the "dropouts" are included as "treatment failures" and their data viewed as "0" or no activity the comparisons show greater significance as more "treatment failures" were included in the less intensive conditions.

In addition, the results were apparently not compromised by the effect of alpha inflation. First, the results were always very consistent, showing the effect of class across all outcome measures. Second, if correlations were run between all dependent measures, the correlations would be consistently high as all the outcome measures are essentially taken from the same information, thus RMANOVA were used on essentially one variable. Finally, even if a more conservative approach were taken, the effect of class was typically $p<.001$, thus demonstrating significance even when multiple tests were run.

Discussion

Summary of Major Findings

The results of this study showed a class emphasizing self-management (self-control, maintenance) strategies compared to an information only class enhanced participation in exercise and activity. However, over weeks, regardless of condition, participation decreased. In addition, in contrast to other studies (Lombard, Lombard, & Winett 1994; King et al., 1988) results indicated frequency of contact did not increase participation rates. That is, individuals participated about equally in physical activity when no contact, low contact and high contact conditions were compared. However, there was a trend for more frequent contact to increase participation rates for individuals who did not receive a strategies class. Overall, this study indicates a limited intervention involving a self-management class can increase participation in activity and exercise for at least several months.

Class: Information versus Strategies. Importantly, participation in a "strategies class" involving teaching individuals self-control or "maintenance" strategies showed consistently better results across all outcome measures than participation in an information only class. The strategies class significantly enhanced participation as evidenced by all three definitions of "dead" in the survival analyses and also by all outcome measures tested with RMANOVA: days active/week, total minutes/week active, average minutes/week active, active or not, ACSM guidelines for frequency and duration. This pattern of consistent results was found when all 18 weeks of the program were compared and when follow-up was examined.

Frequency of contact. The frequency of contact: no contact, low contact and high contact did not result in significant differences across any of the outcome measures. This pattern was shown when all 18 weeks of the program were compared and when follow-up

was examined for both types of analyses used (survival analyses and RMANOVA). However, when participants in the information class were compared across frequency of contact, there was a trend toward significance. Thus, participation in a strategies class versus an information class may preclude the necessity for contact, but contact seems important when participation in an information only class is examined (see Figure 16). In addition, when individuals receiving no contact were compared across type of class, there was a significant difference favoring those participating in the strategies class. Thus, frequency of contact may be important when strategies are not taught, and a strategies class alone seemed to have a stronger effect than an information class alone.

Insert Figure 16 about here

Time. There was also a significant effect for weeks across all outcome measures, representing decreasing values over weeks. The weekly values used in the RMANOVA's were based on averages within groups. This result probably occurred due to the fact that individuals who did not participate in activity within a given week sent in logs indicating this lack of activity and thus, their "zero's" were included within the average for the week, showing an erosion of participation rates in activity over weeks.

Summary. The data demonstrated a consistent pattern of results for the independent variables of class , weeks and frequency of contact. The significant effects found for the strategies versus information class were consistent across all measures. The lack of significant findings for frequency of contact may suggest that use of contact for individuals participating in a seminar designed to teach them strategies to maintain their activity may not be useful, but frequent contact may be beneficial for those not able to participate in such a seminar.

Relevance of findings for the field of physical activity programs.

This project furthered research in physical activity promotion by showing how a class teaching specific self-management strategies can help maintain behavior and thus obviate the need for continued contact with participants. Mechanisms involved in making the class effective and the noneffectiveness of frequent contact are discussed, followed by a brief discussion of the activity logs used to monitor behavior.

Strategies class versus Information class. The impact of the strategies class was found across all outcome measures. Individuals who participated in the strategies class consistently performed, on the average, more physical activity and maintained this behavior longer than those participating in an information class. This finding is particularly encouraging for a variety of reasons. First, a seminar is a simple and easy intervention strategy to implement. In this study, both the strategies seminar and the information seminar were controlled for duration of contact. Thus, simply teaching specific strategies within the same amount of time showed a pronounced effect. Second, the strategies seminar did not require any additional intervention for its effects. That is, the effect of an additional intervention, contact, demonstrated no additive effect within the strategies condition. However, for the information condition, frequency of contact seemed necessary to improve participation.

Third, research assistants and other health care personnel can be taught to implement a strategies seminar. A structured outline, like the one used for reliability in this study, can be used to maintain the integrity of the intervention for future instruction of seminar leaders. Fourth, use of a seminar format allows for instruction and intervention to a larger groups of individuals at one time, thus, reducing the manpower costs and increasing outreach and public health benefits.

Finally, when survival rates are compared for the strategies class condition (46%) to the average survival rate reported in the literature (20% at six months), the results were

particularly encouraging. For example, Daltroy (1985) used a problem-solving technique and found a 50% dropout by week 12. Belisle, Roskies, & Levesque (1987) used self-management techniques including an aspect of relapse prevention and found 43% adherence at 12 weeks. Thus, adherence rates at the 22 month point, for the "Exercise for Everyone" program are encouraging. But, of course, even with this class, adherence is still not very high indicating other intervention components are needed (see later).

While this program was not six months in length, the four month intervention plus the one month follow-up provides an adequate comparison to prior research since many dropouts or low participation rates occur by three months. Moreover, when the more conservative definition for survival was used, missing one week of activity (Dead1), the survival rate was 46% in the strategies condition and 14% in the information condition. Thus, the strategies condition had a survival rate over twice that of the mean reported in many other activity promotion studies and three times as large as the information condition.

Given the encouraging results of the strategies intervention , the major question is why did it work? There are a number of potential explanations. First, the program was designed to promote maintenance of behavior change from the beginning of the activity program. Thus, strategies designed to progress naturally from initiation of behavior change to eventual maintenance were introduced during the class and individuals may have used them to continue their exercise program. However (and unfortunately), it is not known whether participants actually used the strategies. Considerable reporting of such "process" data would have placed a burden on participants, and perhaps resulted in more dropouts. Second, individuals in the strategies condition were provided with a goal-setting form. The form included space to write down potential reinforcers or "rewards" for obtaining weekly and monthly goals and space for "checking" if they met their goal and rewarded themselves (see Appendix J). Although it is not known if the goal-setting

form was used in the manner it was intended, the form may have provided a continual prompt to participate in physical activity and to plan ahead for future goals. Thus, this continual prompt may have been sufficient to promote behavior with the phone contact prompts having no additional value.

Third, a problem-solving exercise was performed during the strategies seminar encouraging individuals to brainstorm potential barriers to physical activity and devise potential solutions and then plan to implement the solutions. This exercise may have aided individuals in planning for potential barriers initially, and they were later encouraged to problem solve again, midway through the program when a "problem-solving form" (see Appendix K) was sent to them. Again, while it is unknown whether participants actually used the form, it may have served as a prompt to "rethink" their barriers to activity at that time and to develop and implement solutions to promote adherence.

Finally, the strategies seminar had a more interactive format than did the information seminar which was more didactic. Thus, individuals in the strategies condition may have taken a more active role in their responsibility for program and activity adherence and therefore may have been more committed to the program. In addition, the interactive format could have allowed participants to experience greater self-efficacy for performing the behavior of physical activity and for eventually maintaining the behavior over time. As most individuals in the program indicated they had attempted to maintain an exercise program in the past, but had failed, practicing to overcome identifiable barriers to activity may have provided individuals with greater efficacy for overcoming their specific barriers.

Finally, this program attempted to apply strategies designed for maintenance of behavior change at the beginning of the program. Often programs attempt to initiate activity and once behavior change is established then implement techniques for

maintenance (King & Frederikson, 1984; Martin et al., 1984). Planning for both short term and long term maintenance of activity at program outset may have been important for adherence within the "Exercise for Everyone" program.

In sum, the consistent finding for the effect of a strategies seminar is very encouraging. Of most importance is the rate of adherence shown by those who participated in the strategies class. Since a seminar is a low-cost, minimal time intervention that can potentially be implemented to large and multiple groups of people, this technique has the potential to become a useful intervention for future physical activity research and many commercial fitness programs. For example, individuals/clients enrolling in a fitness center could be asked to participate in an exercise seminar prior to their first session as a requirement of membership. Their seminar participation could provide benefit to the clients in terms of greater adherence to their exercise program and therefore longer term health benefits, while the fitness center would benefit by continued payment of dues through longer memberships.

Lifestyle Physical Activity. This program encouraged participants to engage in any type of physical activity they desired. Thus, individuals were free to choose whether they walked, jogged, took the stairs at work, mowed their lawn or vacuumed. Tables 52, 53 and 54 show the types of activities chosen across participants and by condition. It seemed few participants engaged solely in activity defined by Blair et al (1992) as "lifestyle physical activity" (e.g., taking the stairs, performing more housework, choosing the long route to the rest room at work, mowing the lawn). Rather, it appeared individuals would couple their lifestyle physical activity with an activity like walking or swimming and gradually shift to just walking or just swimming. It is important to keep in mind, the data for this project was solely self report based on participant's activity logs and it is not known if they simply stopped monitoring their lifestyle physical activity once activity considered more "traditional" (e.g., walking, swimming) was performed on

a more consistent basis. Another explanation might be that participants used lifestyle physical activity as a spring board for more traditional activity. Further, it appeared individuals within both class conditions decreased their use of lifestyle physical activity while increasing their "traditional" activity. However, it seemed, on average, individuals within the strategies condition engaged in more lifestyle activity when compared to those in the information condition. Interestingly, individuals within the strategies condition consistently performed more calisthenic/weight training type activity versus those in the strategies condition. Perhaps, the consistent effect demonstrated for the strategies class on maintenance of physical activity could be related to greater variety or creativity in choosing their activity, perhaps allowing exercise "fit" within their lifestyle and thus become easier to maintain over time. Thus, it appeared individuals did choose a variety of activities to increase their activity level with those in the strategies condition, demonstrating both more variety and greater adherence than those in the information condition.

Insert Tables 52, 53 & 54 about here.

Why was frequency of contact ineffective? It was originally hypothesized that frequent contact would have a greater effect on physical activity adherence than a low frequency or no contact condition; the results did not support this hypothesis. In fact, there was no significant effect for frequency of contact on any outcome measure. However, the pattern of results were interesting. That is, when the strategies class was examined across frequency of contact versus the information class across frequency of contact, frequency of contact appeared more important for participants in the information class for maintenance of physical activity. For example, for individuals participating in the information class, adherence for those in the highest contact condition (15%), and

adherence in the low frequency condition (17%) were greater than adherence in the no contact condition (10%). Interestingly, there were no significant differences in frequency of contact for individuals participating in the strategies condition and individuals in the no contact condition actually demonstrated greater adherence (64%) than those in the low frequency (43%) and the high frequency (43%) conditions. There seemed a straightforward explanation of these results.

Participation in a strategies class and the forms participants received which probably provided prompts may have obviated any additional value of contact. As a result, adherence was somewhat similar among strategies/contact groups. Thus, prompt delivery had some minimal importance for those in the information condition, thus still showing its usefulness as a strategy for promoting physical activity adherence if no strategies are taught and if it is delivered frequently. This finding is consistent with our prior research (Lombard, Lombard, & Winett, 1994) which showed prompting was a successful strategy for physical activity adherence without a strategies class.

Delivery system. This program used three different modes for program delivery: a seminar, the telephone and the mail. All modes have demonstrated efficiency and effectiveness in past physical activity programs (Desharnais et al., 1987; King et al., 1989; King et al., 1991; Oldridge & Jones, 1983). All modes offered low cost and ease of delivery in addition to a somewhat individualized intervention. That is, participation in a seminar required only a classroom or meeting room for one hour and involved personal contact with participants. In addition, all participants scheduled a telephone appointment time during the seminar to minimize experimenter time in trying to reach a participant and to engage the participants in their program. The length of most calls was less than two minutes. Lastly, self-monitoring logs were sent through campus mail or U.S. Mail (five participants) minimizing contact time for data collection and allowed the experimenter to mail the newsletter and problem-solving sheets efficiently. Given the

low-cost and ease of delivery for both the exercise seminar and telephone prompting, both can be used to promote adherence to physical activity with telephone prompting considered a second choice if a strategies class cannot be conducted.

Self-monitoring as data. Most researchers in the area of physical activity promotion use some type of self-monitoring log as an intervention strategy and a few use these logs as their source of program data. This program used the logs both as an intervention strategy and as the sole source of program data. Previous research has shown physical activity logs can be a reliable method for obtaining data (Lombard et al., 1994). The caveats (i.e., primarily reliability issues) associated with using self-monitoring as a sole source of data are recognized. However, as this program was home based and activities were individualized using an activity partner for verifying the accuracy of log data as used in prior research (Lombard et al., 1994) was not feasible in this study. At present, there is no way to assess the differential reporting accuracy by condition of participants in this study.

Meeting ACSM goals. As stated before, the present program demonstrated significantly more individuals met the guidelines for frequency and duration outlined by the ACSM (1990) in a strategies condition than in an information condition. Meeting these goals and meeting them consistently over time is particularly important. These goals were set by the ACSM because meeting those goals on a consistent basis is associated with health benefits (ACSM, 1990). Importantly, use of ACSM guidelines for frequency and duration was used solely for comparison to the existing literature on outcomes of physical activity programs. In this program, meeting ACSM guidelines for frequency and duration is not used to determine fitness gains or health benefits. The results showed 71 % of individuals who participated in the strategies class met their ACSM guidelines for frequency (three or more times per week) and duration (greater

than 30 minutes per session) compared to 52% of those in the information class during all weeks of the program.

Gender: why more female? Many more women participated in this program than men (64 women; 10 men) out of a potential population of approximately 20,000. As shown in the flyer in Appendix B, this program was designed to appeal to all individuals regardless of gender and there was about an equal number of men and women in the university community. Thus, the finding that more women than men decided to participate is of importance. Moreover, another study (a walking program) conducted in the same community found a similar pattern (Lombard et al., 1994). The researchers speculated that because the program offered "walking" and because an informal survey of local men indicated men did not believe walking was "exercise", the men did not choose to join. The present study is different in that it promoted all types of "exercise." Thus, this explanation does not seem relevant for the present study and suggests other explanations.

Perhaps women are more likely to seek help or assistance for a personal difficulty than men. This may explain why more women called for assistance with an exercise program and ultimately participated. Another possible explanation is that perhaps placement of the recruiment flyers and the readership of the university newspaper were more accessible to women, thus increasing the number of women relative to men aware of the program. Again these are only speculations, but important to consider for future research in this area, as men also have difficulty initiating and maintaining an exercise program (Dishman, 1988).

Conclusions.

This program offers some useful techniques for future projects designed to promote physical activity adherence. First, a strategies class designed to promote maintenance of physical activity was more successful in increasing and maintaining

activity than an information class simply providing information concerning the benefits of physical activity. This finding is important as individuals in the strategies class not only maintained their level of activity longer, but a large proportion of them maintained a level associated with health benefits.

Second, frequency of contact does not seem to be differentially beneficial when individuals have participated in a strategies class. However, contact may be beneficial for individuals not receiving a strategies class. In addition, contact may be important if individuals are not continually sending in logs. If no logs are used, other prompts and contact may be necessary even for individuals in a strategies class.

Third, a strategies seminar is a low-cost , simple method of implementing an intervention to a potentially large population even when compared to telephone contact. For example, one individual could conduct a one-hour seminar for 100 people corresponding to less than one minute of time per person. Or to maintain an interactive format, smaller (e.g., 15-20 participants) multiple groups can be held. Although the size of the groups would determine the contact time per person, either large or small self-management groups could eliminate the need for repetitive contact, and thus increase the cost-effectiveness of activity promotion interventions.

Future research directions

The results of this project prompted several questions for future research in this area. First, it would be interesting to duplicate this study with a much larger sample size. The additional power afforded by a greater number of participants may yield statistically significant and clinically meaningful differences for both information and strategies class when different levels of contact are used.

Second, future research could attempt to assess the actual use of strategies. By determining which strategies were used would help to redesign and streamline the group intervention, thus leading to a more effective programs.

Third, the actual necessity of the "class" needs to be examined. That is, can the strategies be conveyed through another mode besides a class situation. Future research could compare strategies presented in a class situation, to strategies presented in booklet form, to strategies presented in a booklet form but in a group setting with no presenter. In this way the effects of strategies vs. professional seminar vs. group support could be delineated.

Fourth, a technique to monitor the reliability of self-report within a home-based, individual program needs to be implemented. While, research shows self-report for physical activity is relatively reliable, repetitively assessing this reliability will be important for the continued use of self-report as data. This point is especially important as the field of physical activity research moves into using lifestyle changes to promote physical activity as the major intervention strategy. Monitoring of the performance of these behaviors and their actual physical fitness benefits should continue to evolve.

Contact may also be differentially important depending on the stage of change and the individual's prior exercise experience. For example, an individual who has never attempted an activity program, but is thinking about one (no experience/contemplation), may require more contact than an individual who has attempted an activity program in the past with some success and has started again recently (successful experience/action).

Conclusions

This study demonstrated the usefulness of programming for maintenance of behavior change through the use of specific behavioral techniques. Strategies known to be beneficial to maintenance of behavior change were implemented at the initiation of the target behavior (Kazdin, 1993). Unfortunately, the field of physical activity research is replete with programs that claim poor outcomes with behavioral techniques, yet these techniques are often not applied in a conceptually and technically correct manner. Moreover, often behavioral techniques are applied because they have worked with other

heath behavior change programs and no assessment is made of their applicability to the target behavior in question, in this case physical activity. Importantly, this study demonstrated specific behavioral strategies designed to promote maintenance can be adapted to help maintain physical activity.

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Table 1. The American College of Sports Medicine (1990) guidelines for physical activity

Intensity	Training should be between 60-90% maximum heart rate or 50-85% of maximum capacity.
Duration	Training should be between 20-60 minutes of continuous aerobic activity for each exercise session.
Frequency	Training should be between 3 to 5 days per week.
Strength	Resistance training or 8-12 repetitions for 8-10 exercises involving large muscle groups at least twice per week.
Sessions	Sessions should have appropriate warm-up and cool-down periods, including flexibility exercises.

Table 2. Goals for the Nation related to physical activity compiled from Department of Health and Human Services (1990).

Goal 1	Increase to at least 30% the proportion of individuals aged 6 or older who engage regularly in light to moderate physical activity for at least 30 minutes per day.
Goal 2	Increase to at least 20% the proportion of individuals aged 18 and older and to at least 75% the proportion of individuals aged 6 through 17 who engage in vigorous physical activity three or more days per week.
Goal 3	Reduce to no more than 15% the proportion of individuals aged 6 and older who engage in no leisure-time activity.
Goal 4	Increase to at least 40% the proportion of individuals aged 6 and older who perform strength, endurance and flexibility activities regularly.
Goal 5	Reduce the rate of obesity to 20% among those aged 20 and older.
Goal 6	Increase to 50% the proportion of overweight individuals 12 and older who have combined sound dietary practices and regular physical activity to attain an appropriate weight.

Table 3. A review of the significant exercise determinants compiled from Dishman (1985), Sallis and Hovell (1990) and Sallis, Hovell, and Hofstetter (1991). Adopted with permission from Lombard (1993).

Modifiable		Non-Modifiable	
Self-Efficacy	+	Past Participation	+
Social Support	+	Blue-Collar Occupation	-
Spousal Support	+	High Risk for Coronary Heart Disease	-
Self-Motivation	+	Low Income Level	-
Perceived Benefits of Exercise	+	Smoking	-
Behavior Modification Skills	+	Over-weight	-
		Type A Behavior	-
		Pro Exercise Family Influence	+
		Pro Exercise Peer Influences	+
		Disruptions in Routine	-
		High School Athlete	+
		Mood Disturbance	-
		Education Level	+
		Time Available	+
		Access to Facilities	+
		Perceived Discomfort of Activity	-

Note: "+" indicates increased probability of adherence to a physical activity program
"-" indicates decreased probability of adherence to a physical activity program

Table 4. Reviews of physical activity promotion programs and their conclusions.

Review	Conclusions	Recommendations
Dishman (1991)	1. Modification techniques typically show increased frequency or time spent in activity. 2. No demonstration that intensity or total activity increased fitness for risk reduction. 3. When modification interventions show activity increase, increase not shown to be associated with therapeutic outcome. 4. Nature of research limits confident conclusions about nature of increases in physical activity 5. Typically, no direct measure of physical activity or fitness, so validity is unclear. 6. Typically, generalizability to maintenance has not been tested or has not occurred for greater than 3 months when follow-up reported.	1. Future investigation should involve use of the Relapse Prevention Model (Marlatt & Gordon, 1985) and the Transtheoretical Model (Prochaska & DeClementi, 1985). 2. Include literature on known determinants of physical activity.
Glasgow and Terborg (1988)	1. Even when programs located on site adherence rate no different from population estimates. 2. Participant profile is one of less health risk. 3. Long-term adherence is difficult.	1. Motivational and organizational factors to foster greater participation and adherence (e.g., self-motivation, Dishman, Sallis & Orenstein, 1985; stages of change, Prochaska & DiClemente, 1983). 2. Application of strategies to organization. 3. Use of consistent outcome measures. 4. Use of appropriate level of analysis (worksite). 5. Evaluation of non-participants.
Godin and Shephard (1983)	1. Results are inconclusive. 2. Programs show immediate impact, with poor long-term effects. 3. Few studies show benefits for greater than 1-2 years. 4. Follow-up rarely conducted.	1. Recognition that physical fitness is not just a biological manifestation but is a joint outcome of socio-economic, cultural, behavior, and environmental factors. 2. Prior to program development, greater attention given to behavior change strategies. 3. Design standardized method and materials for use on large scale. 4. Attempt long-term attitude and behavior change.

Table 4 (continued).

Review	Conclusions	Recommendations
Iverson, Fielding, Crow and Christenson (1985)	**Medical.** 1. Few settings offer programs outside of cardiac rehabilitation. 2. Practitioners provide excellent position to educate and assist patients. 3. Many opportunities for primary care physicians to inquire. 4. Patients indicate physician advice encourages them to participate. 5. Physicians typically, do not ask or counsel their patients about physical activity even though they believe it is important. 6. Physicians can be effective in altering patient behavior. **Worksite.** 1. Can reach a large portion of the population 2. Well-developed and effectively implemented programs show benefits for participants and employers. 3. Most programs exist with large company offering many activities housed within a comprehensive health promotion program 4. Employers interested in offering programs to employees. 5. Effective programs include: strong leadership, ongoing promotion, recruitment and fitness assessment, variety of activities, long-term commitment, recognition system and spouse and family involvement. **Community.** 1. Many organizations sponsor programs for their populations. 2. No controlled studies assessing effects of community programs. 3. Use of mass media show success in increasing awareness and interest, but not short-term attitude and behavior change. **School.** 1. Ideal setting to influence physical activity habits for children. 2. Most states have physical education requirement regulations. 3. Approximately one-third of children participated in daily physical education. 4. Little agreement found concerning program outcomes. 5. Significant percentage of children have not reached adequate fitness levels.	**Recommendations** 1. Determine outcomes that can be reasonably expected. 2. Determine types and extent of current programs. 3. Conduct studies to determine most effective program components. 4. Determine factors positively related to adoption and diffusion. 5. Determine expected penetration rate for organized programs on populations presented. 6. Determine most effective motivational strategies to increase physical activity. 7. Determine effects of programs in multiple settings. 8. Attempt cost-effects and cost-effectiveness analysis. 9. Attempt to assess prospectively and retrospectively the effects of school programs on adult physical activity levels.

Table 5. Behavior Change Strategies for Initiation and Maintenance.

Strategy	Definition	Initiation	Maintenance
Positive Reinforcement	Increase in frequency of a response that is followed by a positive reinforcer	Contingent on behavior (consistently). Delivered immediately after response. Magnitude related to satiation and deprivation. Quality determined by individual. Continuous schedule (until high rate behavior occurs).	Delayed reinforcement. Variable-Intermittant schedule (increasingly intermittent).
Social Reinforcment	Reinforcers resulting from interpersonal interaction (e.g.,attention, praise, smiles, touch)	Easily administered, immediate. Can occur during behavior. Naturally occuring, often follow positive behavior. May not be reinforcing for all.	Can continue to follow behaviors outside of program setting. May not be reinforcing for all.
High-probability Behaviors	Response performed with relatively high frequency when individual given the opportunity to choose among alternative behaviors.	Activities readily available. Access cannot always immediately follow low-probability behavior. Use of immediate reinforcement as bridge to delay. Low-criteria for reinforcement. Flexibility in activities. Activities over and above usually offered activities.	Better applied after lower-probability behavior has been established. Gradually increasing criteria for reinforcement.
Feedback	Information about performance.	Ease of application. Need explicit performance criterion. Less effective alone than in combination with other reinforcers. Can begin with feedback.	Change to more potent source of reinforcement and complex program.

Note: Adapted from Kazdin, A. E. (1989). Behavioral Modification in Applied Settings. Belmont, CA: Wadsworth, Inc.

TABLE 5 (continued)

Strategy	Definition	Initiation	Maintenance
Tokens	A tangible object serving as a generalized conditioned reinforcer. Can be exchanged for back-up reinforcers constituting its value.	Potent reinforcers, can develop behaviors at higher level than other reinforcers. Can bridge delay, less subject to satiation, easily administered, allow administration to individuals with different reinforcer preferences. Can be earned toward greater reinforcers. Not available in natural environment. May exert stimulus control	Continue with praise, other easily administered reinforcers. Variable schedule to reduce stimulus control.
Contingency Contracts	Behavior-modification program. A contract is drawn between an individual who wishes to change behavior and an individual who's behaviors to change. Specify relationship between behavior and its consequences	Ideally should contain: 1. expectations of gain; 2. observable behaviors; 3. sanctions for failure to meet terms; 4. include bonus clause to reinforce consistent compliance; 5. means of monitoring rate of of positive reinforcement given and received. Active participation by individuals.	Flexible; can be changed to meet needs over time. Little data for maximal effectiveness of contracts.
***Enhancing Performance*:**			
Prompting	An antecedent event helping to initiate a response. A discriminative stimulus occasioning a response (e.g., instructions, gestures, physical guidance, and modeling).	Initiate behavior through antecedent event. Verbal: delivered immediately before opportunity for behavior, specify precise behavior, nondemanding and polite fashion, immediate reinforcement.	Depends on consequences following prompting.

TABLE 5 (continued)

Strategy	Definition	Initiation	Maintenance
Shaping	Developing a new behavior by reinforcing successive approximation toward the terminal response.	Shorter response more likely to occur than longer one. Reinforcers provided for any form of behavior related to goal. Gradual progression.	Longer behavior or more behavior reinforced once behavior is consistent at less stringent levels.
Response Priming	Any procedure that initiates early steps in a sequence of responses. Initiating early steps, increases the likelihood the terminal response will be performed.	Initiate early steps in a sequence or chain of responses already in repertoire. Used for low-frequency behaviors, facilitates shaping Based on chaining: each behavior closer to final reinforcing consequence. Each response serves to reinforce previous response facilitated performance of response again.	Continue with shaping.
Reinforcer Sampling	A case of response priming where the purpose is to develop or increase the use of an event as a reinforcer A sample or small portion of the event increases the likely the entire event can serve as a reinforcer.	Provide brief sample of reinforcing event to promote greater utilization of event (special case of response priming). Initiate performance for individual not engaging in event. Sample + augmentation of use. Small sample to avoid satiation	
***Group-based Programs*:**			
Group Contingencies	Contingencies where group participates. Behavior of groups as whole determines consequences delivered to each member.	Criterion for reinforcement based on performance of group as a whole. Suited to peer groups.	

TABLE 5 (continued)

Strategy	Definition	Initiation	Maintenance
Team-based Contingencies	Group contingency where members of groups earn reinforcers based on group's performance. Teams compete to earn reinforcers between teams.	Groups divided into two or more subgroups functioning on separate group contingency. Greater effectiveness than group contingencies without teams	
Consequence Sharing	Consequences earned by one person are provided to that person and peers.	Peers involved by sharing in reinforcing consequences earned by client. Groups reinforced when target client performs behavior	
Lotteries	Way of arranging reinforcement contingencies to develop specific behaviors in a group of persons. Token economy where behaviors earn tokens exchangeable for back-up reinforcers. Only one back-up reinforcer, not everyone earns it.	Arranging reinforcement contingencies to develop specific behaviors in groups. One back-up reinforcer not everyone earns it, maximize behavior generated by small number of rewards. Can dispense large rewards incentive leads to great deal of behavior. Some individuals don't enter lottery	
Self-Control Techniques	Behaviors an individual deliberately performs to achieve self-selected outcome by manipulating antecedent and consequent events.		Sparse evidence unless externally managed contingencies present may be considered part of fading of contingencies

TABLE 5 (continued)

Strategy	Definition	Initiation	Maintenance
Stimulus Control	Presence of a particular stimulus serves as an occasion for a particular response. Response performed only in the presence of a particular stimulus.	Specific behavior performed in presence of specific stimuli, stimuli then associated with behavior cue and increase behavior	Continue to use cues and develop other cues to elicit behavior. Expand breadth of stimuli to control behavior over many conditions. Introduce various components of transfer situation while training is ongoing
Self-Monitoring	Assessing or recording one's own behavior.	Systematically observing one's behavior. Inconsistent results. Usually combined with other techniques	Continually self-monitoring becomes reinforcing itself. Adherence difficulties
Self-Reinforcement	Providing oneself with reinforcing consequences contingent on behavior. Client must be free to partake of reinforcers at any time, whether or not particular response has been performed	Free to reward self at any time. Client determines response requirements and control of reinforcement.	Difficulty in adherence. Perhaps apply external contingencies initially, then apply self-control strategies.
Cognitive Processes:			Continuation of initiation strategies show some effect Often gains in measures do not transfer to behavior change.
Self-instructions and Self-Statements	Individual prompts own behavior by providing covert self-instructions or statements that direct and guide.	Trained to make suggestions and comments to guide own behavior. May need external reinforcers for acquisition. Not clear on effectiveness.	

TABLE 5 (continued)

Strategy	Definition	Initiation	Maintenance
Problem-solving Skills Training	Train to generate problems and solutions for behavior change.	Identify potential problems and possible solutions. Not clear on effectiveness.	Continued use of skills to encounter new problems.
Combined Procedures		Cognitive interventions combined with externally imposed contingencies may be more effective than individual procedures alone.	Each procedure emphasizes different aspect of contingencies that control behavior.Limited when applied individually
***Response Maintenance and Transfer of Training*:**			Needs to be programmed systematically into initiation contingencies.
Behavior Under Control of Natural Contingencies			Reinforcing consequences that ordinarily follow behavior in everyday life. Lack of guidelines for implementation.
Programming of Naturally Occurring Reinforcers		Programmed special contingencies.	Naturally occurring events substituted systematically to sustain performance.
Gradual Removing or Fading of Contingencies			Fade contingencies resembles contingencies likely to encounter
Training to Respond to General Case			1. Specify set of stimulus situations for after training; 2. define range of varying dimensions or characteristics; 3. define range of response variations across situations; 4. select and teach examples from range of stimulus and response domains;
Peer Facilitators		Peers involved in program. Stimulus control of contingency implementers.	Provide cues to continue behavior.
Duration of Programs			Unlikely in brief treatment periods, maintenance increases as program length increases.

Table 6. Demographic statistics of all initial participants.

	Treatment Condition						
	Information Class			Strategies Class			No Class
	No contact	Low contact	High contact	No contact	Low contact	High contact	No contact
N	15	15	15	17	17	17	22
Age X	38.3	37.0	37.2	35.6	37.0	37.3	34.8
S^2	9.9	10.3	9.5	10.3	11.7	11.0	7.8
Weight X	148.9	158.1	176.7	154.3	148.6	156.5	169.2
S^2	27.3	30.8	36.5	22.3	32.0	20.4	44.1
Height X	65.9	66.2	66.0	67.1	65.2	65.8	65.2
S^2	3.9	4.2	2.4	2.7	3.3	2.3	3.1
Stage X	3.3	3.5	3.9	3.8	3.2	4.1	3.2
. S^2	.90	.92	.89	1.1	.90	.68	.85
SmokersX	1	2	2	1	1	0	1

Table 7. Demographic statistics of all participants in the final data set.

		Treatment Condition					
		Information Class			Strategies Class		
		No contact	Low contact	High contact	No contact	Low contact	High contact
N		10	12	13	11	14	14
Age	X	38.1	39.3	37.5	34.0	36.3	37.1
	S^2	11.1	9.9	10.3	10.6	11.4	11.1
Weight	X	151.5	167.7	166.5	157.0	145.4	155.2
	S^2	29.7	26.6	26.6	20.8	31.3	22.2
Height	X	65.8	66.6	65.8	67.6	65.6	65.7
	S^2	3.6	4.5	2.4	2.5	3.4	2.5
Stage	X	3.0	3.5	4.1*	3.7	3.2	4.0*
	S^2	.667	.798	.862	1.3	.975	.679
Smokers	X	0	2	1	1	1	0

* indicates a .05 level significant different between groups.

Table 8. A review of the major outcome variables over the 18 weeks by treatment condition.

Weeks

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
Average Days/Week Exercising																		
Information Class																		
No Contact	3	3.1	4.7	5.0	4.0	4.1	3.0	2.3	2.5	2.8	1.2	.5	.5	1.1	1.3	1.5	1.3	.70
Low Contact	1.5	1.3	4.1	4.2	4.0	4.7	3.8	3.5	2.7	2.9	2.6	2.5	2.4	2.4	2.5	2.3	1.7	1.8
High Contact	2.7	3.3	4.6	4.4	3.8	3.8	5.0	4.1	3.8	4.2	4.7	4.0	3.6	4.0	2.8	2.9	1.5	1.0
Strategies Class																		
No Contact	3.8	4.0	4.6	5.0	4.8	4.9	4.3	3.8	3.8	3.8	3.3	3.3	3.5	3.6	3.2	3.5	3.7	4.0
Low Contact	3.1	4.0	3.9	3.1	3.7	4.0	4.0	3.1	4.2	4.0	3.9	3.5	3.9	3.6	3.5	3.6	3.6	3.8
High Contact	3.1	3.2	5.6	5.0	4.4	4.5	4.6	4.9	4.3	4.5	4.6	3.6	3.5	3.8	3.4	3.7	3.9	3.5
Average Minutes/Day																		
Information Class																		
No Contact	34	45	49	36	33	27	20	22	42	28	13	7	11	10	11	10	6	2
Low Contact	15	12	45	44	47	35	30	34	34	31	34	40	29	27	35	31	32	32
High Contact	27	45	53	55	41	51	54	40	37	46	41	38	47	41	41	33	29	21
Strategies Class																		
No Contact	53	60	61	52	50	43	46	44	35	48	50	60	49	60	54	49	45	49
Low Contact	26	39	32	40	47	60	93	75	72	46	55	47	54	67	56	63	60	51
High Contact	29	37	52	39	52	42	41	44	45	38	37	34	47	44	42	48	42	41
Total Minutes/Week																		
Information Class																		
No Contact	144	167	213	199	199	173	118	122	208	118	46	19	19	38	44	48	39	14
Low Contact	75	45	180	188	237	169	159	186	178	127	151	150	135	107	148	119	117	120
High Contact	122	183	262	241	166	213	250	167	159	238	199	199	199	213	141	133	103	53
Strategies Class																		
No Contact	254	244	276	276	248	227	218	217	186	256	205	247	215	259	205	195	178	228
Low Contact	119	153	125	156	194	227	221	188	330	222	262	214	288	325	240	238	231	215
High Contact	161	174	290	198	244	218	207	229	206	198	200	145	186	197	164	210	189	184

Table 8 (continued).

Percentage Active per week																		
Information Class																		
No Contact	.70	.80	1.0	.90	.70	.70	.60	.50	.60	.60	.30	.20	.30	.30	.30	.30	.20	.10
Low Contact	.33	.33	1.0	1.0	.92	.83	.83	.83	.67	.58	.58	.58	.50	.50	.50	.50	.42	.42
High Contact	.62	.77	.92	1.0	.92	.92	.92	.92	.85	.77	.92	.77	.77	.77	.69	.69	.46	.39
Strategies Class																		
No Contact	.82	.91	1.0	1.0	1.0	1.0	.82	.82	.73	.73	.73	.82	.82	.82	.82	.82	.91	.91
Low Contact	.71	.86	.86	.86	.93	1.0	1.0	.86	1.0	.93	.86	.79	.86	.86	.86	.93	.93	.93
High Contact	.57	.64	1.0	.93	.93	.86	.93	.93	.93	.86	.86	.86	.86	.86	.86	.86	.86	.79
Percentage Met ASCM																		
Information Class																		
No Contact	.40	.60	.70	.70	.70	.70	.60	.50	.40	.50	.20	.10	.10	.30	.30.	.30	.20	.10
Low Contact	.25	.17	.67	1.0	.75	.67	.67	.67	.58	.5	.58	.42	.42	.5	.42	.42	.33	.42
High Contact	.46	.69	.69	.77	.85	.62	.85	.69	.54	.69	.69	.69	.62	.62	.46	.39	.31	.15
Strategies Class																		
No Contact	.73	.73	.73	.91	.73	.82	.82	.55	.64	.73	.64	.64	.73	.64	.55	.64	.73	.82
Low Contact	.43	.57	.50	.57	.57	.64	.79	.50	.71	.71	.64	.64	.64	.71	.71	.71	.71	.86
High Contact	.50	.57	.93	.93	.93	.86	.79	.93	.79	.79	.79	.79	.71	.79	.79	.79	.79	.71

Table 9. RMANOVA with dependent measure days active each week and independent measure class for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Class (A)	1	277.498	277.498	6.107	.0158
Subject (group)	72	3271.535	45.438		
Weeks (B)	17	528.700	31.100	10.167	<.0001
AB	17	148.981	8.764	2.865	<.0001
B x Subjects w/groups	1224	3743.986	3.059		

Condition	Count	Mean	Standard Deviation	Standard Error
Information	630	3.003	2.616	.104
Strategies	702	3.917	2.199	.083

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
Info	2.4	2.5	4.5	4.5	4.0	3.9	4.3	3.5	3.3	3.3	3.1	2.5	2.3	2.6	2.3	2.3	1.5	1.2
Strategies	3.3	3.7	4.7	4.4	4.3	4.4	4.3	3.9	4.1	4.1	3.9	3.5	3.6	3.7	3.4	3.6	3.7	3.7

Table 10. RMANOVA with dependent measure days active each week and independent measure class for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Class (A)	1	212.368	212.368	26.388	<.0001
Subject (group)	72	579.443	8.048		
Weeks (B)	1	.973	.973	1.144	.2885
AB	1	.768	.768	.903	.3451
B x Subjects w/groups	72	61.259	.851		

Condition	Count	Mean	Standard Deviation	Standard Error
Information Class	70	1.357	2.167	.259
Strategies Class	78	3.756	2.033	.230

	Week	
Cond	21	22
Info class	1.5	1.2
Strategy class	3.8	3.7

Table 11. RMANOVA with dependent measure days active each week and independent measure condition for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Condition (A)	5	447.753	89.551	1.964	.0952
Subject (group)	68	3101.280	45.607		
Weeks (B)	17	528.700	31.100	10.603	<.0001
AB	85	502.119	5.907	2.014	<.0001
B x Subjects w/groups	1440	2310.653	1.605		

Condition	Count	Mean	Standard Deviation	Standard Error
1	180	2.367	2.653	.198
2	216	2.921	2.573	.175
3	234	3.568	2.513	.164
4	198	3.934	2.287	.163
5	252	3.706	2.131	.134
6	252	4.115	2.184	.138

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
1	3	3.1	4.7	5.0	4.0	4.1	3.0	2.3	2.5	2.8	1.2	.5	.5	1.1	1.3	1.5	1.3	.70
2	1.5	1.3	4.1	4.2	4.0	4.7	3.8	3.5	2.7	2.9	2.6	2.5	2.4	2.4	2.5	2.3	1.7	1.8
3	2.7	3.3	4.6	4.4	3.8	3.8	5.0	4.1	3.8	4.2	4.7	4.0	3.6	4.0	2.8	2.9	1.5	1.0
4	3.8	4.0	4.6	5.0	4.8	4.9	4.3	3.8	3.8	3.8	3.3	3.3	3.5	3.6	3.2	3.5	3.7	4.0
5	3.1	4.0	3.9	3.1	3.7	4.0	4.0	3.1	4.2	4.0	3.9	3.5	3.9	3.6	3.5	3.6	3.6	3.8
6	3.1	3.2	5.6	5.0	4.4	4.5	4.6	4.9	4.3	4.5	4.6	3.6	3.5	3.8	3.4	3.7	3.9	3.5

Table 12. RMANOVA with dependent measure days active each week and independent measure condition for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Cond(A)	5	219.176	43.835	5.205	.0004
Subject (group)	68	572.635	8.421		
Weeks (B)	1	.973	.973	1.154	.2864
AB	5	4.716	.943	1.119	.3586
B x Subjects w/groups	68	57.311	.843		

Condition	Count	Mean	Standard Deviation	Standard Error
1 NC/IC	20	1.000	2.449	.548
2 LC/IC	24	1.750	2.382	.486
3 HC/IC	26	1.269	1.710	.335
4 NC/SC	22	3.864	2.031	.433
5 LC/SC	28	3.714	1.883	.356
6 HC/SC	28	3.714	2.242	.424

	Week	
Cond	21	22
1	1.3	.7
2	1.7	1.8
3	1.5	1.0
4	3.7	4.0
5	3.6	3.8
6	3.9	3.5

Table 13. RMANOVA with dependent measure days active each week and independent measure frequency of contact for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Frequency (A)	2	108.089	54.045	1.115	.3335
Subject (group)	71	3440.944	48.464		
Weeks (B)	17	528.700	31.100	10.209	<.0001
AB	34	216.102	6.356	2.086	.0003
B x Subjects w/groups	1207	3676.865	3.046		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	378	3.188	2.586	.133
Low contact	468	3.344	2.376	.110
High contact	486	3.852	2.362	.107

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
No contact	3.4	3.5	4.6	5.0	4.4	4.5	3.7	3.1	3.2	3.3	2.3	1.9	2.0	2.4	2.3	2.5	2.6	2.4
Low contact	2.3	2.7	4.0	3.6	3.9	4.0	4.3	3.5	3.9	3.4	3.5	3.1	3.2	3.1	3.1	3.0	2.7	2.9
High contact	2.9	3.3	5.1	4.7	4.1	4.1	4.8	4.5	4.0	4.4	4.6	3.7	3.6	3.9	3.1	3.3	2.8	2.3

Table 14. RMANOVA with dependent measure days active each week and independent measure frequency of contact for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Frequency (A)	2	2.808	1.404	.126	.8815
Subject (group)	71	789.003	11.113		
Weeks (B)	1	.973	.973	1.164	.2843
AB	2	2.679	1.339	1.602	.2086
B x Subjects w/groups	71	59.348	.836		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	42	2.500	2.643	.408
Low contact	52	2.808	2.327	.323
High contact	54	2.537	2.337	.318

	Week	
Cond	21	22
No contact	2.6	2.4
Low contact	2.7	2.9
High contact	2.8	2.3

Table 15. RMANOVA with dependent measure days active each week and independent measure contact for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Contact (A)	1	46.603	46.603	.958	.3310
Subject (group)	72	3502.430	48.645		
Weeks (B)	17	528.700	31.100	10.211	<.0001
AB	17	165.002	9.706	3.187	<.0001
B x Subjects w/groups	1224	3727.965	3.046		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	378	3.188	2.586	.133
Contact	954	3.603	2.381	.077

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
No contact	3.4	3.5	4.6	5.0	4.4	4.5	3.7	3.1	3.2	3.3	2.3	1.9	2.0	2.4	2.3	2.5	2.6	2.4
Contact	2.6	3.0	4.6	4.2	4.1	4.1	4.6	4.0	3.9	3.8	4.1	3.4	3.4	3.5	3.1	3.2	2.8	2.6

Table 16. RMANOVA with dependent measure days active each week and independent measure contact for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Contact (A)	1	.867	.867	.079	.7795
Subject (group)	72	790.943	10.985		
Weeks (B)	1	.973	.973	1.130	.2914
AB	1	.005	.005	.006	.9367
B x Subjects w/groups	72	62.022	.861		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	42	2.500	2.643	.408
Contact	106	2.670	2.325	.226

	Week	
Cond	21	22
No contact	2.6	2.4
Contact	2.8	2.6

Table 17. RMANOVA with dependent measure mean minutes/day per week active and independent measure class for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Class (A)	1	85359.083	85359.083	7.164	.0092
Subject (group)	72	857867.142	11914.821		
Weeks (B)	17	28501.772	1676.575	1.556	.0686
AB	17	29219.948	1718.820	1.596	.0582
B x Subjects w/groups	1224	1318562.502	1077.257		

Condition	Count	Mean	Standard Deviation	Standard Error
Information class	630	32.837	38.601	1.538
Strategies class	702	48.870	43.012	1.623

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
IC	25	33	49	46	41	39	36	33	37	35	31	30	30	27	30	26	24	19
SC	35	44	47	43	50	49	61	55	52	44	47	46	50	57	51	54	49	47

Table 18. RMANOVA with dependent measure mean minutes/day per week active and independent measure class for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Class (A)	1	25910.196	2590.196	10.368	.0019
Subject (group)	72	179939.973	2499.166		
Weeks (B)	1	373.142	373.142	.895	.3474
AB	1	36.811	36.811	.088	.7673
B x Subjects w/groups	72	30032.547	417.119		

Condition	Count	Mean	Standard Deviation	Standard Error
Information class	70	21.486	43.611	5.212
Strategies class	78	47.987	32.062	3.630

	Week	
Cond	21	22
IC	24	19
SC	49	47

Table 19. RMANOVA with dependent measure mean minutes/day per week active and independent measure condition for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Condition (A)	5	142026.790	28405.358	2.411	.0451
Subject (group)	68	801199.435	11782.345		
Weeks (B)	17	28501.772	1676.575	1.583	.0616
AB	85	123161.237	1448.956	1.368	.0176
B x Subjects w/groups	1156	1224621.213	1059.361		

Condition	Count	Mean	Standard Deviation	Standard Error
1 NC/IC	180	22.411	28.694	2.139
2 LC/IC	216	32.560	46.653	3.174
3 HC/IC	234	41.111	35.055	2.292
4 NC/SC	198	50.475	35.503	2.523
5 LC/SC	252	54.595	54.919	3.460
6 HC/SC	252	41.885	32.826	2.068

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
1	34	45	49	36	33	27	20	22	42	28	13	7	11	10	11	10	6	2
2	15	12	45	44	47	35	30	34	34	31	34	40	29	27	35	31	32	32
3	27	45	53	55	41	51	54	40	37	46	41	38	47	41	41	33	29	21
4	53	60	61	52	50	43	46	44	35	48	50	60	49	60	54	49	45	49
5	26	39	32	40	47	60	93	75	72	46	55	47	54	67	56	63	60	51
6	29	37	52	39	52	42	41	44	45	38	37	34	47	44	42	48	42	41

Table 20. RMANOVA with dependent measure mean minutes/day per week active and independent measure condition for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Condition (A)	5	37807.894	7561.579	3.060	.0150
Subject (group)	68	168042.275	2471.210		
Weeks (B)	1	373.142	373.142	.867	.3550
AB	5	807.626	161.525	.375	.8639
B x Subjects w/groups	68	29261.733	430.320		

Condition	Count	Mean	Standard Deviation	Standard Error
1 NC/IC	20	4.050	10.645	2.380
2 LC/IC	24	32.125	64.528	13.172
3 HC/IC	26	25.077	31.097	6.099
4 NC/SC	22	46.909	23.849	5.085
5 LC/SC	28	55.393	40.148	7.587
6 HC/SC	28	41.429	27.837	5.261

	Week	
Cond	21	22
1	6	2
2	32	32
3	29	21
4	45	49
5	60	51
6	42	41

Table 21. RMANOVA with dependent measure mean minutes/day per week active and independent measure frequency of contact for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Frequency (A)	2	11225.306	5612.653	.428	.6538
Subject (group)	71	932000.920	13126.774		
Weeks (B)	17	28501.772	1676.575	1.563	.0666
AB	34	53455.555	1572.222	1.466	.0419
B x Subjects w/groups	1207	1294326.896	1072.350		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	378	37.111	35.306	1.816
Low contact	468	44.425	52.384	2.421
High contact	486	41.512	33.885	1.537

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
No	44	53	55	44	42	36	33	34	38	38	33	34	31	36	33	31	26	27
Low	21	26	38	42	47	49	64	56	54	39	45	43	42	49	46	48	47	42
High	28	41	52	46	47	46	47	42	41	42	39	36	47	43	42	41	36	31

Table 22. RMANOVA with dependent measure mean minutes/day per week active and independent measure frequency of contact for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Frequency (A)	2	7963.066	3981.533	1.429	.2465
Subject (group)	71	197887.103	2787.142		
Weeks (B)	1	373.142	373.142	.887	.3496
AB	2	190.963	95.482	.227	.7976
B x Subjects w/groups	71	29878.395	420.822		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	42	26.500	28.516	4.400
Low contact	52	44.654	53.557	7.427
High contact	54	33.556	30.314	4.125

	Week	
Cond	21	22
No	26	27
Low	47	42
High	36	31

Table 23. RMANOVA with dependent measure mean minutes/day per week active and independent measure contact for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Contact (A)	1	9202.401	9202.401	.709	.4024
Subject (group)	72	934023.824	12972.553		
Weeks (B)	17	28501.772	1676.575	1.562	.0671
AB	17	33636.661	1978.627	1.843	.0193
B x Subjects w/groups	1224	1314145.790	1073.649		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	378	37.111	35.306	1.816
Contact	954	42.941	43.945	1.423

	Week																
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
No contact	44	53	55	44	41	36	33	34	38	38	33	35	31	36	33	31	26	27
Contact	25	34	45	44	47	47	55	49	47	40	42	40	45	46	44	44	41	37

Table 24. RMANOVA with dependent measure mean minutes/day per week active and independent measure contact for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Contact (A)	1	4700.169	4700.169	1.682	.1987
Subject (group)	72	201150.000	2793.750		
Weeks (B)	1	373.142	373.142	.899	.3462
AB	1	190.447	190.447	.459	.5003
B x Subjects w/groups	72	29878.911	414.985		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	42	26.500	28.516	4.400
Contact	106	39.000	43.452	4.220

	Week	
Cond	21	22
No contact	26	27
Contact	41	37

Table 25. RMAVOVA with dependent measure total minutes per week active and independent measure class for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Class (A)	1	1563143.768	1563143.768	5.970	.0170
Subject (group)	72	18850710.058	261815.417		
Weeks (B)	17	857687.826	50452.225	2.701	.0002
AB	17	541449.283	31849.958	1.705	.0362
B x Subjects w/groups	1224	22866917.891	18682.122		

Condition	Count	Mean	Standard Deviation	Standard Error
Information class	630	146.930	168.716	6.722
Strategies class	702	215.544	189.647	7.158

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
IC	112	131	220	210	200	186	181	160	179	166	139	131	125	127	116	103	89	65
SC	172	186	227	205	227	224	215	211	245	223	224	199	231	261	203	216	202	208

Table 26. RMANOVA with dependent measure total minutes per week active and independent measure class for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Class (A)	1	600309.771	600309.771	14.447	.0003
Subject (group)	72	2991758.289	41552.198		
Weeks (B)	1	2440.547	2440.547	.390	.5345
AB	1	8371.773	8371.773	1.336	.2515
B x Subjects w/groups	72	451028.179	6264.280		

Condition	Count	Mean	Standard Deviation	Standard Error
Information class	70	77.143	147.077	17.077
Strategies class	78	204.705	159.586	18.070

	Week	
Cond	21	22
IC	89	65
SC	202	208

Table 27. RMANOVA with dependent measure total minutes per week active and independent measure condition for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Condition (A)	5	2211873.284	442374.657	1.653	.1580
Subject (group)	68	18201980.542	267676.184		
Weeks (B)	17	857687.826	50452.225	2.779	.0001
AB	85	2418404.477	28451.817	1.567	.0011
B x Subjects w/groups	1156	20989962.697	18157.407		

Condition	Count	Mean	Standard Deviation	Standard Error
1 NC/IC	180	107.217	145.220	10.824
2 LC/IC	216	144.074	176.451	12.006
3 HC/IC	234	180.115	171.989	11.243
4 NC/SC	198	229.884	179.740	12.774
5 LC/SC	252	219.738	219.972	13.857
6 HC/SC	252	200.083	162.123	10.213

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
1	144	167	213	199	199	173	118	122	208	118	46	19	19	38	44	48	39	14
2	75	45	180	188	237	169	159	186	178	127	151	150	135	107	148	119	117	120
3	122	183	262	241	166	213	250	167	159	238	199	199	199	213	141	133	103	53
4	254	244	276	276	248	227	218	217	186	256	205	247	215	259	205	195	178	228
5	119	153	125	156	194	227	221	188	330	222	262	214	288	325	240	238	231	215
6	161	174	290	198	244	218	207	229	206	198	200	145	186	197	164	210	189	184

Table 28. RMANOVA with dependent measure total minutes per week active and independent measure condition for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Condition (A)	5	712544.902	142508.980	3.365	.0089
Subject (group)	68	2879523.158	42345.929		
Weeks (B)	1	2440.547	2440.547	.388	.5352
AB	5	32165.041	6433.008	1.024	.4106
B x Subjects w/groups	68	427234.912	6282.866		

Condition	Count	Mean	Standard Deviation	Standard Error
1 NC/IC	20	26.250	67.060	14.995
2 LC/IC	24	118.542	205.302	41.907
3 HC/IC	26	78.077	117.431	23.030
4 NC/SC	22	203.591	145.174	30.951
5 LC/SC	28	223.679	190.638	36.027
6 HC/SC	28	186.607	138.498	26.174

	Week	
Cond	21	22
1	39	14
2	117	120
3	103	53
4	178	228
5	231	215
6	189	184

Table 29. RMANOVA with dependent measure total minutes per week active and independent measure frequency of contact for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Frequency (A)	2	78889.412	39444.706	.138	.8716
Subject (group)	71	20334964.414	286407.949		
Weeks (B)	17	857687.826	50452.225	2.732	.0002
AB	34	1116513.549	32838.634	1.778	.0041
B x Subjects w/groups	1207	22291853.625	18468.810		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	378	171.471	175.094	9.006
Low contact	468	184.816	204.370	9.447
High contact	486	190.469	167.072	7.579

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
No	202	208	246	239	224	202	171	172	197	191	129	139	122	154	129	125	112	126
Low	99	103	151	171	214	200	193	188	260	178	211	185	218	225	198	183	179	172
High	142	178	277	219	206	215	228	199	183	217	200	171	192	205	153	173	148	121

Table 30. RMANOVA with dependent measure total minutes per week active and independent measure frequency of contact for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Frequency (A)	2	81426.334	40713.167	.823	.4431
Subject (group)	71	3510641.727	49445.658		
Weeks (B)	1	2440.547	2440.547	.386	.5366
AB	2	10116.707	5058.353	.799	.4536
B x Subjects w/groups	71	449283.246	6327.933		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	42	119.143	144.619	22.315
Low contact	52	175.154	202.607	28.097
High contact	54	134.352	138.826	18.892

	Week	
Cond	21	22
No	112	126
Low	179	172
High	148	121

Table 31. RMANOVA with dependent measure total minutes per week active and independent measure contact for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Contact (A)	1	71270.801	71270.801	.252	.6170
Subject (group)	72	20342583.025	282535.875		
Weeks (B)	17	857687.826	50452.225	2.704	.0002
AB	17	569862.481	33521.322	1.797	.0239
B x Subjects w/groups	1224	22838504.693	18658.909		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	378	171.471	175.094	9.006
Contact	954	187.696	186.227	6.029

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
No contact	202	208	246	240	225	202	170	172	197	191	130	139	122	154	129	125	112	126
Contact	121	142	215	195	210	208	210	194	221	198	205	178	205	215	175	178	163	146

Table 32. RMANOVA with dependent measure total minutes per week active and independent measure contact for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Contact (A)	1	37324.767	37324.767	.756	.3875
Subject (group)	72	3554743.294	49371.435		
Weeks (B)	1	2440.547	2440.547	.389	.5329
AB	1	7486.485	7486.485	1.193	.2784
B x Subjects w/groups	72	451913.468	6276.576		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	42	119.143	144.619	22.315
Contact	106	154.368	173.454	16.847

	Week	
Cond	21	22
No contact	112	126
Contact	163	146

Table 33. RMANOVA with dependent measure active and independent measure class for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Class (A)	1	15.596	15.596	12.582	.0007
Subject (group)	72	89.243	1.239		
Weeks (B)	17	15.355	.903	9.961	<.0001
AB	17	8.265	.486	5.361	<.0001
B x Subjects w/groups	1224	110.991	.091		

Condition	Count	Mean	Standard Deviation	Standard Error
Information class	630	.651	.477	.019
Strategies class	702	.868	.339	.013

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
IC	.54	.63	.97	.97	.86	.83	.80	.77	.71	.66	.63	.54	.54	.54	.51	.51	.37	.31
SC	.69	.80	.95	.92	.95	.95	.92	.87	.90	.85	.82	.82	.85	.85	.85	.87	.90	.87

Table 34. RMANOVA with dependent measure active and independent measure class for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Class (A)	1	10.828	10.828	35.065	<.0001
Subject (group)	72	22.233	.309		
Weeks (B)	1	.061	.061	3.062	.0844
AB	1	.009	.009	.461	.4994
B x Subjects w/groups	72	1.430	.020		

Condition	Count	Mean	Standard Deviation	Standard Error
Information class	70	.343	.478	.057
Strategies class	78	.885	.322	.036

	Week	
Cond	21	22
IC	.37	.31
SC	.90	.87

Table 35. RMANOVA with dependent measure active and independent measure condition for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Condition (A)	5	23.704	4.741	3.973	.0032
Subject (group)	68	81.135	1.193		
Weeks (B)	17	15.355	.903	10.321	<.0001
AB	85	18.092	.213	2.432	<.0001
B x Subjects w/groups	1156	101.164	.088		

Condition	Count	Mean	Standard Deviation	Standard Error
1 NC/IC	180	.506	.501	.037
2 LC/IC	216	.630	.484	.033
3 HC/IC	234	.782	.414	.027
4 NC/SC	198	.859	.349	.025
5 LC/SC	252	.889	.315	.020
6 HC/SC	252	.853	.355	.022

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
1	.7	.8	1.0	.9	.7	.7	.6	.5	.6	.6	.3	.2	.3	.3	.3	.3	.2	.1
2	.33	.33	1.0	1.0	.92	.83	.83	.83	.67	.58	.58	.58	.50	.50	.50	.50	.42	.42
3	.62	.77	.92	1.0	.92	.92	.92	.92	.85	.77	.92	.77	.77	.77	.69	.69	.46	.39
4	.82	.91	1.0	1.0	1.0	1.0	.82	.82	.73	.73	.73	.82	.82	.82	.82	.82	.91	.91
5	.71	.86	.86	.86	.93	1.0	1.0	.86	1.0	.93	.86	.79	.86	.86	.86	.93	.93	.93
6	.57	.64	1.0	.93	.93	.86	.93	.93	.93	.86	.86	.86	.86	.86	.86	.86	.86	.79

Table 36. RMANOVA with dependent measure active and independent measure condition for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Condition (A)	5	12.049	2.410	7.799	<.0001
Subject (group)	68	21.012	.309		
Weeks (B)	1	.061	.061	3.006	.0875
AB	5	.063	.013	.626	.6802
B x Subjects w/groups	68	1.376	.020		

Condition	Count	Mean	Standard Deviation	Standard Error
1 NC/IC	20	.150	.366	.082
2 LC/IC	24	.417	.504	.103
3 HC/IC	26	.423	.504	.099
4 NC/SC	22	.909	.294	.063
5 LC/SC	28	.929	.262	.050
6 HC/SC	28	.821	.390	.074

	Week	
Cond	21	22
1	.2	.1
2	.42	.42
3	.46	.39
4	.91	.91
5	.93	.93
6	.86	.79

Table 37. RMANOVA with dependent measure active and independent measure frequency of contact for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Frequency (A)	2	3.521	1.761	1.234	.2974
Subject (group)	71	101.317	1.427		
Weeks (B)	17	15.355	.903	9.619	<.0001
AB	34	5.913	.174	1.852	.0022
B x Subjects w/groups	1207	113.343	.094		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	378	.690	.463	.024
Low contact	468	.769	.422	.019
High contact	486	.819	.385	.017

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
No	.76	.86	1.0	.95	.86	.86	.71	.67	.67	.67	.52	.52	.57	.57	.57	.57	.57	.52
Low	.54	.62	.92	.92	.92	.92	.92	.85	.85	.77	.73	.69	.69	.69	.69	.73	.69	.69
High	.59	.70	.96	.96	.93	.89	.93	.93	.89	.82	.89	.82	.82	.82	.78	.78	.67	.59

Table 38. RMANOVA with dependent measure active and independent measure frequency of contact for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Frequency (A)	2	.487	.243	.530	.5908
Subject (group)	71	32.574	.459		
Weeks (B)	1	.061	.061	3.079	.0836
AB	2	.037	.019	.939	.3960
B x Subjects w/groups	71	1.402	.020		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	42	.548	.504	.078
Low contact	52	.692	.466	.065
High contact	54	.630	.487	.066

	Week	
Cond	21	22
No	.57	.52
Low	.69	.69
High	.67	.59

Table 39. RMANOVA with dependent measure active and independent measure contact for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Contact (A)	1	2.932	2.932	2.072	.1544
Subject (group)	72	101.906	1.415		
Weeks (B)	17	15.355	.903	9.674	<.0001
AB	17	4.972	.292	3.132	<.0001
B x Subjects w/groups	1224	114.284	.093		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	378	.690	.463	.024
Contact	954	.795	.404	.013

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
No contact	.76	.86	1.0	.95	.86	.86	.71	.67	.67	.67	.52	.52	.57	.57	.57	.57	.57	.52
Contact	.57	.66	.94	.94	.93	.91	.93	.89	.87	.79	.81	.76	.76	.76	.74	.76	.68	.64

Table 40. RMANOVA with dependent measure active and independent measure contact for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Contact (A)	1	.382	.843	2.072	.3617
Subject (group)	72	32.678	.454		
Weeks (B)	1	.061	.061	3.044	.0853
AB	1	.001	.001	.037	.8485
B x Subjects w/groups	72	1.438	.020		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	42	.548	.504	.078
Contact	106	.660	.476	.046

	Week	
Cond	21	22
No contact	.57	.52
Contact	.68	.64

Table 41. RMANOVA with dependent measure ACSM guidelines and independent measure class for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Class (A)	1	12.577	12.577	9.051	.0036
Subject (group)	72	100.053	1.390		
Weeks (B)	17	11.541	.679	4.538	<.0001
AB	17	8.005	.471	3.147	<.0001
B x Subjects w/groups	1224	183.122	.150		

Condition	Count	Mean	Standard Deviation	Standard Error
Information class	630	.519	.500	.020
Strategies class	702	.714	.456	.017

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
IC	.37	.49	.69	.83	.77	.66	.71	.63	.51	.57	.51	.43	.40	.49	.40	.37	.29	.23
SC	.54	.62	.72	.80	.74	.77	.80	.67	.72	.74	.69	.69	.69	.72	.69	.72	.74	.80

Table 42. RMANOVA with dependent measure ACSM guidelines and independent measure class for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Class (A)	1	9.674	9.674	30.001	<.0001
Subject (group)	72	23.218	.322		
Weeks (B)	1	0	0	0	*
AB	1	.108	.108	2.006	.1610
B x Subjects w/groups	72	3.892	.054		

Condition	Count	Mean	Standard Deviation	Standard Error
Information class	70	.257	.440	.053
Strategies class	78	.769	.424	.048

	Week	
Cond	21	22
IC	.29	.23
SC	.74	.80

Table 43. RMANOVA with dependent measure ACSM guidelines and independent measure condition for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Condition (A)	5	18.590	3.718	2.688	.0282
Subject (group)	68	94.041	1.383		
Weeks (B)	17	11.541	.679	4.584	<.0001
AB	85	19.937	.235	1.584	.0009
B x Subjects w/groups	1156	171.189	.148		

Condition	Count	Mean	Standard Deviation	Standard Error
1 NC/IC	180	.411	.493	.037
2 LC/IC	216	.563	.501	.034
3 HC/IC	234	.598	.491	.032
4 NC/SC	198	.707	.456	.032
5 LC/SC	252	.647	.487	.031
6 HC/SC	252	.786	.411	.026

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
1	.40	.60	.70	.70	.70	.70	.60	.50	.40	.50	.20	.10	.10	.30	.30.	.30	.20	.10
2	.25	.17	.67	1.0	.75	.67	.67	.67	.58	.5	.58	.42	.42	.5	.42	.42	.33	.42
3	.46	.69	.69	.77	.85	.62	.85	.69	.54	.69	.69	.69	.62	.62	.46	.39	.31	.15
4	.73	.73	.73	.91	.73	.82	.82	.55	.64	.73	.64	.64	.73	.64	.55	.64	.73	.82
5	.43	.57	.50	.57	.57	.64	.79	.50	.71	.71	.64	.64	.64	.71	.71	.71	.71	.86
6	.50	.57	.93	.93	.93	.86	.79	.93	.79	.79	.79	.79	.71	.79	.79	.79	.79	.71

Table 44. RMANOVA with dependent measure ACSM guidelines and independent measure condition for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Condition (A)	5	10.274	2.055	6.177	<.0001
Subject (group)	68	22.618	.333		
Weeks (B)	1	0	0	0	*
AB	5	.470	.094	1.809	.1228
B x Subjects w/groups	68	3.530	.052		

Condition	Count	Mean	Standard Deviation	Standard Error
1 NC/IC	20	.150	.366	.082
2 LC/IC	24	.375	.495	.101
3 HC/IC	26	.231	.430	.084
4 NC/SC	22	.773	.429	.091
5 LC/SC	28	.786	.418	.079
6 HC/SC	28	.750	.441	.083

	Week	
Cond	21	22
1	.20	.10
2	.33	.42
3	.31	.15
4	.74	.82
5	.71	.86
6	.79	.71

Table 45. RMANOVA with dependent measure ACSM guidelines and independent measure frequency of contact for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Frequency (A)	2	4.290	2.145	1.406	.2519
Subject (group)	71	108.341	1.526		
Weeks (B)	17	11.541	.679	4.440	<.0001
AB	34	6.600	.194	1.270	.1390
B x Subjects w/groups	1207	184.526	.153		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	378	.566	.496	.026
Low contact	468	.590	.497	.023
High contact	486	.695	.461	.021

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
No	.57	.67	.71	.81	.71	.76	.71	.52	.52	.62	.43	.38	.43	.47	.43	.47	.47	.47
Low	.35	.39	.58	.77	.65	.65	.73	.58	.65	.62	.62	.54	.54	.62	.58	.58	.54	.65
High	.48	.63	.82	.85	.89	.74	.82	.82	.67	.74	.74	.74	.67	.70	.63	.59	.56	.44

Table 46. RMANOVA with dependent measure ACSM guidelines and independent measure frequency of contact for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Frequency (A)	2	.396	.198	.433	.6502
Subject (group)	71	32.495	.458		
Weeks (B)	1	0	0	0	*
AB	2	.340	.170	3.295	.0428
B x Subjects w/groups	71	3.660	.052		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	42	.476	.505	.078
Low contact	52	.596	.495	.069
High contact	54	.500	.505	.069

	Week	
Cond	21	22
No	.47	.47
Low	.54	.65
High	.56	.44

Table 47. RMANOVA with dependent measure ACSM guidelines and independent measure contact for weeks 1-16 including follow-up.

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Contact (A)	1	1.625	1.625	1.054	.3081
Subject (group)	72	111.006	1.542		
Weeks (B)	17	11.541	.679	4.436	<.0001
AB	17	3.807	.224	1.463	.0998
B x Subjects w/groups	1224	187.319	.153		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	378	.566	.496	.026
Contact	954	.644	.481	.016

	Week																	
Cond	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
No contact	.57	.67	.71	.81	.71	.76	.71	.52	.52	.62	.43	.38	.43	.47	.43	.47	.47	.47
Contact	.42	.51	.70	.81	.77	.70	.77	.70	.66	.68	.68	.64	.60	.66	.60	.59	.55	.55

Table 48. RMANOVA with dependent measure ACSM guidelines and independent measure contact for weeks 21 and 22 (follow-up).

Source	df:	Sum of Squares:	Mean Square	F-test:	P-value:
Contact (A)	1	.152	.152	.333	.5655
Subject (group)	72	32.740	.455		
Weeks (B)	1	0	0	0	*
AB	1	0	0	0	*
B x Subjects w/groups	72	4.000	.056		

Condition	Count	Mean	Standard Deviation	Standard Error
No contact	42	.476	.505	.078
Contact	106	.547	.500	.049

	Week	
Cond	21	22
No contact	.48	.48
Contact	.55	.55

Table 49. LEE DESU values from SURVIVAL analyses performed on the dependent variable Dead 1 with the independent variables class, frequency, contact, and stage.

Stratifier	**df:**	**LD**	**P Value**
Class	1	5.763	.0164
Frequency	2	1.340	.5116
Contact	1	1.290	.2560
Stage	4	4.287	.3686

Table 50. LEE DESU values from SURVIVAL analyses performed on the dependent variable Dead 2 with the independent variables class, frequency, contact, and stage.

Stratifier	df:	LD	P Value
Class	1	5.524	.0188
Frequency	2	3.026	.2203
Contact	1	1.592	.2070
Stage	4	1.898	.7545

Table 51. LEE DESU values from SURVIVAL analyses performed on the dependent variable Dead 3 with the independent variables class, frequency, contact, and stage.

Stratifier	df:	LD	P Value
Class	1	17.430	<.0001
Frequency	2	.516	.7725
Contact	1	.445	.5045
Stage	4	1.141	.8878

Table 52. Type of physical activity performed across participants and conditions.

	Weeks																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
I	4	4	4	4	4	4,1,3	3,4	3,4	3,4,5	3,4,5	0	0	0	0	0	0	0	0
n	1,2,4	1,3,4	1,2,4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
f	5	5	4,B	4,2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
o	4	4	4	4	4,A	4	4	4	4	4	4,B	4,A	4	4,5	4	4	4	4
	4	4	4,6	4	4,6	4.5	4,5	4,5	4	A	0	0	4	4	4	4	4	4
N	4,5	5,4	5	5,4	5,4	5,4	5	5,4	5	0	0	0	0	0	0	0	0	0
o	4	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0
	5	5,3,A	5,A	6,5,A	6,5,A	6,5,A	0	0	0	0	0	0	0	0	0	0	0	0
	1,3,4A	1,3,4,A	3,4,A	1,3,A	3,4,A	3,4,A	3,4,A	0	0	0	0	0	0	0	0	0	0	0
	4,5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0	0
I	0	4	4	4	4	4	4	4	4	4	4,5	5	0	0	0	0	0	0
n	4	1,3,4,A	3,4,5	4,5	4,5	4	4	4	4,5	4	4	4,5,6	4,6	0	4	4	4	4
f	0	0	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	0	0
o	0	0	4.5	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4	4	3,4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0
L	0	0	2,4	2,4	2,4	4	4	4	4	0	0	0	0	0	0	0	0	0
o	0	0	1,2,4,6	4,5,A	4,2,6,A	4,6,A	4,6	4,6	4,6	0	0	0	0	0	0	0	0	0
w	3,4,5	0	3,4,5	2,3,4,5	4	4	3,4	4	4	4	4	4	3,4	4	4	2,4	4	3,4
	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	0	0	3,4,5	3,4,5	3,4	3,4,5	3,5	3,4,5	3,4,5	4,5	5,4	5,4	5,4	5,4,3	4,5	4,5	4,5	4,5
	3,4,5	3,4	3	4,5	3,4	4,A	3,4,5,A	4,5,A	4,5	4,5	3,4,5	4,5	3,4,5	5	5,A,B	4,5	3,B	B
	0	0	4,5,B	4,5,B	4,5,B	0	0	0	0	0	0	0	0	0	0	0	0	0
I	4	4	4,5	4	4	4	4	4	4	4,6	4,6	4,5,6	6,4	6,4	6,4	6	6	6
n	4,5	4	4,5	4	4	4	4	4	4,5	4	4	4	4	4	4	4,5	4	4
f	5	5,2	4,5	5,4	5	0	5	5,2	5,4	5	5,4	5,4	0	0	0	0	0	0
o	4	4	4,3	4,3	4	4,3	4,3	4,3	4,3	4,3	4	4	4,3	0	0	0	0	0
	4,6	6,5	6,5,2	6,1	6,4,1	4,1	4,1	4,1	4,1	4,1	4,5	0	4	4,2	4	4	6,4	6
H	6	6,4,2	6,4	6,5	6,4	6,5,4	6,5,4	6,4	6,5	0	5	5	5	5,4	5,4	5	5,4	6,4
i	0	0	6,4	6,4	4,5,6	4,5,6	4,5,6	4,6	4,5,6	4,5,6	4,5,6	4,5,6	4,5,6	4,5,6	4	4,5,6	4,5,6	4,5,6
g	0	0	6	4	6,4	4	0	0	0	0	0	0	0	0	0	0	0	0
h	0	0	1,2,4,5	1,4,5	1,4	1,4	1,4,5	1,4,5	1,4	1,4	1,4	0	0	0	0	0	0	0
	0	3,5	3	3,4,5	3,4	3,4,5	3	3,4,5	2,3,5	3,4,5	2,3,5	2,3,5	2,3,5	4,5	4,3	5	0	0
	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0	0
	0	3,4	3,4	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0
	5,4	5,4	6,5,2	5,6,4	5,6	5,4	6	6,5	6,5,4,3	5	5,4	5,4	5,4	3,2	5,4	5,4	4	0

0=No activity
1=Lifestyle activity (e.g., stairs, park car further)
2=Housework
3=Yardwork
4=Walking
5=Individual activity (e.g., jog, run, swim, hike)
6=Organized activity (e.g., aerobics, team sports)
A=Calisthenics
B=Weight training

Table 52 (continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
Strategies No	5,A	A,6,5,4	A,5,4,3	A,5,4	A,2	4	A,5	A,4,6	A,4,6	A,6,5,4	A,6,4	A,6,4	A,6,4	A,4	A,4	A,4	A,4	A,4
	4	4,5	4	4	4,5	4,6	4,A	4	4,6	4	4	4	4,3,5	4	4	4,5	4	4
	4,5,6	6,5,3	6,5,4,3	6,5,4,3	4,5,3	4,5,3	0	0	0	0	0	0	0	0	0	0	0	0
	4,1,3	1,4	1,4	1,4	1,3,4	5,4,3	3,4	3,4	0	4,3	4	4,5,3	3,4	4	4,3,2	4,3	4	4,3,2
	6,2,1	6,2,1	6,4,1	6,1,3	6,1,3	1,2,3	6,1,2,3	6,4,2	6,1,2	6,4,2,1	4,	4,2	6,4,3	6,4,2,1	6,4,1	6,3,1	6,4,1	4,1
	5,4	5,B	5,4,B,A	5,4,B	5,4,A	5,4	5,4	5,4	5,4	5,4,A	5,4,A,B	5,4,B	5,4,B	5,4,2,B	5,4,B	5,4,B	5,4,B	5,B
	6,4,A	6,5,4,A	4	4,A,2	A,4	4,5,A	4,5,A	A,5	A,4,5	0	0	5	5,4	5,4	2,A	5	5,2	5,4
	5,A,B	5	5	5,4	5,4,B	5,4	5	5	5,4	5	5,4,B	5,4,B	5,4,B	5	5,4	5	5	5,B
	0	0	4,5,B	2,4,B	4,5,B	4,5,B	4,5,B	4,5,B	5,4,B	5,B	5,4,B	5,B	B	5,4,B	5,B	5,B	5,B	5,B
	0	4,1	4	4	4	4,5	0	0	0	0	0	0	0	0	0	0	4	4
	4,B	4,5,1	4,5	4,5	4,5,B	4,5	4,A	4	4,5	4,5,A,B	4,5,A	4	4	4	4	4	4	4
Strategies So	4	4	4,3,2	4,3	4,3	4,3	4	4,3	4,3	4	4	4	0	0	4,3	3	4	4,3
	6	6	0	0	0	6	0	6	6	6	6	6	6	6	6	6	6	6
	4,2	4	4	4	4	4,3	4	4,3	4,3	4	4	0	4,3	4	4	4	4	4
	4,2	0	0	0	4	4	4,2	4,2,1	4	0	0	0	0	0	0	0	0	0
	4,5	6,4,A	4	4	4,B	6,4,5	4	4	1,2	1,2	1,2	4	6,4	5	5	4	6,4	6,4
	0	5	4	4	4	4,5	5	0	4,5	5,4,2	5,2	4,2	4	4,2	4,5	5,4	4	4,2
	0	4,5,B	B,5	B,4	B,4	B,4,5	B,4	B,4,5	4,B,5	4,B	4,B	4,B	2,B,5	B,5,4	B,5,4	2,B,4	B,4,5	B,4,5
	5,1,4	1,4	1	1,2	2,3,4	4	4,1	4	4,3,1	4,2,5	4,3,2	2,1	2	2	2,3	2,4,5	4	4
	4,1	1,4,2	1,4,2	4,1	1,4	4,1,3	4	4	4	4,2	4,2,3	4,2,3	1,4,3	4,2,3	4,2,1	4,2	4,2	4,2
	0	1,A	1,A	4	4	4	4	4	4,A	5,4,B,A	5,4,B,A	5,B,A	5,4,B	5,B	5,B,A	5,4,B,A	5,B,A	5,4,B,A
	4,5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Low	4,6,5,B	6,4,5	4,5	4,5,6	4,5,6,3	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5	4,5
	0	0	6	6	6	5,6,4,A	6,5,4,A	5,4	5	6,A	4	6,5	6,5	4	4	6,4	6,4	6,4
	1	4,3	4,3	5,4,3	4	4,3,B	4,5,3	5	5	5	5	5	5	5	5	5	5	5
Strategies Sh	A,4,5	A,3,4	A,5	A,5	5,4	5,4,A	5,A	5,4,A	5,A	0	0	0	0	0	0	0	0	0
	4	4	4	4	4	4	4	4	4	4,5	4,5	4	4	4	4	4	4	4
	4,5	5,4,3	5,4	5,4,2	5,3	4,3	4,2	4,3	4,2	5	5	5,4	4	5,4	5,4	4	5,4	4
	0	0	4,3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4,2	4,2	4,2	4,2	4,2,A	4,2,A	4,5	4,3	4,3	4,5	4,5	4,5	4,5	4,1,2	4,5	5	5	4,2
	4,A	4,A	4,5,A	4,5,A	4,5,A	4,5,A	5,4,3	4,5	4,6,A	6,4	4,6	6,4,A	6,5,4,A	4	4	4	5,4	5,4
	4,A	4,A,2	4	4	4,1	0	4,2	5,A	0	4,5	4,2	4	4,3,2	4,5	4,5,3	5,2	5,4,2,A	4,2,A
	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	0	0	4	4	4,5	4,5	5,4,2	4,5,2	4,5	4,5	4,5	4	4,5	4,5	4	4	4,5	5,4
	0	4,1	4,1,2	4,1,2	4	4	4,1,2,3	4,1,2,3	4,3,1,2	4,1,2	4,1,3	4,1,5,3	4,5,1,2	4,5,2	4,5,1	4,5	4,5,2	4,1
High	5,1,A	4,3	4,3,5,A	4,3,2	4,3,5	4	4,3	4,3	4	4,3	4,3	4,5,3	4,5,3	4,5	5	5,4,2	5,4,B	4
	0	0	4	4	6,4	6,4	6,4	4,6	4,6	6,4	6,A	6,A	4,A	A	A	4,A	6,A	6
	4,6	4,6	6,4	4,6	4	4,A	4,5	4	4,5	4,5,6	4,5	4,6	6,4	6,4	6,4	6,4	6,4	6,4
	0	0	4,1,B,A	4	4,1	4,A	4	4	4	4	4	4	4	4	4	4	4	4

0=No activity
1=Lifestyle activity (e.g., stairs, park car further)
2=Housework
3=Yardwork
4=Walking
5=Individual activity (e.g., jog, run, swim, hike)
6=Organized activity (e.g., aerobics, team sports)
A=Calisthenics
B=Weight training

Table 53. Types of physical activity performed across conditions.

			Weeks																	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
INFORMATION CONDITION	No Contact	0=	0	0	0	0	2	2	3	4	4	5	8	8	7	7	7	7	8	8
		1=	2	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		2=	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3=	1	3	1	1	0	2	2	1	1	0	0	0	0	0	0	0	0	0
		4=	8	8	8	8	1	6	6	5	5	3	2	2	3	3	3	3	2	2
		5=	2	3	2	2	7	3	1	2	2	0	0	0	0	1	0	0	0	0
		6=	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0
		A=	1	2	2	2	3	2	1	0	0	1	0	1	0	0	0	0	0	0
		B=	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Lo Contact	0=	8	8	0	0	1	2	2	2	2	5	5	5	6	7	6	6	7	6
		1=	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		2=	0	0	2	2	2	0	0	0	0	0	0	0	0	0	0	1	0	0
		3=	2	2	5	2	2	1	3	1	1	0	1	0	2	1	0	0	1	1
		4=	3	3	11	12	11	10	9	10	10	7	7	6	5	4	5	6	4	4
		5=	2	0	6	8	3	2	3	2	4	3	4	5	3	3	3	3	1	1
		6=	0	0	1	0	1	1	1	1	1	0	0	1	1	0	0	0	0	0
		A=	0	1	0	1	1	2	1	1	0	0	0	0	0	0	1	0	0	0
		B=	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1
	Hi Contact	0=	5	3	0	0	0	1	1	1	1	2	1	3	4	5	5	5	7	8
		1=	0	0	1	2	2	2	2	2	2	2	1	0	0	0	0	0	0	0
		2=	0	2	3	0	0	0	0	1	1	0	1	1	1	2	0	0	0	0
		3=	0	2	3	2	1	2	2	2	3	2	1	1	2	1	1	0	0	0
		4=	4	7	9	11	11	12	9	10	10	9	10	8	7	7	8	5	5	3
		5=	3	3	6	5	3	4	2	3	6	4	6	6	3	3	2	5	2	1
		6=	1	2	5	4	5	2	3	3	3	2	2	2	2	2	1	2	3	4
		A=	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		B=	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

0=No activity
1=Lifestyle activity (e.g., staris, park car further)
2=Housework
3=Yardwork
4=Walking
5=Individual activity (e.g., jog,run swim, hike)
6=Organized activity (e.g., aerobics, team sports)
A=Calisthenics
B=Weight training

Table 53 (continued)

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	22
STRATEGIES CONDITION	No Contact	0=	2	1	1	0	0	0	2	2	3	3	3	2	2	2	2	2	1	1
		1=	2	4	2	1	2	1	1	0	1	1	0	0	0	1	1	1	1	1
		2=	1	1	0	2	1	1	1	1	1	0	0	1	0	2	2	0	1	1
		3=	1	1	2	2	3	3	2	1	0	1	0	1	3	0	1	2	0	1
		4=	6	6	10	10	9	10	6	7	7	6	8	7	8	8	7	5	7	7
		5=	4	7	6	5	6	8	5	5	5	5	4	4	4	4	3	5	4	4
		6=	3	4	2	2	1	1	1	2	3	2	1	1	2	1	1	1	1	0
		A=	3	2	2	1	3	1	3	1	2	3	3	1	1	1	2	1	1	1
		B=	2	1	2	2	3	1	1	1	1	1	3	3	3	2	2	2	2	2
	Lo Contact	0=	4	2	2	2	1	0	1	1	0	1	1	2	2	2	1	1	1	1
		1=	1	3	3	2	1	1	1	1	2	1	1	1	1	0	1	0	0	0
		2=	2	1	2	1	1	0	1	1	1	4	4	3	2	3	2	3	1	2
		3=	0	1	2	2	3	4	1	2	2	0	2	1	2	1	2	1	0	1
		4=	8	8	7	8	11	12	11	10	9	8	8	6	6	6	7	9	9	10
		5=	4	4	3	3	2	6	4	5	6	6	4	5	6	6	7	6	5	4
		6=	2	3	1	1	2	3	1	1	1	2	1	2	2	1	1	2	6	3
		A=	0	2	1	0	0	1	1	0	1	2	1	1	0	0	1	1	1	1
		B=	1	1	1	1	2	2	1	1	1	2	2	2	2	1	2	2	2	2
	Hi Contact	0=	6	5	0	1	1	2	1	1	2	2	2	1	2	2	2	2	2	2
		1=	1	1	2	1	2	0	1	1	1	1	1	0	1	1	1	0	0	1
		2=	1	2	2	4	1	1	4	2	2	1	1	0	2	2	0	2	2	2
		3=	0	3	2	1	2	1	3	4	2	1	2	2	2	0	1	0	0	0
		4=	7	9	13	12	12	12	12	12	11	11	11	11	12	11	10	10	10	11
		5=	3	1	4	3	5	3	5	3	3	6	5	4	5	5	5	3	7	2
		6=	1	1	1	1	1	1	1	1	2	3	2	3	2	1	1	1	2	2
		A=	4	3	3	1	1	5	1	2	2	0	1	1	2	1	1	1	2	1
		B=	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

0=No activity
1=Lifestyle activity (e.g., staris, park car further)
2=Housework
3=Yardwork
4=Walking
5=Individual activity (e.g., jog,run swim, hike)
6=Organized activity (e.g., aerobics, team sports)
A=Calisthenics
B=Weight training

Table 54. Types of physical activity performed shown in percentage of lifestyle activity, traditional activity and calistenics/weight training by class.

Condition	Type of Activity	1-4	5-8	Weeks 9-12	13-16	21-22
Information	1-3	23%	15%	12%	10%	6%
	4-6	71%	78%	86%	88%	89%
	AB	6%	6%	2%	2%	6%
Strategies	1-3	22%	20%	16%	18%	11%
	4-6	65%	69%	71%	71%	76%
	AB	13%	11%	13%	11%	13%

1-3 = Lifestyle activity, house work, yardwork
4-6 = "Traditional" activity: walking, jogging, swimming, team sports, aerobics
AB = Calisthenics/weight training

Program Design

	Frequency Of Contact		
Strategies	**High contact**	**Low contact**	**No contact**
Maintenance Strategies	**N=17**	**N=17**	**N=17**
No Maintenance Strategies	**N=15**	**N=15**	**N=15**

Figure 1. Experimental Design

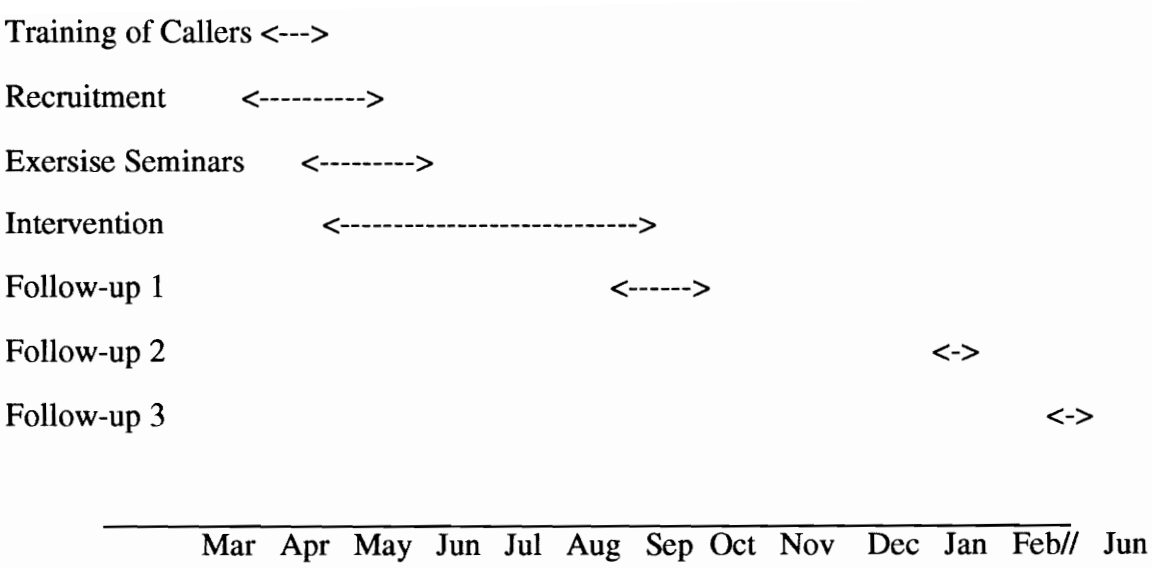


Figure 2. Time Line

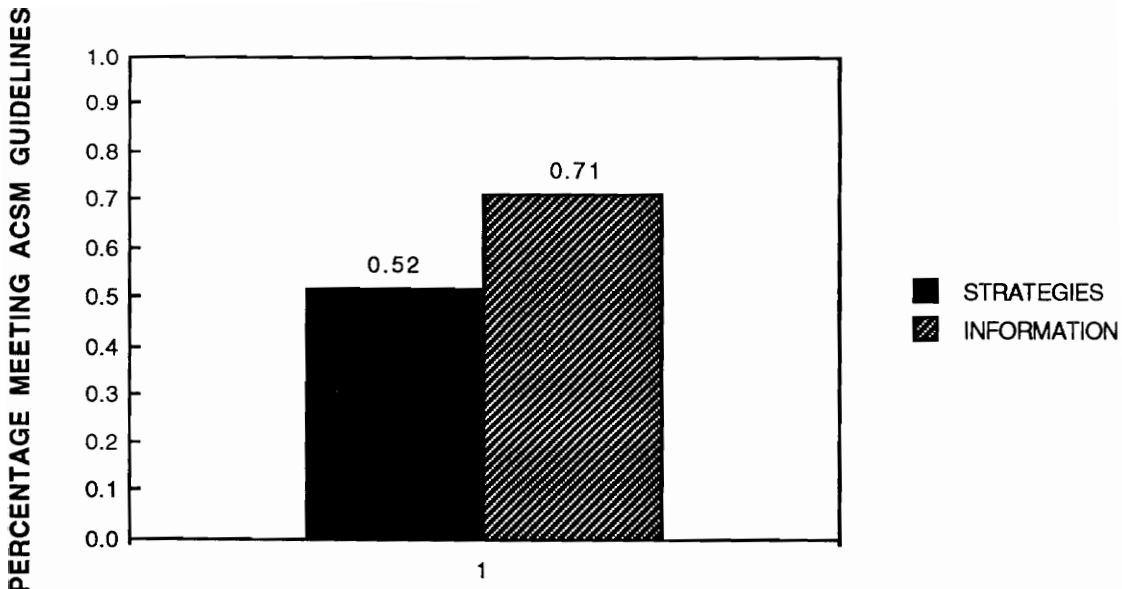


Figure 3. Percentage meeting ACSM guidelines for frequency and duration by class for weeks 1-16 including follow-up.

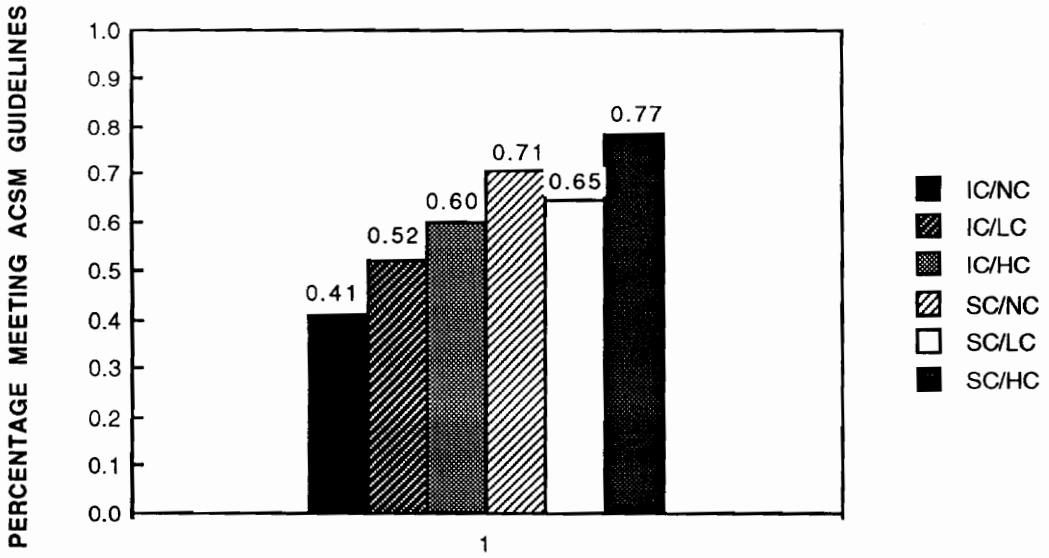


Figure 4. Percentage meeting ACSM guidelines for frequency and duration by condition for week 1-16 including follow-up.

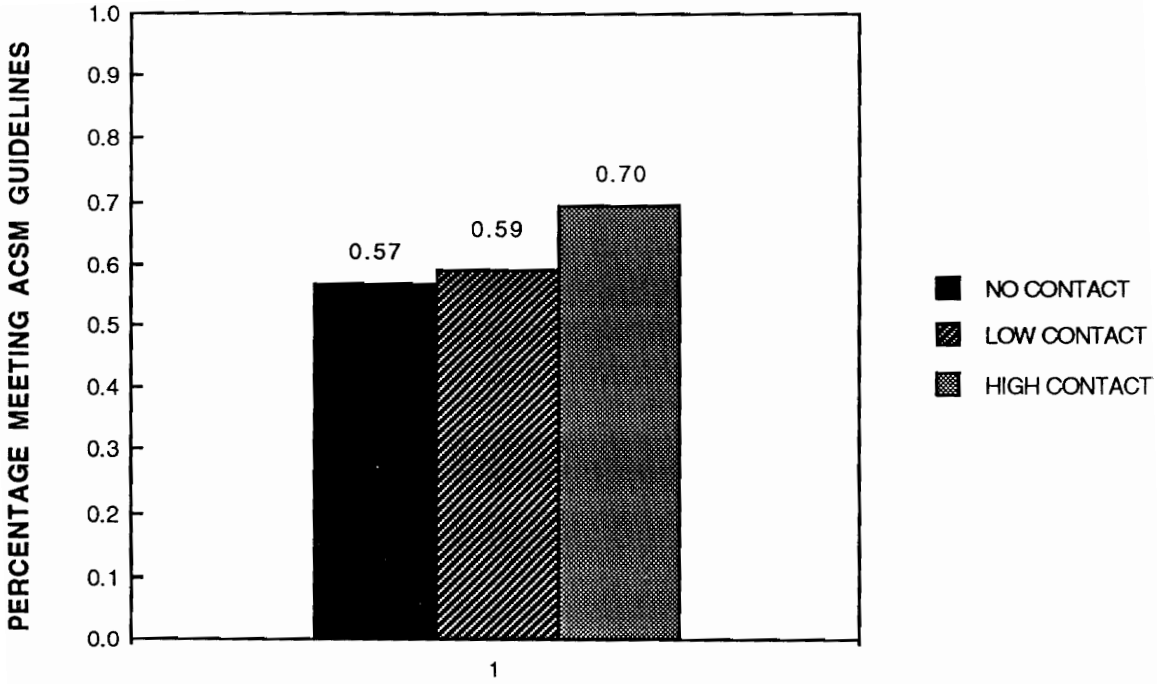


Figure 5. Percentage meeting ACSM guidelines for frequency and duration by frequency of contact over weeks 1-16 including follow-up.

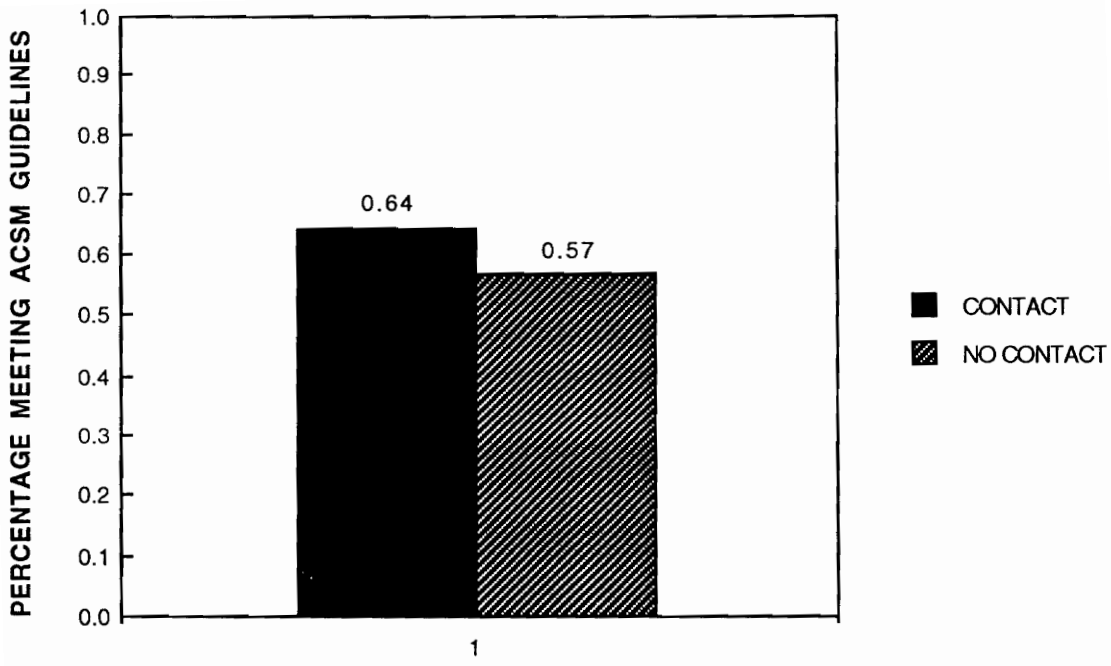
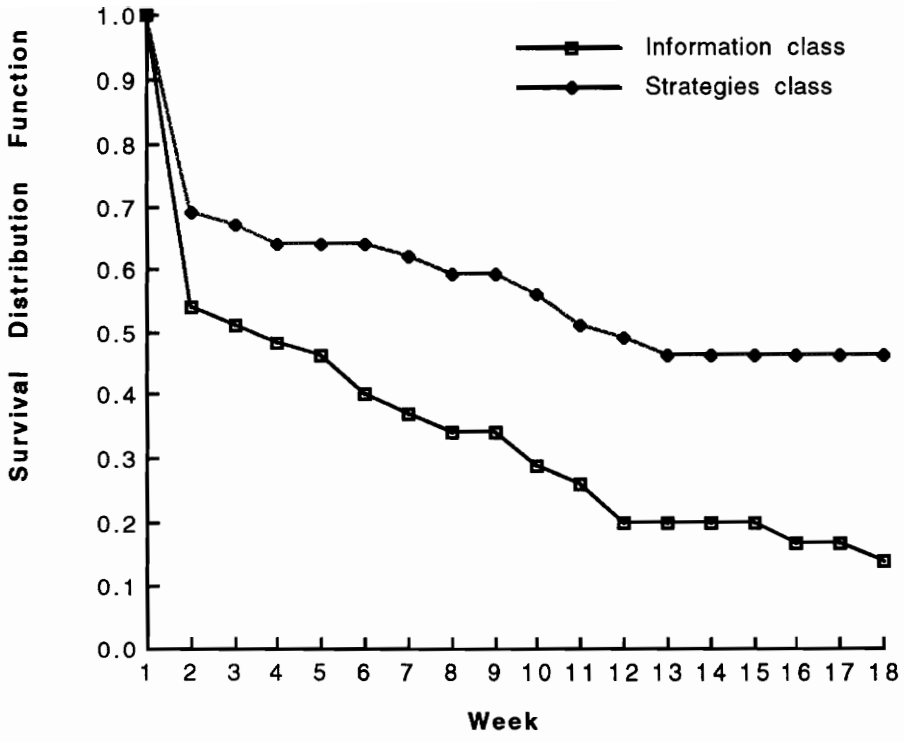


Figure 6. Percentage meeting ACSM guidelines for frequency and duration by contact over week 1-16 including follow-up.



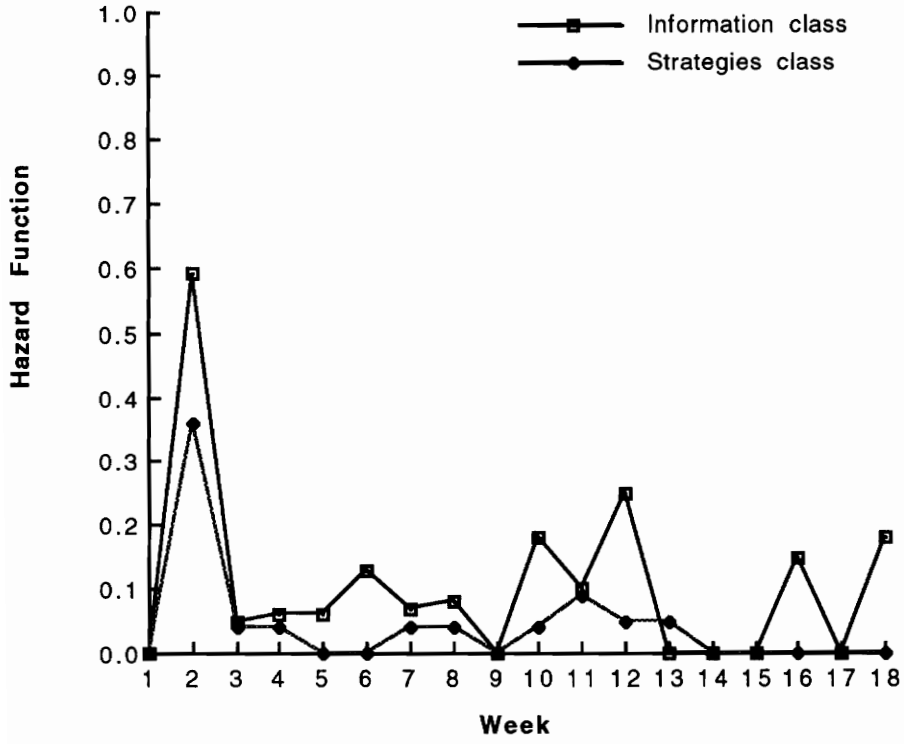
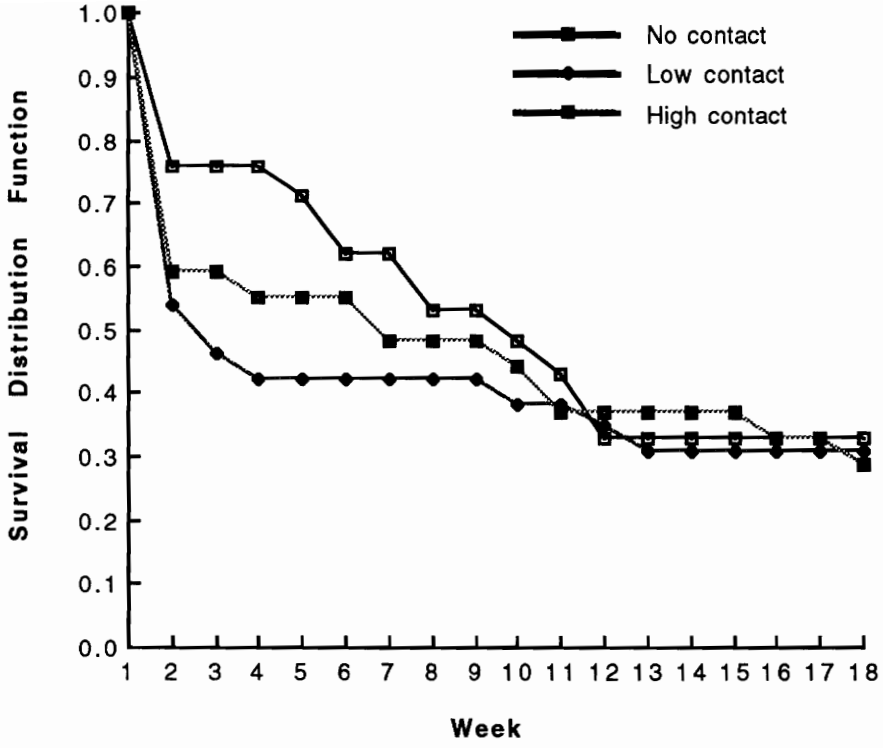


Figure 7. Survival and hazard functions for Dead 1 by class.



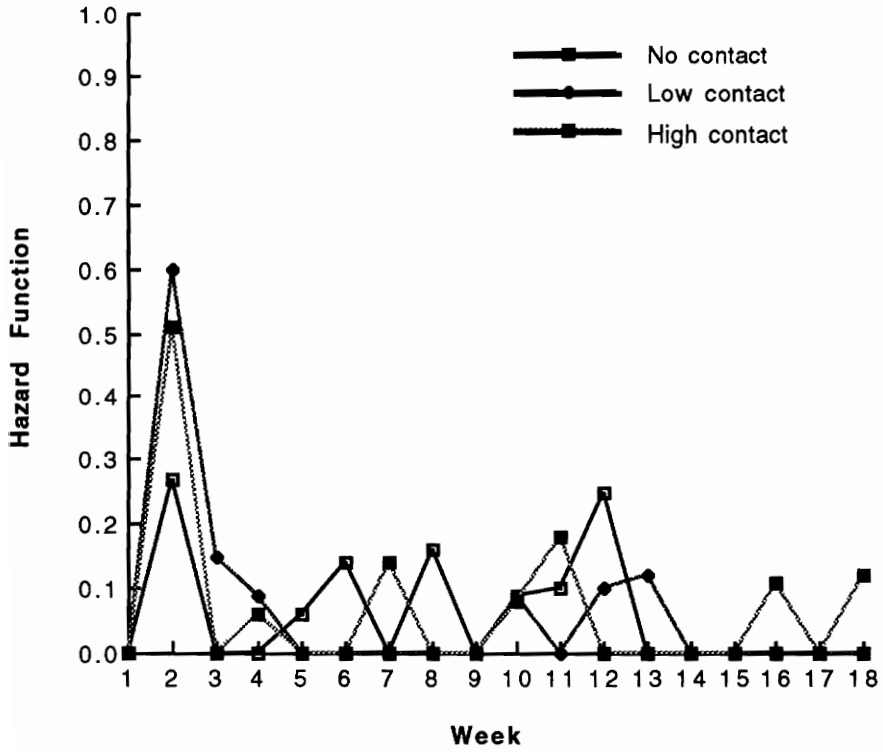
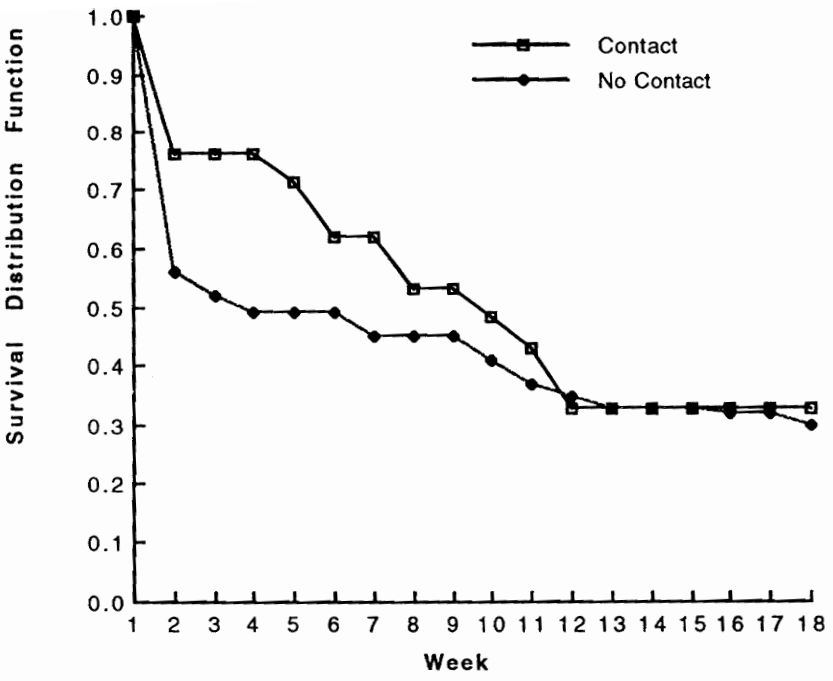


Figure 8. Survival and hazard functions for Dead 1 by frequency of contact.



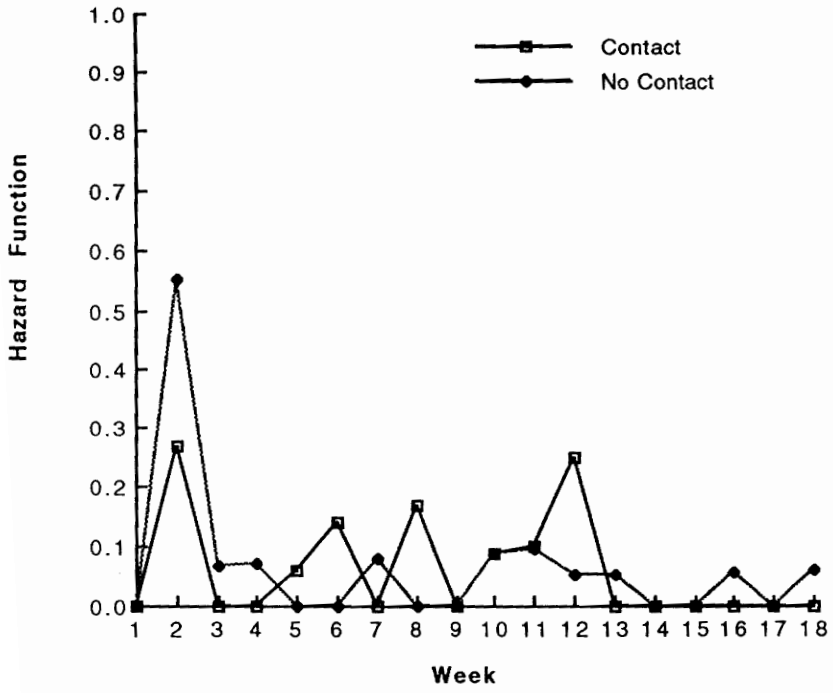


Figure 9. Survival and hazard function for Dead 1 by contact.

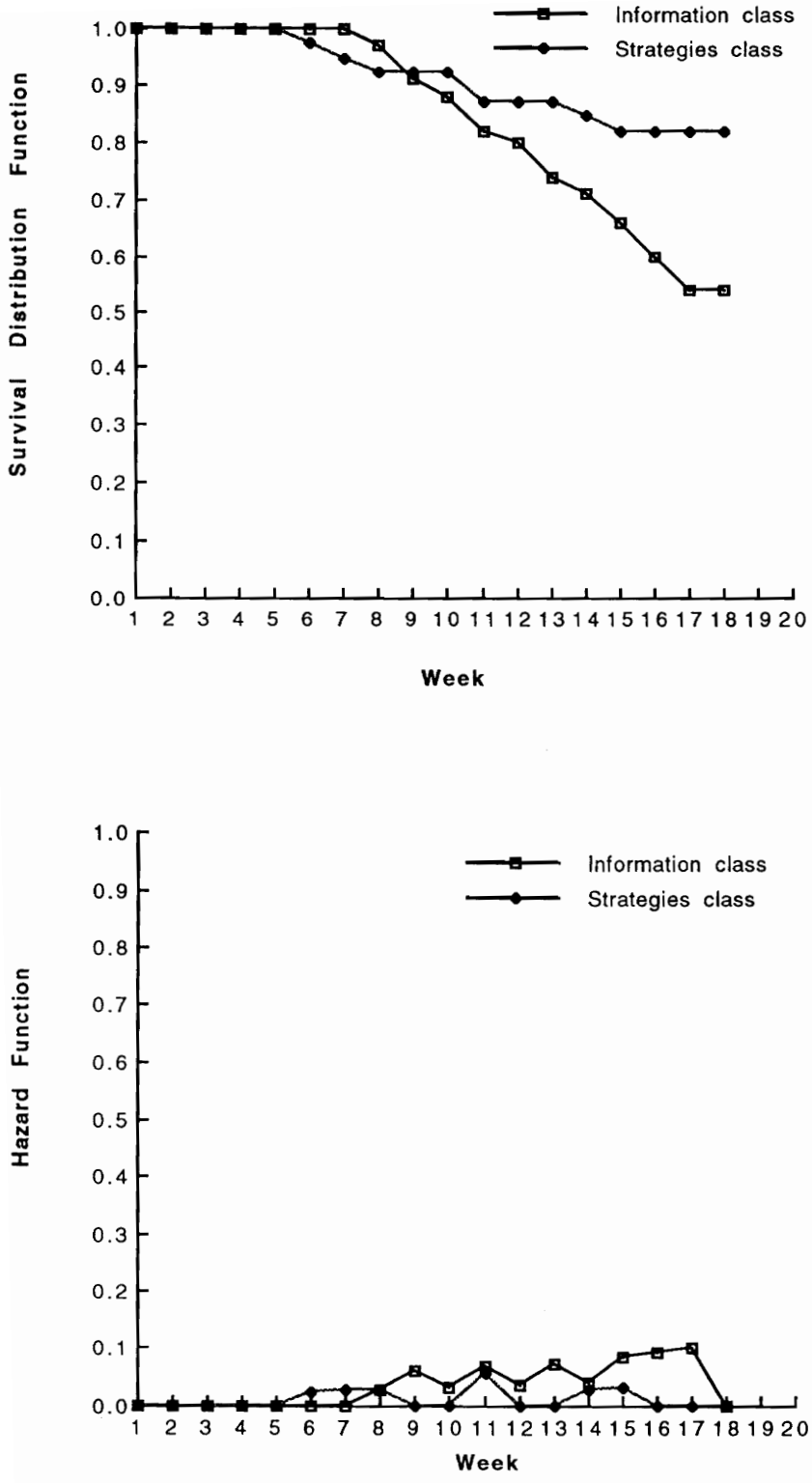
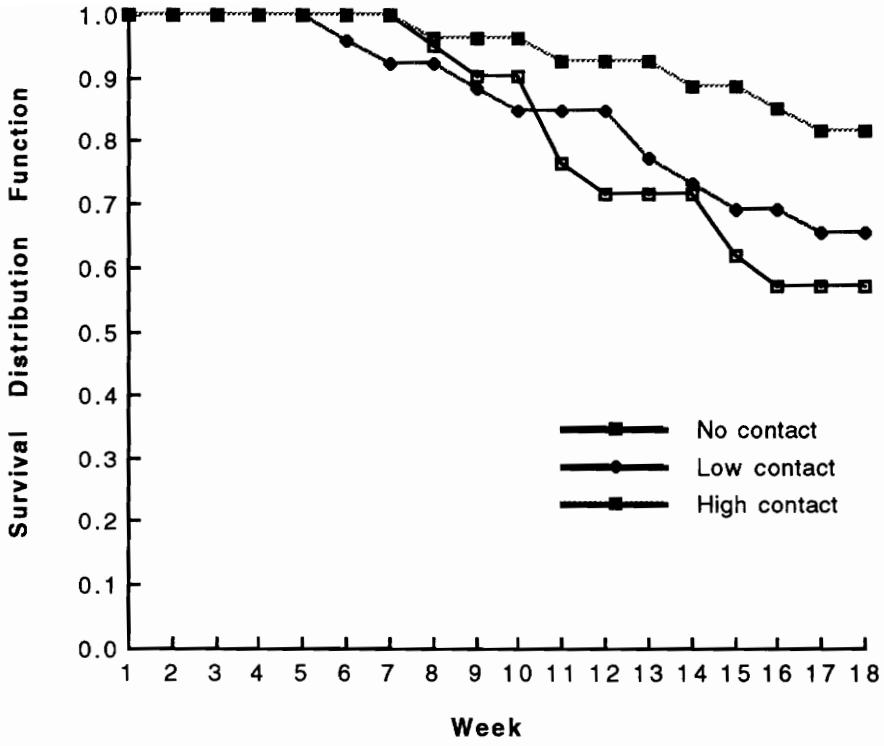


Figure 10. Survival and hazard functions for Dead 2 by class.



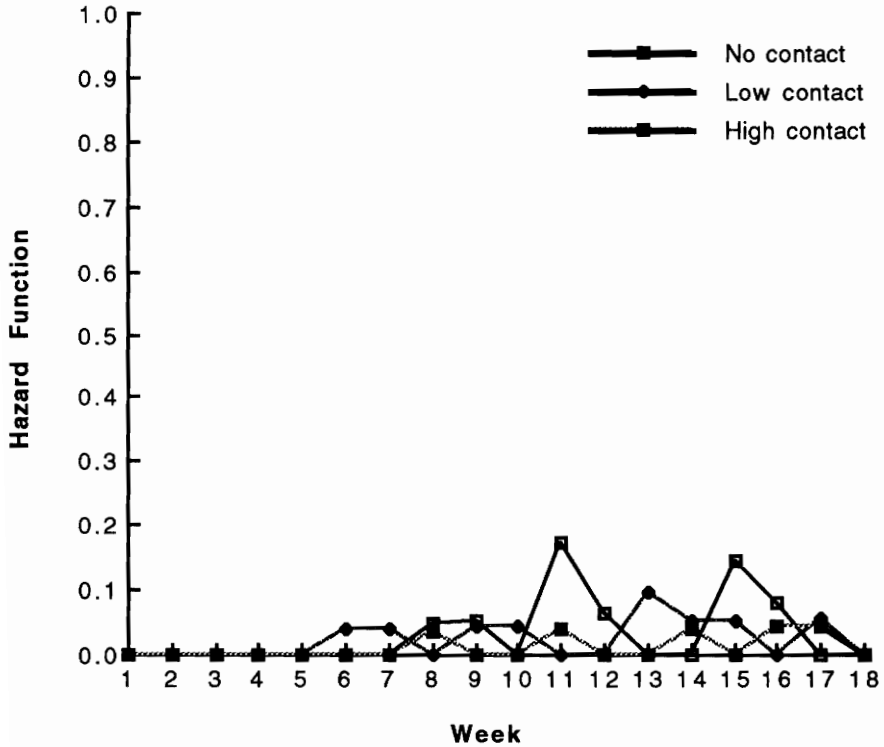
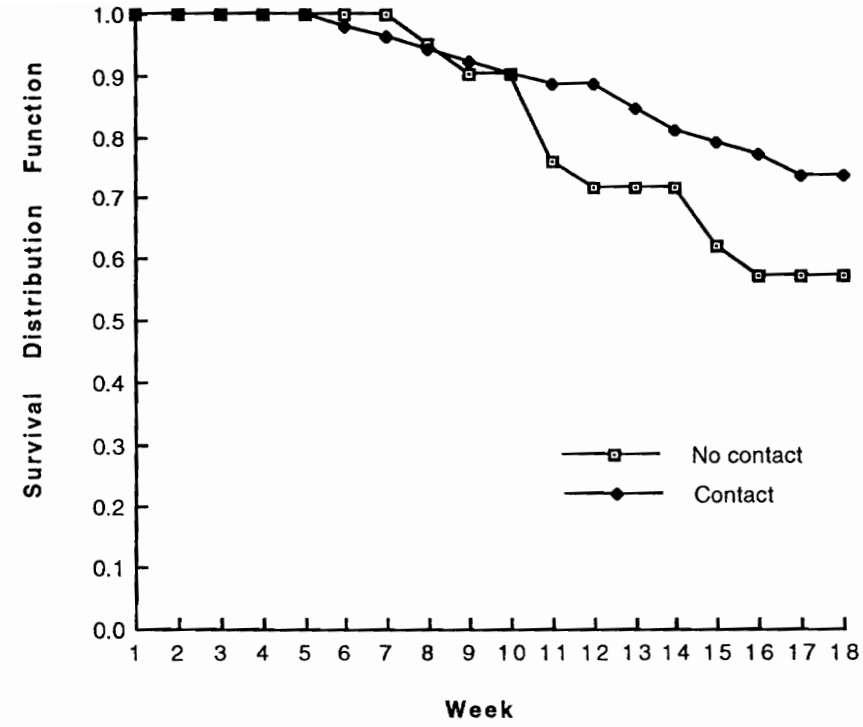


Figure 11. Survival and hazard functions for Dead 2 by frequency of contact.



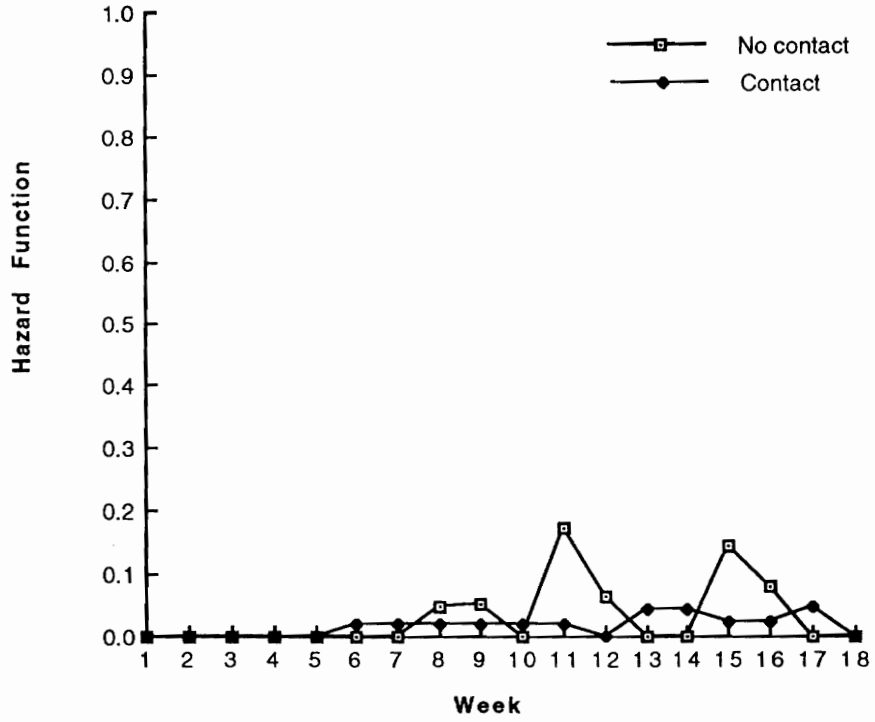
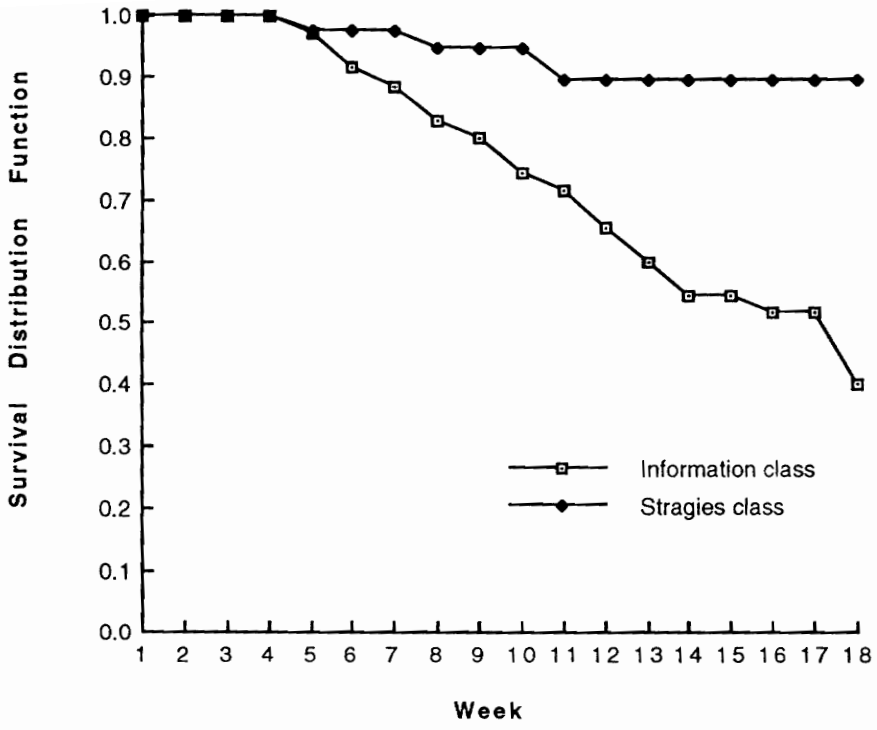


Figure 12. Survival and hazard functions for Dead 2 by contact.



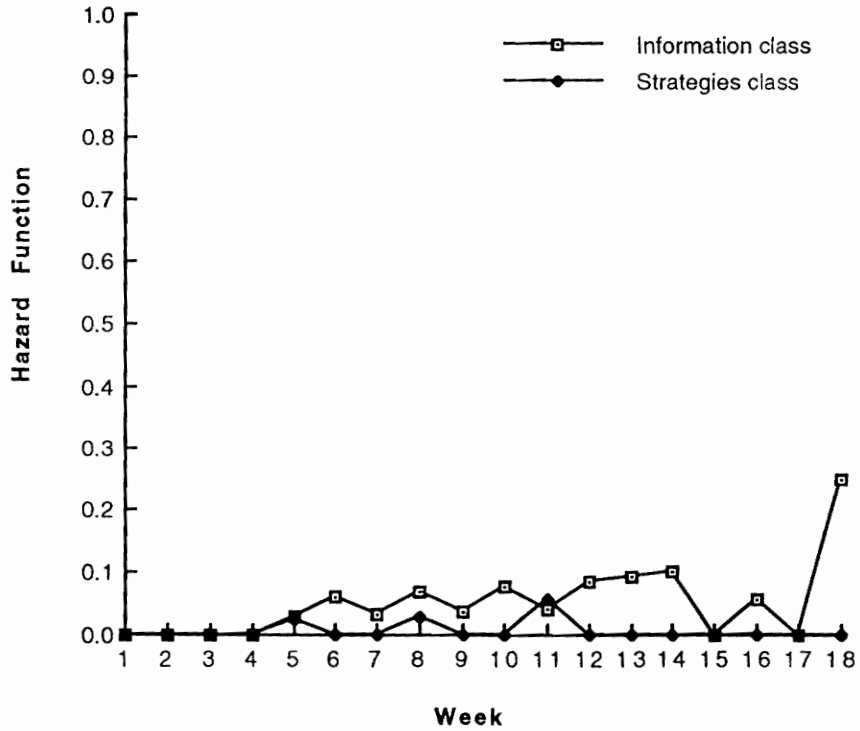
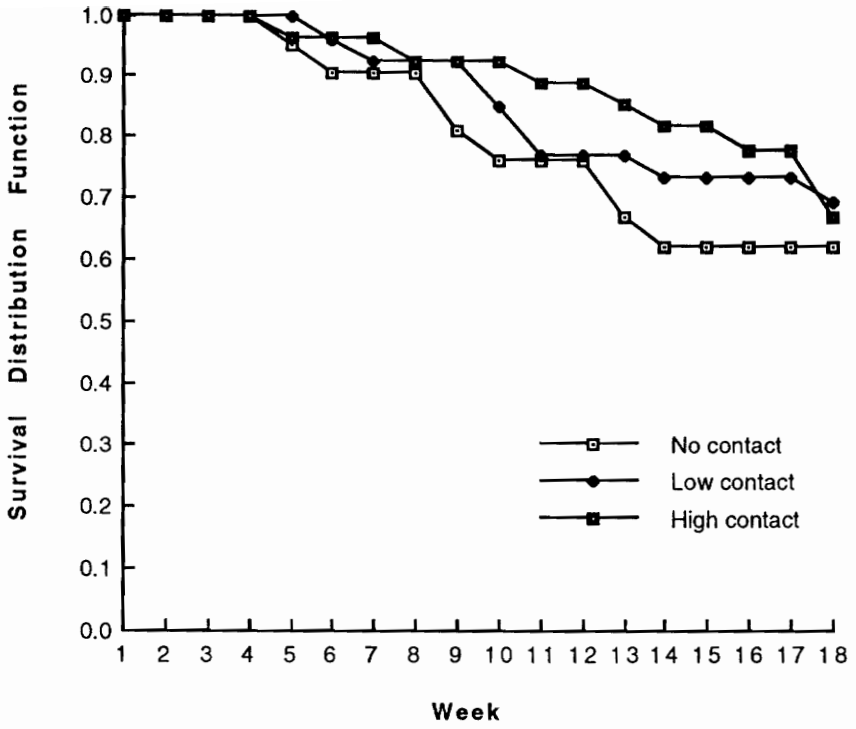


Figure 13. Survival and hazard functions for Dead 3 by class.



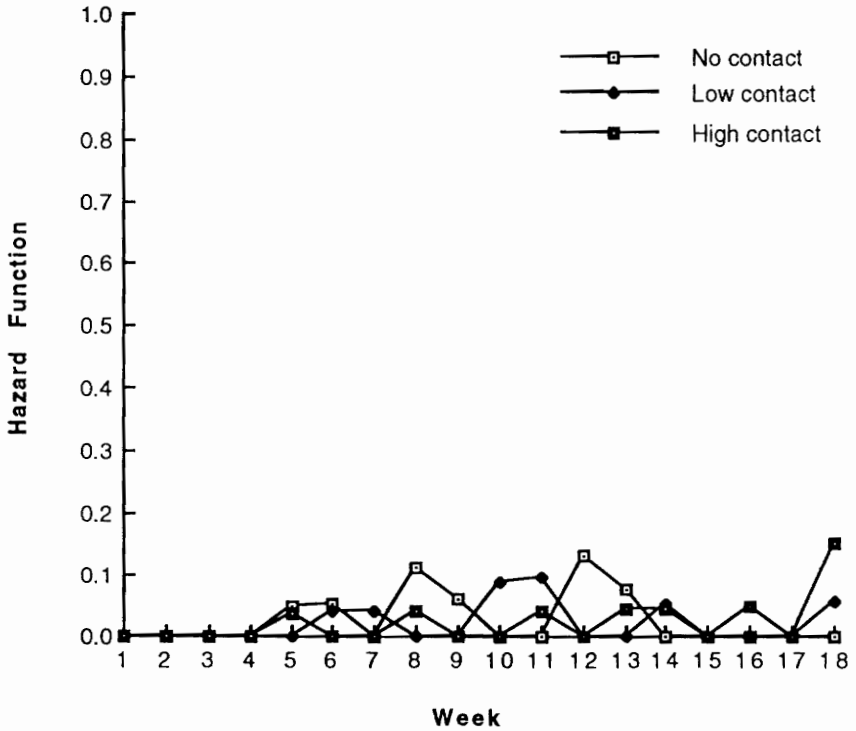
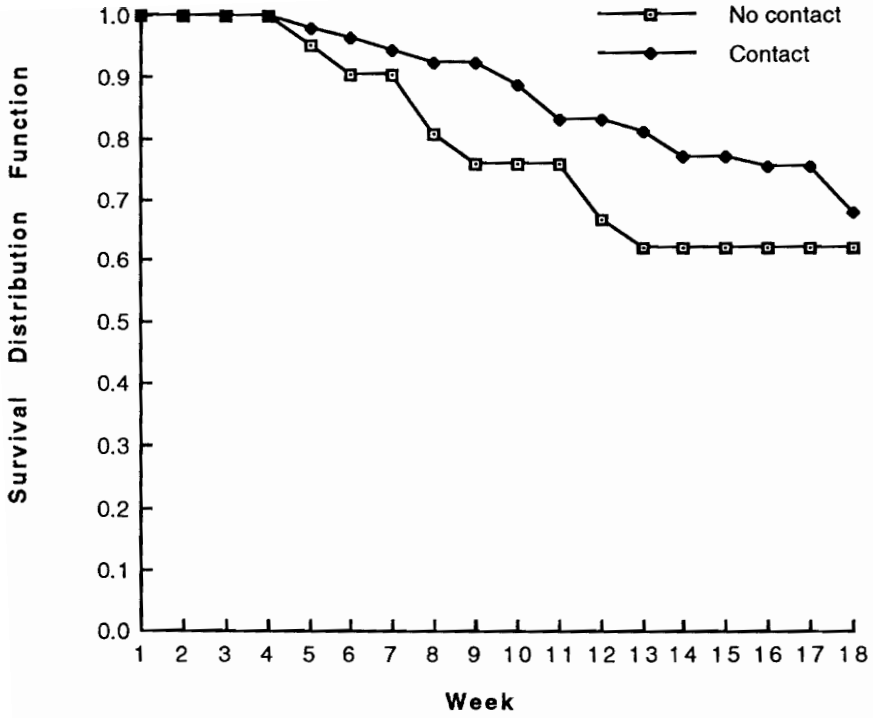


Figure 14. Survival and hazard functions for Dead 3 by frequency of contact.



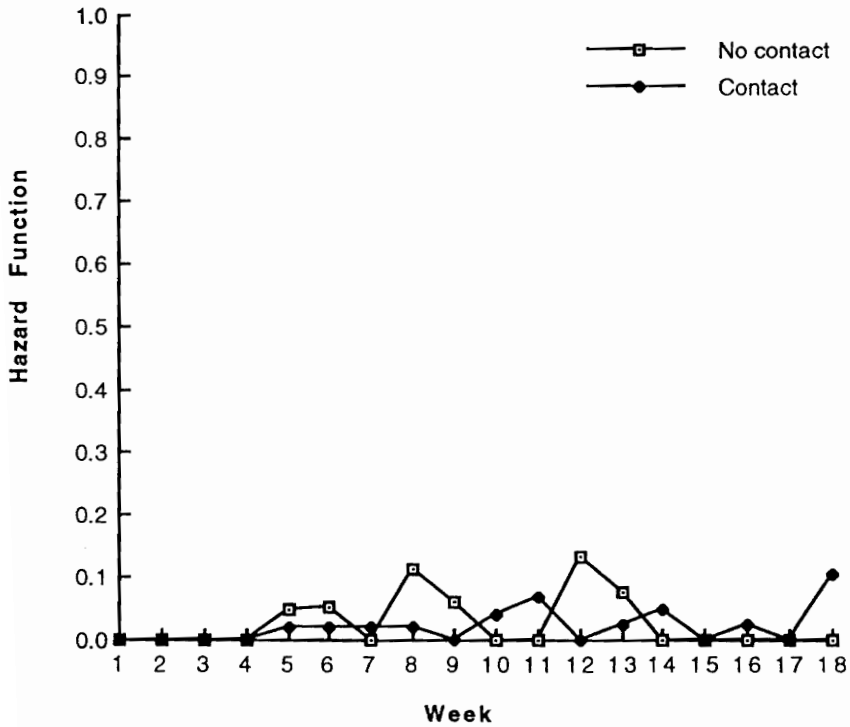


Figure 15. Survival and hazard functions for Dead 3 by contact.

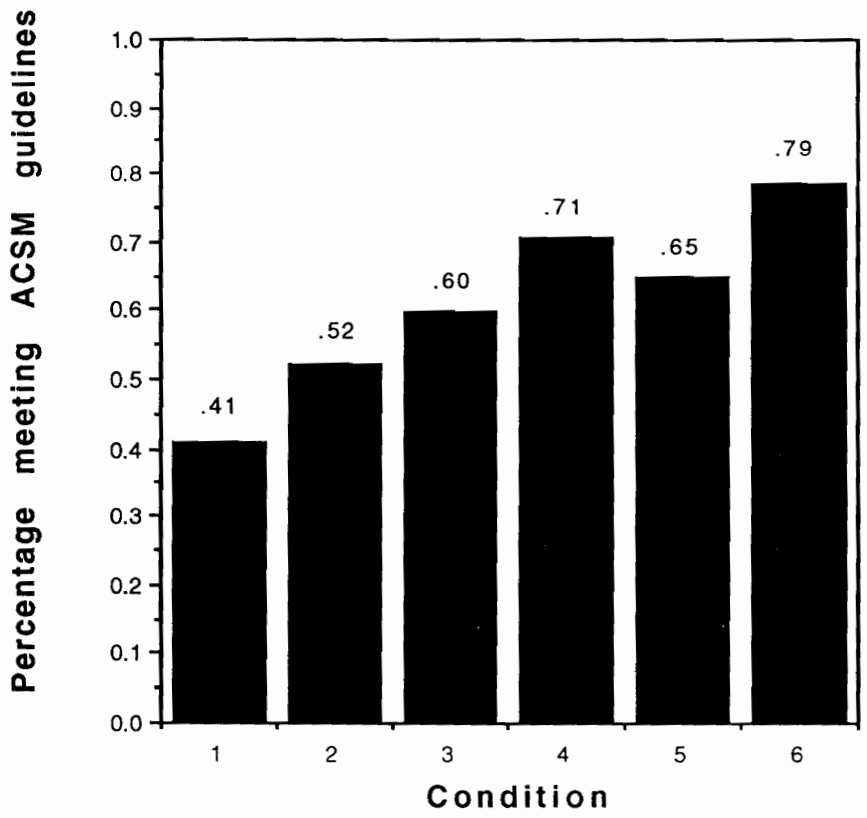


Figure 16. Percentage of individuals meeting ACSM guidelines including "dropouts" by condition for weeks 1-16 including follow-up.

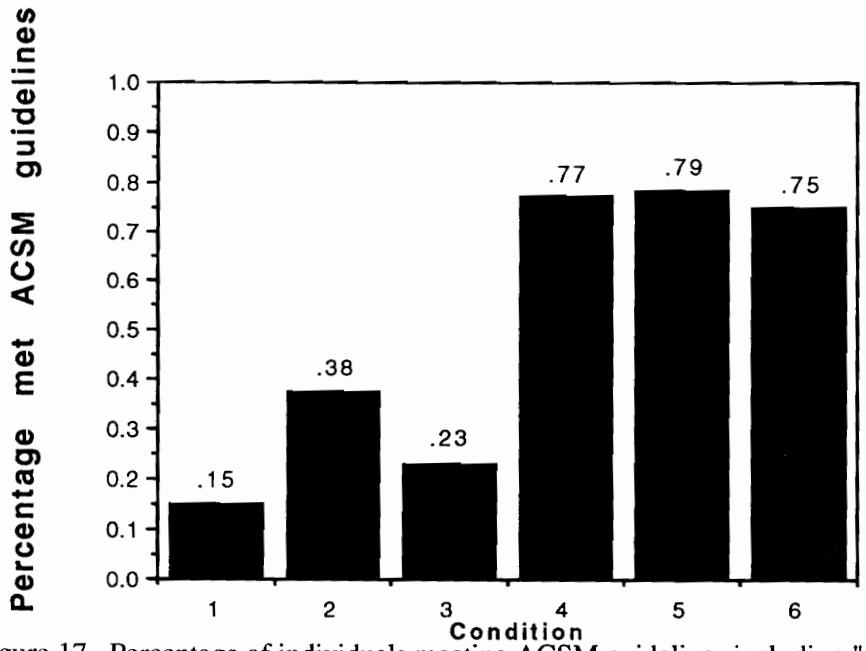


Figure 17. Percentage of individuals meeting ACSM guidelines including "dropouts" by condition for weeks 21 and 22 (follow-up).

Appendix A

Dear Patient:

As you know preventing illness is better than treating illness. One important component of preventing illness is to sustain an adequate level of physical activity. Many people start exercise programs or lifestyle changes but for one reason or another, are unable to sustain them over time. This problem is the focus of a project directed by Tamara N. Lombard, from the Center for Research in Health Behavior, Department of Psychology at Virginia Tech.

Your participation in this project may be helpful in supporting your adoption and maintenance of an adequate level of physical activity to promote your good health. This activity does not only include aerobic activity but all forms of activity. One method of the study is to incorporate activity patterns within a persons lifestyle so that it can be sustained.

There would be few demands on your time and no cost for participation in this project. You will learn new information about exercise and activity levels. If you are interested in participating, please call Tamara N. Lombard at 231-8747. Calling does not obligate you to participate. But, calling will enable you to find out more about the project.

Best wishes,

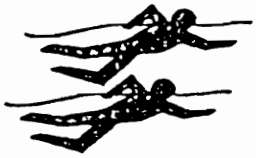
William T. Hendricks, M. D.

Appendix B

EXERCISE FOR EVERYONE!!!!

A FREE exercise program is being offered for all :

Faculty
Staff
Graduate Students
and
Family



by the Center for Research in Health Behavior and the Department of Psychology at Virginia Tech

The program offers you:

Information on how to START exercising and how to KEEP exercising
Walking Maps of Campus and Other Areas
Ways to FIT exercise into YOUR lifestyle!
Individualized, Personalized Feedback on your progress
Several Possible Health Benefits:
Reduced Risk for Heart Disease, Diabetes, Colon Cancer, Osteoporosis and Lower Cholesterol Levels

All staff are trained in the best techniques to start you exercising and keep you exercising

For more Information or to Sign-up please call the Project Director,
Tamara Lombard at 231-6275

Exercise Program Tamara Lombard 231-6275
Exercise Program Tamara Lombard 231-6275
Exercise Program Tamara Lombard 231-6275
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Exercise Program Tamara Lombard 231-6275

Appendix C

Consent Form
Physical Activity Promotion Program

Description

The purpose of this study is to help you begin and maintain a physical activity program for four months. As a participant in this project, you will be provided with up-to-date information, guidance, and support to help you meet exercise goals. Also, a number of strategies from psychology and health behavior change will be employed to help you increase your exercise levels to 20 to 30 minutes a day for 4 times per week for any type of physical activity you prefer.

Your participation in this study will last four months and include the following responsibilities:

1) attending a 30 minute initial meeting with the program staff,
2) attending a 1 hour 30 minute "program meeting" with the program staff, and
3) keeping and sending in weekly exercise logs

Risks and Benefits

Participation in this physical activity program may produce certain discomforts (e.g., stiff muscles, minor join pain, and shortness of breath) and may not be advisable for some individuals. If on your survey entitled "PARQ" you answered YES to any item, you should consult a physician, at your own cost, before beginning this program. Your physician, Dr. Hendricks is consulting on this project and you may consult him or another physician of your choice. Please bring a letter from the physician noting his/her recommendation and any possible limitation you may have so we can give you the best program possible.

The discomforts most likely to occur after beginning a physical activity program are "stiff" muscles, minor joint pain, and shortness of breath. If participants follow the program goals, risk of these problems and any others will be minimized. If any problems do occur, the program director has the names of physicians who specialize in sports injuries who you can see at your own monetary cost. Please notify the director of any and all health problems you feel! The "NO Pain, No Gain" motto is not part of this program!

The possible benefits from this program include increased stamina and muscle tone, decreased body fat and weight, and decreased risk for coronary heart disease, hypertension, non-insulin dependent diabetes, and colon cancer. Many people who exercise regularly also state the benefit of reduced stress and overall happier moods. Long-term benefits include a decreased risk for a number of chronic diseases such as heart disease and certain site cancers.

Informed Consent

I understand that my data will be held confidentially and will be used for research purposes only, without revealing my name. I understand that I may abstain from participation in any part of this study or withdraw from the experiment at any time.

I understand that it is my personal responsibility to advise the program director of any preexisting or presently occurring medical conditions that may affect my participation in this program. I understand that if initial screening suggests I seek medical consultation I must obtain written approval from my physician before I begin this program. I understand medical referral will be given to me if I request. I understand that all visits to physicians or any other medical settings will not be paid for by this project. I understand I will have to cover all my personal medical expenses during this project.

I understand this project requires me to perform mild to moderately intense exercise. Although the risk for injury is minimal, I agree not to hold Virginia Polytechnic Institute and State University or the Project Director responsible for any injuries or financial costs resulting from my participation in this project.

To the best of my knowledge, I do not now, and have not in the past, had any medical or psychological problems or disorders that would negatively affect my participation in the research as described.

I am not on any medications. If I am, I have informed the project director.

I have read the above statements and have had the opportunity to ask questions. I understand that the researcher will, at any time, answer my inquiries concerning the procedures used in this project in a truthful and straightforward manner.

I understand that this research program has been approved by the Psychology Department's Human Subjects Research Committee, and that any questions I may have about the project should be directed to the program director, Tamara Lombard (231-8746), Dr. Richard Winett (231-8746) or Dr. Joseph Franchina, Chairperson, Human Subjects Committee (231-6520) or Institutional Review Board Director, Dr. Janet Johnson (231-5712).

I, _____, have read and understood the above information about the research project described. I hereby agree to voluntarily participate under these conditions.

Date _____
Participant Signature_____
Witness_____

Appendix D

The Physical Activity Readiness Questionnaire

PAR-Q is designed to help you help yourself. Many health benefits are associated with regular exercise, and the completion of PAR-Q is a sensible first step to take if you are planning to increase the amount of physical activity in your life.

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

Common sense is your best guide in answering these few questions. Please read them carefully and circle the YES or NO for each question as it applies to you.

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

If you answered YES to one or more questions:

If you have not recently done so, consult with your personal physician by telephone or in person **BEFORE** increasing your physical activity and/or taking a fitness test. Tell him or her what questions you answered YES.

After a medical evaluation, seek advice from your physician as to your suitability for:

- unrestricted physical activity, probably on a gradually increasing basis or
- restricted and supervised activity to meet your specific needs, at least on an initial basis. Check in your community for special programs or services.

If you answered NO to all questions:

If you answered the questions on the PAR-Q accurately, you have reasonable assurance of your present suitability for:

- A GRADUATED EXERCISE PROGRAM--A gradual increase in proper exercise promotes good fitness development while minimizing or eliminating discomfort.
- AN EXERCISE TEST--Simple tests of fitness may be undertaken if you so desire.

Postpone exercise or exercise testing:

- If you have a temporary minor illness, such as a common cold.

Appendix E

Exercise History and Demographic Questionnaire

Please answer the following questions.

Name: _____ Age: _____ Gender : _____

Weight : _____ Height : _____

Office Phone : _____ Home Phone : _____

Department : _____

Marital Status : (Please circle one) Married Divorced Single Widowed

Number of Children : _____

Are you presently on any medications? YES NO

If you are on any medications, please list them:

1) _____ 2) _____ 3) _____

Do you smoke? YES NO

If you do smoke, how many packs a day? _____

Appendix F

Stages of Change Questionnaire

If the following statements are true about you, please circle TRUE. If the statement is not true, please circle FALSE.

1)	I am not thinking about beginning any kind of exercise program.	TRUE FALSE
2)	I am thinking about beginning an exercise program.	TRUE FALSE
3)	I've decided to begin an exercise program, but haven't started yet.	TRUE FALSE
4)	I've recently began an exercise program.	TRUE FALSE
5)	I have been exercising for at least 6 months.	TRUE FALSE
6)	I have started exercise programs in the past, but have never been able to stick with them.	TRUE FALSE
7)	I find it easy to maintain an exercise program for periods of months.	TRUE FALSE
8)	I exercise only once or less a week.	TRUE FALSE
9)	I exercise only on weekends.	TRUE FALSE
10)	I exercise only between two to three times a week.	TRUE FALSE
11)	I exercise four or more times each week.	TRUE FALSE
12)	I generally find exercising boring.	TRUE FALSE

Appendix G

Weekly Activity Log

Name: _____ Week: _____

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Date							
Activity							
Time (minutes)							

Did you change activity? YES NO

If YES, Why?

Comments:

Please send this log each week to Tamara Lombard, Department of Psychology (0436) through campus mail. If you have any questions, please feel free to call the program director, Tamara Lombard at 231-8747 or 231-6275 at the Center for Research in Health Behavior.

Appendix H

Dear Exerciser,

Congratulations on your progress with the "Exercise for Everyone" program!! Exercisers are performing many different activities ranging from mowing their lawn to horseback riding to aerobics and walking. In addition, it seems we have some heavy duty gardeners and housecleaners!! Keep up the great work.

Several people in our program have asked me for suggestions on how to handle some difficulties that occur during the summer months and during an exercise program in general. So, I thought I'd offer some suggestions on how to deal with these concerns.

*** What If Friends or Family Are Coming For Vacation?**

You could have them exercise with you. For example you could take them on a walking tour of areas around Blacksburg or wherever you live. You could try to set aside 10 to 15 minute periods to walk or garden. Although this may not be as long as you usually exercise, remember, some is better than none. Sometimes it is helpful to explain to guests your exercise schedule and how important it is to you to keep to it! Also, you may enjoy a break from your guests!

*** What Should I Do If I Am Going Out of Town?**

Check your hotel for maps of the local area. Many hotels frequently have walking maps of areas near and around the hotel and other areas of interest in their town. Take walks with the friends or family you are visiting. Your hotel may have an indoor gym with exercise equipment or the people you are visiting may be members of a gym or club. Also, most clubs or gyms offer one day passes, often at nominal cost. Sometimes trying some new equipment, like a rowing machine or ski machine, can be fun and add a little variety.

*** What About My Exercise Goals During Vacation?**

If you can reach your goals during vacation **Great**. But don't stop exercising because you think you may not be able to reach your goal. Remember, simply exercising once a week can give you significant health benefits.

*** Should I Send in My Activity Log During Vacation?**

Yes. Just send it in when you get back from your wonderful vacation. Also, you can send in any old logs you haven't had a chance to send in.

***OOPS! I Forgot to Send in My Logs or OOPS! I Haven't Had a Chance to Exercise!**

Send those logs in anyway! Sometimes you can back track and record what you have done. It is a helpful strategy to mail the logs in even when you haven't done anything to at least "keep in mind" your exercise goals.

***I'm Getting a Little Bored With My Routine**

It is easy to get bored with your program and unfortunately this is when most people drift away" from exercise. You can spice up your regular schedule by varying the scenery or setting different goals. For example, if you walk, try a different path or set a goal to get to a certain landmark in a certain period of time. Another way is to change your activity, or add some other activity in. You can vary your schedule by trying different activities on different days. Or enroll in a class teaching a different activity, you learn a new form of exercise and maybe make a new friend!

Keep Up the Great Job! As Always, Please Feel Free To Call Me Anytime At 231-6275

Tamara Lombard

Appendix I

Dear Participant,

We are coming to the end of the initial four month phase of our exercise program. Everyone has done an excellent job of getting out and exercising. We also appreciate the great job everyone has done in sending in the weekly activity logs.

*** What's Different Now That The First 4 Months Are Over?**

First of all can you believe it's been four months! Secondly, nothing is really different, except that you are really and truly on your own. Keep exercising, set your own goals and keep it up!

*** What If I have A Problem? Can I Call You?**

YES! You are always free to call us at anytime to ask questions or tell us of a problem you may be having. Our number is 231-6275. If we are not in when you call, please leave a message and we will get back to you as soon as possible.

*** Should I Continue To Send In My Weekly Activity Logs?**

Keep sending them in until September 1st. After September 1st, you do not need to send them in each week. We will be sending out follow-up logs for you to fill out a few times over the next year.

*** What Is A Follow-Up Log?**

Three times over the next year, we will send you 2 weekly activity logs we would like you to fill out. This will give us information on how well people are doing 1 month, 6 months, and even a year later. We really appreciate you taking the time to fill out and send in these follow-up logs. We will send the first follow-up log to you October 1st.

*** What If I Already Dropped Out Of The Program? Should I Still Send In Follow-Up Logs?**

YES! We realize some participants have dropped out of the program. But, we believe it is important to follow-up with those who drop out to see if they have started any other exercise programs. If at all possible, we would still like you to send in the weekly logs that we send to you.

***What if I haven't sent in my logs for a while!**

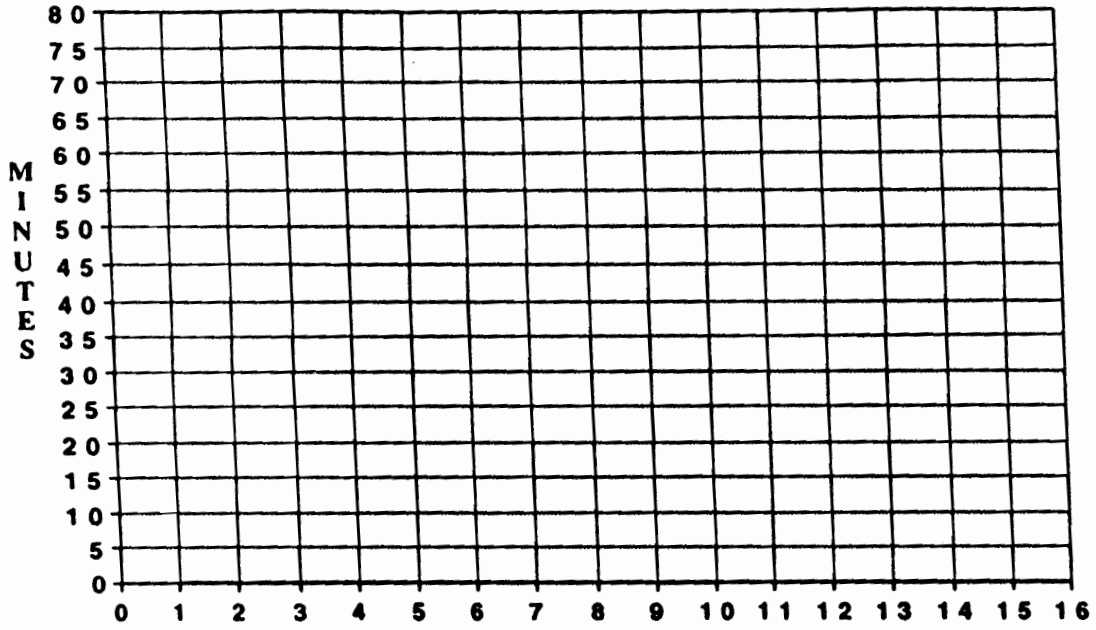
Still send in your follow-up logs. Ideally we would appreciate it if you could "back-track" and send in the logs we are missing. This would help the program greatly. As always, even if you haven't exercised, it is O.K. and important to send in your forms. Sending in your forms keeps reminding you to exercise!

I Hope You Are Enjoying your Exercise. As Always, Please Feel Free To Call Anytime At 231-6275.

Tamara Lombard and the Exercise Program Staff

Appendix J

Physical Activity Log



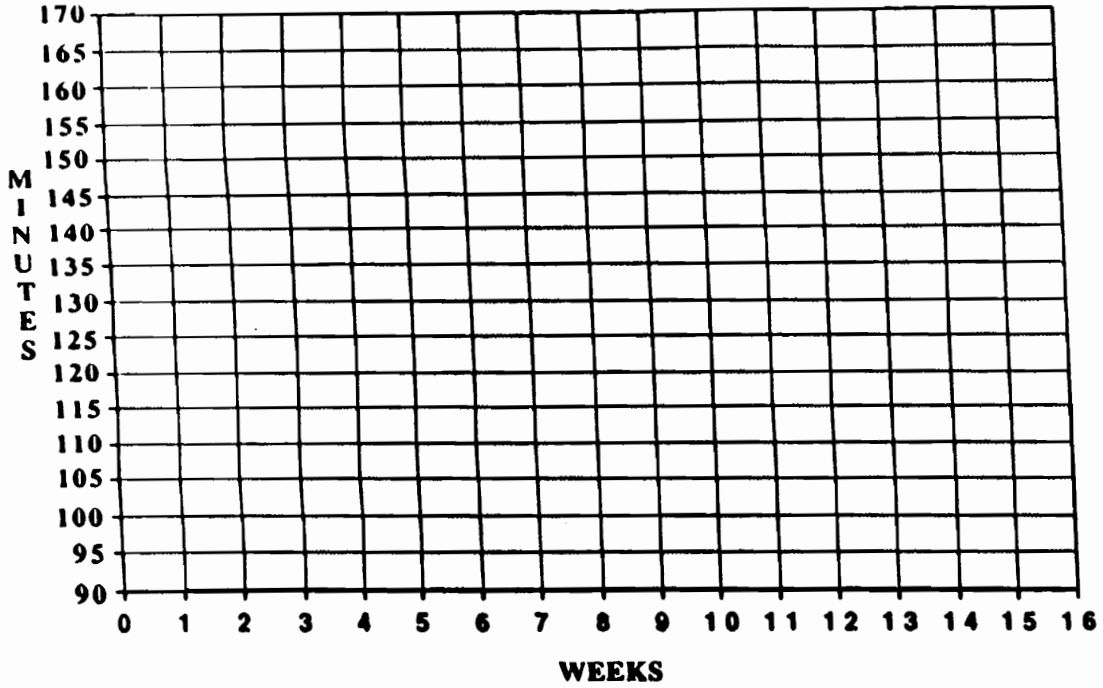
GOALS

	Achieved	Reward		Achieved	Reward		Achieved	Reward		Achieved	Reward
Week 1	_____	_____	Week 5	_____	_____	Week 9	_____	_____	Week 13	_____	_____
Week 2	_____	_____	Week 6	_____	_____	Week 10	_____	_____	Week 14	_____	_____
Week 3	_____	_____	Week 7	_____	_____	Week 11	_____	_____	Week 15	_____	_____
WEEK 4	_____	_____	WEEK 8	_____	_____	WEEK 12	_____	_____	WEEK 16	_____	_____

OVERALL GOAL _____

Possible Rewards

Physical Activity Log



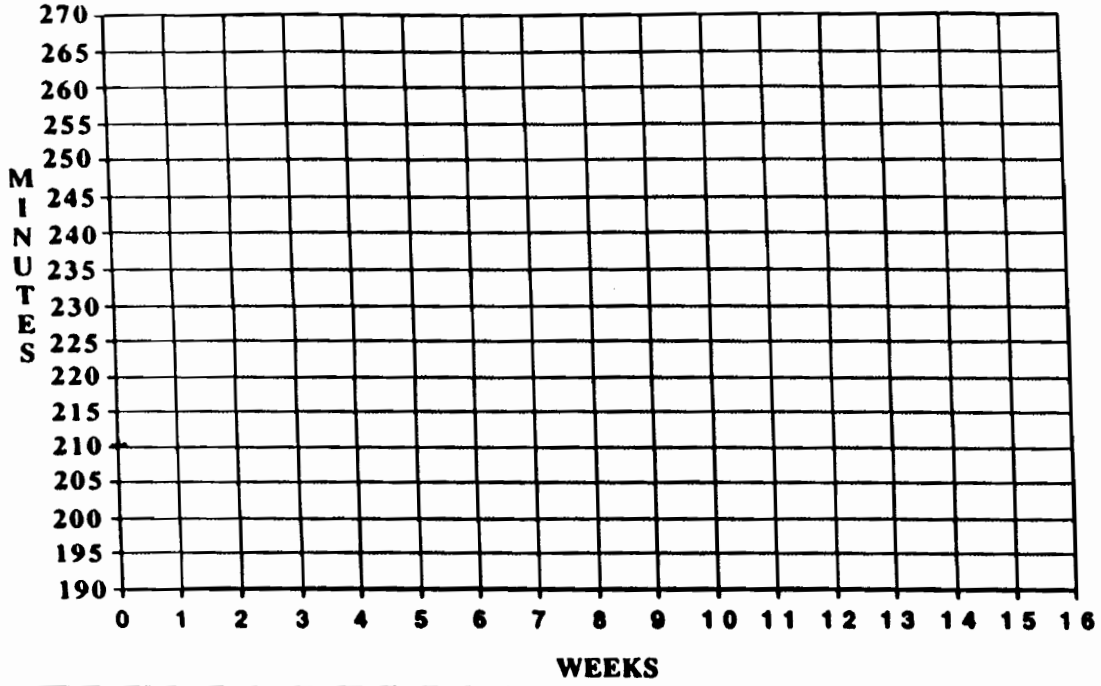
GOALS

	Achieved	Reward		Achieved	Reward		Achieved	Reward		Achieved	Reward
Week 1	_____	_____	Week 5	_____	_____	Week 9	_____	_____	Week 13	_____	_____
Week 2	_____	_____	Week 6	_____	_____	Week 10	_____	_____	Week 14	_____	_____
Week 3	_____	_____	Week 7	_____	_____	Week 11	_____	_____	Week 15	_____	_____
WEEK 4	_____	_____	WEEK 8	_____	_____	WEEK 12	_____	_____	WEEK 16	_____	_____

OVERALL GOAL _____

Possible Rewards

Physical Activity Log



GOALS

	Achieved	Reward		Achieved	Reward		Achieved	Reward		Achieved	Reward
Week 1	_____	_____	Week 5	_____	_____	Week 9	_____	_____	Week 13	_____	_____
Week 2	_____	_____	Week 6	_____	_____	Week 10	_____	_____	Week 14	_____	_____
Week 3	_____	_____	Week 7	_____	_____	Week 11	_____	_____	Week 15	_____	_____
WEEK 4	_____	_____	WEEK 8	_____	_____	WEEK 12	_____	_____	WEEK 16	_____	_____

OVERALL GOAL _____

Possible Rewards

Appendix K

As you are continuing to exercise on a regular basis you may have noticed your barriers to exercise have changed. Here is a quick worksheet designed to help you brainstorm ways to overcome your new barriers (or you may need to brainstorm an old one!)

My Barrier for Exercise is:

_____

First list four potential solutions

Then list Good points and Bad points for each solution

1. _____

Good _____

_____

Bad _____

_____

2. _____

Good _____

_____

Bad _____

_____

3. _____

Good _____

_____

Bad _____

_____

4. _____

Good _____

_____

Bad _____

_____

Pick the solution that works best for you

_____

Make a plan

_____

_____

_____

Anticipate difficulties

_____

_____

Appendix L

Phone Contact Sheet

Participant: _____ Caller: _____

Date: _____ Duration of Call: _____

1) How is your activity program going?
2) Are you having any problems?
3) Do you have any questions?
4) "Do you need any more activity log forms?" YES NO

CURRICULUM VITA
April, 1994
TAMARA NEUBAUER LOMBARD

PERSONAL INFORMATION

Birthdate:	September 18, 1966
Birthplace:	Cincinnati, Ohio
Marital Status:	Married
Work Address:	89th Med Group/SGHAB 1040 Boston Rd. Andrews AFB, MD 20331
Work Phone:	(301) 981-7186
Home Address:	6505 Sunburst Way Alexandria, VA 20331
Home Phone:	(703) 922-7014

EDUCATION

August 1993-present

United Stated Air Force
Malcolm Grow Medical Center
Andrews AFB, MD
Clinical Internship
Mentor: Dr. Walker S.C. Poston

December 1990-present

Virginia Polytechnic Institute and State University
Blacksburg, Virginia
Doctoral program
Area of Specialization: Clinical Health Psychology
Major advisor: Dr. Richard A. Winett
Dissertation: Increasing and maintaining physical activity: Effects of telephone prompting and self-control strategies
Chair: Dr. Richard A. Winett

September 1988-December 1990

Virginia Polytechnic Institute and State University
Blacksburg, Virginia
Masters program
Area of Specialization: Clinical Health Psychology
Major advisor: Dr. Richard A. Winett
Thesis: Cholesterol Reduction in Men: An Experimental Investigation of Intensive Treatment with Frequent Feedback versus a Simple Educational Treatment
Chair: Dr. Richard A. Winett

September 1984-
April 1988

University of Michigan
Ann Arbor, Michigan
B.A. awarded April 1988
Concentration: Psychology

POSITIONS HELD

January 1993-
July 1994

Co-Principal Investigator
2 year Community Skin Cancer Prevention Program
American Cancer Society Grant
Center for Research in Health Behavior
Blacksburg, Virginia
Duties: Co-wrote submitted grant, coordinate direction and implementation of the project

August 1992-
May 1993

Instructor
Psychology of Personality
Department of Psychology
Virginia Polytechnic Institute and State University
Supervisor: Dr. Ellie Sturgis
Duties: Full teaching responsibility for undergraduate course in Personality (100 students)

January 1992-
May 1992

Instructor
Abnormal Psychology
Department of Psychology
Virginia Polytechnic Institute and State University
Supervisor: Dr. Joseph Sgro
Duties: Full teaching responsibility for undergraduate course in Abnormal Psychology (150 students)

August 1991-
December 1991

Graduate Teaching Assistant
Human Intelligence Assessment
Department of Psychology
Virginia Polytechnic Institute and State University
Supervisor: Dr. Ross Greene
Duties: Teach intelligence and achievement assessment instruments to first year graduate students including: WAIS-R, WISC-R, Woodcock Johnson, PPVT-R, Stanford-Binet, WPPSI, VMI. Observe and evaluate students performance in test administration, scoring and test interpretation and report writing.

November 1990-
May 1993

Graduate Research Assistant
Community Intervention to Reduce AIDS Risk Behavior
NIMH grant
Center for Research in Health Behavior
Department of Psychology, Blacksburg, VA
Supervisor: Dr. Richard A. Winett
Duties: Conduct AIDS prevention intervention groups and data collection when needed

December 1990 -
August 1991

Graduate Project Assistant/Project Director
Family Media Approach to AIDS Prevention
NIMH grant
Center for Research in Health Behavior,
Department of Psychology, Blacksburg, VA
Supervisor: Dr. Eileen Anderson
Duties: Coordinate and direct all aspects of program: video production, assistant hiring, participant recruitment, data collection, program implementation.

January 1991 -
May 1991

Graduate Teaching Assistant
Psychology of Personality
Department of Psychology
Virginia Polytechnic Institute and State University
Supervisor: Dr. Joseph Sgro
Duties: Assist course instructor by grading students papers and teaching course when needed

September 1990-
December 1990

Graduate Research Assistant
Family Media Approach to AIDS Prevention.
NIMH grant
Center for Research in Health Behavior, Department of Psychology, Blacksburg, VA
Supervisor: Dr. Eileen Anderson
Duties: Assist in video production, recruitment and hiring of data collectors and program implementors, program development and implementation

May 1989-
September 1990

Project Director
Graduate Project Assistant
Nutrition for a Lifetime
National Cancer Institute grant
National Institute of Health
Center for Research in Health Behavior, Department of Psychology, Blacksburg, VA
Supervisor: Dr. Richard A. Winett
Duties: Coordinate program implementation; participant recruitment, hiring of research assistants, data management and analyses, act as liaison between program implementation and project team; video production, program development

October 1988-
May 1989

Assistant Project Director
Nutrition for a Lifetime
National Cancer Institute grant
National Institute of Health
Center for Research in Health Behavior, Department of Psychology, Blacksburg, Virginia
Supervisors: Dr. Richard A. Winett and Dr. Jana Wagner
Duties: Assist Project director with: Coordination of program implementation; participant recruitment, hiring of research assistants, data management and analyses, act as liaison between program implementation and project team, video production, program development

September 1988-
May 1989

Graduate Teaching Assistant
Introductory Psychology
Department of Psychology
Virginia Polytechnic Institute and State University
Supervisor: Dr. Joseph Sgro
Duties: Teach 4 discussion sections (35 students/lab) of introductory psychology

October 1987-
May 1988

Undergraduate Research Assistant
Developmental Psychology
University of Michigan
Ann Arbor, Michigan
Supervisor: Dr. James P. Byrnes
Duties: Assisted in project development and implemented program designed to assess conceptual and procedural knowledge of mathematics in 4th graders.

September 1985-
May 1988

Teaching Assistant
Project Outreach
Department of Psychology
University of Michigan
Ann Arbor, Michigan
Supervisor: Dr. Stuart Seegal
Duties: Coordination of volunteers to work at either a Center for Eating Disorders or the Continuing Education Center for Women. Taught weekly discussion section related to these two centers.

HONORS, ACTIVITIES AND PROFESSIONAL AFFILIATIONS

Elected Department delegate: Graduate Student Assembly	1991-1993
American Psychological Association- Division 12	1989-present
Association for the Advancement of Behavior Therapy	1989-present
Society of Behavioral Medicine	1991-present
University of Michigan Student Recognition Award: Excellence in Peer Counseling,	1987
University of Michigan, Senior Leadership Recognition	
Order of Omega, National Honor Society	
Delta Gamma Sorority, 1984--, Ann Arbor, Michigan	
Vice President,	1986
President,	1987
Sarah Browne Smith Award,	1986
Outstanding Junior,	1987
Elaine Madden Hennan Award (Outstanding Senior),	1988
Chapter Scholarship Advisor, Blacksburg, Virginia	1989 - 1992

CLINICAL EXPERIENCE

June 1992-
June 1993

Advanced Graduate Clinician
Southwestern Virginia Mental Health Institute
Marion, Virginia
Supervisors: Richard Mears, Ph.D.
Denise Mance, Psy.D.
Duties: Acute Admission Psychological Assessment and Evaluation, Individual Psychotherapy

August 1992-
May 1992

Advanced Graduate Clinician, Supervisor
Psychological Services Center
Virginia Polytechnic Institute and State University
Supervisors: Jack W. Finney,Ph.D.
George A. Clum, Ph.D.
Duties: Individual Psychotherapy and Assessment, Supervise First and Second Year Clinical Psychology Students

January 1992-
May 1992

Group Facilitator
AIDS Prevention Project
Hollins College, Roanoke, Virginia
Supervisor: Dr. Deborah Webster
Duties: Conduct intervention groups within the all female campus

December 1991-
February 1992

Assistant Group Facilitator
AIDS Prevention Project
Wilmington, North Carolina
Supervisor: Dr. Laurie Desiderato
Duties: Conduct Intervention Groups when needed

December 1990-
February 1991

Assistant Group Facilitator
AIDS Prevention Project
Wilmington, North Carolina
Supervisor: Dr. Laurie Desiderato
Duties: Conduct Intervention Groups when needed

July 1990-
June 1991

Clinician (intern)
Center for Behavioral Medicine
(Chronic Pain)
Radford, Virginia
Supervisor: W. Bruce Walker, Ph.D.
Duties: Conduct Pain evaluations using clinical interview, assessment questionnaires and psychophysiological measures; conduct groups such as relaxation, assertiveness training, stress management, group therapy; provide inservice training, individual psychotherapy

September 1989-
July 1990

Graduate Clinician
Psychological Services Center
Virginia Polytechnic Institute and
State University
Supervisor: Richard M. Eisler, Ph.D.
Duties: Psychological assessments, Individual therapy, Couples therapy and Group therapy

September 1988-
May 1989

Graduate Clinician
Psychological Services Center
Virginia Polytechnic Institute and
State University
Supervisors: Russell T. Jones, Ph.D.
Carolyn Pickett, Ph.D.

September 1985-
May 1988

Therapist and Volunteer Coordinator
Center for Eating Disorders
Ann Arbor, Michigan
Supervisor: Judith Banker, M. A.
Duties: conduct lay therapy, coordinate groups including eating disorder groups and family and friends support groups, coordinate volunteers on hotline, conduct training for volunteers

VOLUNTEER CLINICAL PARTICIPATION

August 1990-
July 1993

AIDS Education Committee
New River Valley AIDS Coalition
Duties: Coordinate and plan community education programs

August 1990-
July 1993

AIDS Client Service Committee
New River Valley AIDS Coalition
Duties: Coordinate community services and provide "buddy" support to individuals living with HIV and AIDS

April 1992

Dealing with Test Anxiety
Slusher Dorm Presentation
Virginia Polytechnic Institute and State University
Duties: Provided information and coping strategies to students experiencing test anxiety

November 1991	**AIDS "BUDDY" Training** New River Valley AIDS Coalition, Buddy Training **Duties**: Conduct seminar on "Psychosocial aspects of living with HIV and AIDS" to individuals training to be a "Buddy"
February 1991- July 1993	**Friends for Life Support Group** New River Valley AIDS Coalition **Duties**: Co-facilitate Bi-weekly Support group for individuals who are HIV+ or diagnosed with AIDS
July 1990	**Stress Management Program: Job Stress and Coping with Difficult People** Blacksburg Municipal Building **Duties**: Conduct seminar with town employees to cope with job stressors.

PUBLICATIONS

Southard, D.R., Winett, R.A., Walberg-Rankin, J.L., **Neubauer, T.E.**, Donckers-Roseveare, Burkett, P.A., Gould, R., Lombard, D., & Moore, J.F. (1992). Increasing the effectiveness of the National Cholesterol Education Program: Dietary and behavioral interventions for clinical settings Annals of Behavioral Medicine, 14, 1, 12-20.

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EDITORSHIP

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