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An Investigation of Stage-Specific Interventions to
Encourage Exercise Adherence to Corporate Fitness Programs

by

Patricia A. Peters

A dissertation submitted to the Graduate Faculty in
Psychology in partial fulfillment of the requirements for
the degree of Doctor of Philosophy, The City University of
New York

1995

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ABSTRACT

An Investigation of Stage-Specific Interventions to
Encourage Exercise Adherence to Corporate Fitness Programs
by
Patricia A. Peters

Advisor: Professor Roger E. Millsap

Worksite exercise programs have been found to lead to many benefits. Such programs, however, have typically evidenced low rates of adherence. Prochaska & DiClemente's (1982) transtheoretical model suggests that this may be because people at different "stages of exercise adoption" (stage) may require different types of motivational programs to encourage exercise behavior. To extend upon this research, a survey was created and administered within two organizations and one academic setting to a total of 504 male and female subjects (86% between 20-39 years old) which investigated the relationship between stage and: 1) contextual features, 2) self-efficacy for exercise, 3) social support, 4) organizational culture, 5) processes of change, 6) the pros and cons of exercise, 7) theoretically-based interventions, and 8) demographic characteristics. MANOVA's followed by trend analyses indicated that subjects in later stages reported higher self-efficacy for exercise, greater social support for exercise, and greater use of 7 of

9 processes of change than did subjects at earlier stages. Subjects at later stages also reported that the pros of exercise were more important in their decision to exercise, while subjects in earlier stages reported that cons were more important. Self-efficacy enhancement, social support, and contracting interventions were differentially favored by subjects at different stages. It was concluded that people at different stages may indeed require different types of interventions to activate and maintain exercise behavior.

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TABLE OF CONTENTS

Title Page.....	i
Approval Page.....	ii
Abstract.....	iii-iv
Acknowledgements.....	v
Table of Contents.....	vi-vii
List of Tables.....	viii
List of Figures.....	ix-x
Introduction.....	1
Typical Fitness Programs in Organizations.....	11
The Problem.....	14
Context Variables.....	17
Variables influencing Exercise Adherence.....	19
Person Characteristics.....	19
Self-Motivation.....	20
Self-Efficacy for Exercise.....	22
Biological Characteristics.....	29
Need for Exercise Program.....	31
Summary of Person Characteristics.....	32
Environmental Characteristics.....	33
Social Support through Group Exercise Norms.....	33
Support of Exercise Through Organizational Culture.....	43
Activity Choice.....	50
Models of Exercise Adherence.....	52
Static Models.....	52

Process Models.....	59
The Transtheoretical Model.....	66
Areas of Intervention and Their Results.....	78
Self-Efficacy for Exercise Enhancement.....	79
Social Support through Group Exercise Norms.....	82
Contracting.....	86
Decision Balance.....	88
Goal-Setting.....	91
Rewards.....	97
Lapse Management.....	100
Summary of Interventions.....	102
Summary of Literature Review.....	102
The Present Study.....	104
Hypotheses.....	106
Method.....	108
Subjects.....	108
Measures.....	112
Procedure.....	130
Results.....	133
Discussion and Limitations.....	196
Appendix A.....	216
Appendix B.....	237
Appendix C.....	241
Appendix D.....	244
Appendix E.....	246
Bibliography.....	250

LIST OF TABLES

Table 1: The Processes of Change.....	73
Table 2: Grouping by Self-Report Stage Measure.....	117
Table 3: Grouping by Diary and Computer Measure.....	120
Table 4: Descriptive Statistics.....	135
Table 5: Comparative Fit Indices for Confirmatory Factor Analysis of the Self-Efficacy for Exercise Scale.....	146
Table 6: Standardized Factor Loadings for the Self-Efficacy for Exercise Scale.....	148
Table 7: Comparative Fit Indices for Confirmatory Factor Analysis of the Social Support Scale.....	150
Table 8: Standardized Factor Loadings for the Social Support Scale.....	151
Table 9: Means for Self-Reevaluation and Consciousness Raising.....	203

LIST OF FIGURES

Figure 1: Bandura's (1977) Model of Self-Efficacy.....	23
Figure 2: Sonstroem's (1988) Psychological Model for Physical Activity Participation.....	54
Figure 3: Becker and Maiman's (1975) Health Belief Model.....	55
Figure 4: Becker and Maiman's (1975) Model for Predicting and Explaining Compliance Behavior.....	57
Figure 5: Knapp's (1988) Stage-Based Delineation of Exercise Adherence Models.....	61
Figure 6: Davis et al.'s (1984) Model of Modifiers of Participation in Health Promotion Programs...	63
Figure 7: Horn's (1977) Personal Choice Health Behavior Model.....	65
<u>Figures for the Student Sample:</u>	
Figure 8a:Plot of Self-Efficacy for Exercise by Stage....	155
Figure 8b:Plot of Social Support by Stage.....	156
Figure 8c:Plot of Consciousness raising by Stage.....	159
Figure 8d:Plot of Dramatic relief by Stage.....	160
Figure 8e:Plot of Self-reevaluation by Stage.....	161
Figure 8f:Plot of Counterconditioning by Stage.....	162
Figure 8g:Plot of Helping relationships by Stage.....	163
Figure 8h:Plot of Reinforcement management by Stage.....	164
Figure 8i:Plot of Self-liberation by Stage.....	165
Figure 8j:Plot of Stimulus-control by Stage.....	166
Figure 8k:Plot of Pros of Exercise by Stage.....	168

Figure 8l:Plot of Cons of Exercise by Stage.....	169
Figure 8m:Plot of Self-Efficacy Enhancement Intervention by Stage.....	171
Figure 8n:Plot of Contracting Intervention by Stage.....	172
Figure 8o:Plot of Relapse Prevention Intervention by Stage.....	173
<u>Figures for the Organizational Sample</u>	
Figure 9a:Plot of Self-Efficacy for Exercise by Stage....	177
Figure 9b:Plot of Social Support by Stage.....	178
Figure 9c:Plot of Consciousness raising by Stage.....	180
Figure 9d:Plot of Self-reevaluation by Stage.....	181
Figure 9e:Plot of Counterconditioning by Stage.....	182
Figure 9f:Plot of Reinforcement management by Stage.....	183
Figure 9g:Plot of Self-liberation by Stage.....	184
Figure 9h:Plot of Stimulus-control by Stage.....	185
Figure 9i:Plot of Pros of Exercise by Stage.....	187
Figure 9j:Plot of Cons of Exercise by Stage.....	188
Figure 9k:Plot of Social Support Intervention by Stage...	190
Figure 9l:Plot of Contracting Intervention by Stage.....	191

INTRODUCTION

Exercise programs have been found to be related to improvements in both the psychological and physical health of program participants and to the economic health of organizations that support such programs.

In terms of psychological variables, exercise has been linked to decreases in anxiety and depression, to certain behavioral patterns, and to improvements in self-concept. Taylor, Sallis, and Needle (1985) represents one review of the literature documenting this relationship between exercise and mental health. They reported that "acute and chronic exercise of vigorous intensities" (p. 197) has been found to reduce state anxiety, and to have relaxation effects. Exercise also appeared to help alleviate depression in subjects suffering from mild to moderate depression, and was been linked to reductions in Type A behavior and anger, as well as to reduced physiological responses to stress. Taylor et al. reported that surveys in both Canada and the U.S. have linked exercise with reports of an improved "sense of well-being" among exercisers. Folkins (1976) lends further support to this "improvement in sense-of-self" in her report that women in exercise groups experienced an increase in self-confidence; these increases were found to be correlated with changes in fitness (cited in Taylor et al., 1985).

King, Taylor, Haskell, and DeBusk (1989) also reviewed

the literature relating physical exercise and mental health, noting that this literature has revealed the following group of effects due to exercise: enhanced mental performance and concentration, improved self-image and feelings of confidence and well-being, perceived improvement in quality of sleep, energy level, mood, and tension/stress levels, as well as decreased anxiety, depression, and hostility. However, according to King et al., this research has focused primarily upon subjects with clinical signs of depression or anxiety and has had a tendency to use cross-sectional or correlational research designs. Lacking are true experiments using normal populations to document linkages between exercise and psychological health.

Imm (1990) overcame one of these disadvantages by studying 29 "normal" employees who volunteered to participate in an aerobic fitness program. After 8 weeks of forty-five minute aerobic exercise classes, all subjects completed a 15-item questionnaire developed by the author to measure perceived psychological benefits. Subjects reported a decrease in stress, increased stamina/endurance, improvement in mood and self-concept (feelings about oneself), and moderately improved flexibility. However, this study was limited by King et al.'s (1989) second criticism of the literature; in particular, it lacked a control group. Also, there was no report of any validation of the questionnaire utilized, and there was no evidence of

any physiological effect of exercise; it is thus unclear whether subjects actually adhered to or achieved any physical benefits from exercise. While this study provides some preliminary support for the idea that exercise can promote psychological benefits in normal populations, it is by no means conclusive.

Pauly, Palmer, Wright, and Pfeiffer (1982) utilized a similar research design to study the effects of exercise in normal populations. All subjects took part in a 14-week exercise program; subjects were grouped for statistical analysis by frequency of exercise during the program. Results indicated significant improvements for all groups in terms of trait anxiety, and personal, social and physical self-concept. Again, the conclusiveness of these results is limited by the lack of a control group. A stronger limitation, however, is the fact that changes in anxiety and self-concept were unrelated to either frequency of participation in exercise or improvements in maximum oxygen uptake. It thus appears that exercise per se was not responsible for these changes.

A study by King et al. (1989) improved significantly on the research design of both Imm's (1990) and Pauly et al.'s (1982) work by randomly assigning a sample of 120 sedentary employees to either a 6-month home-based aerobic exercise program or an assessment-only control group condition. Physiological changes due to the exercise program were

calculated, revealing significant differences between treatment and experimental groups in terms of both aerobic fitness and body weight. Self-ratings of several psychological variables were taken at baseline and biweekly throughout the 6-month measurement period. Significant changes were found in only those psychological variables most directly related to exercise; in particular, subjects in the treatment condition reported greater improvement on items measuring satisfaction with current physical shape and appearance, current physical fitness level, and satisfaction with current weight than subjects in the control group. No such differences were found between the groups with respect to reported levels of sleep satisfaction, depressed mood, tension/anxiety, concentration, alertness, confidence/well-being, appetite, or stress. This study provides a more realistic view of the psychological benefits we may expect "normal" employees to derive from exercise programs.

Stronger relationships have been reported between physical health and exercise. According to Czajkowski et al. (1990), "Aerobic fitness has been shown to produce several changes in cardiovascular functioning, including increased maximal oxygen uptake (VO_2 max), increased stroke volume (allowing for greater cardiac output), and decreased heart rate during physical exercise" (p.677). Pauly et al. (1982) reported additional physiological benefits derived from exercise in their 14-week study of an aerobic fitness

program, including significant improvements in resting heart rates, resting systolic blood pressure, VO_2 max, and total cholesterol levels. Cady, Thomas, and Karwasky (1985) also provided evidence for the effectiveness of physical fitness programs in improving physiological variables. Their 14-year study for the promotion of health and physical fitness of fire fighters revealed a "marked" improvement in physical work capacity among these fire fighters. Since high blood pressure and high cholesterol have been implicated as "risk factors" for coronary heart disease, the reduction in these and related risk factors through exercise would appear to be useful in preventing heart disease (Gebhardt & Crump, 1990). Taken together, these results suggest strongly that physical exercise has beneficial effects upon health.

In addition to the potential psychological and physical benefits of exercise for program participants, several organizational-level economic benefits have been linked to employee involvement in corporate fitness programs.

One type of economic benefit derived from corporate fitness programs is a reduction in health care costs for program participants. Health care costs decrease when employees participate in physical fitness programs. Bowne, Russell, Morgan, Optenberg and Clarke (1984), for example, found that a group of employees who participated in a corporate fitness program experienced a 45.7% reduction in major medical costs and a 20.1% reduction in average number

of disability days from program preentry to postentry; the authors stated that \$1.93 was realized for each \$1 invested in the program, suggesting a "return sufficient to justify the investment" (p. 815). Baun, Bernacki, and Tsai (1986) reported lower health care costs among exercisers than nonexercisers. In particular, the "...overall medical care cost for nonexerciser male employees was approximately twice as high as that of the exercisers (\$1,003 v \$561). The same pattern was found for female employees (\$1,535 v \$639)" (p. 20). However, according to these authors, these differences were not statistically significant due to large within-group variances.

While the above studies are suggestive of economic benefits, several authors have questioned these results due to methodological failures. Chen (1984) reviewed the health promotion literature with an eye to this issue. Based on his review of published accounts concerning the economic impact of such programs, he concluded that "...the great majority of outcomes seem to be derived from 'pre-experimental' research designs" (p. 237); many of the studies he reviewed were case studies which employed no comparison groups, thus limiting the conclusions which can be drawn. Warner, Wickizer, Wolfe, Shildroth, and Samuelson (1988) performed a similar literature review of health promotion programs ranging from 1974 to 1985; their conclusions are remarkably similar to those of Chen. Their

review of evidence for the cost-effectiveness of 28 exercise programs rated evidence from these studies as having "almost no research base" from which to draw conclusions. The literature in this area, according to both papers, does not fulfill the rigors required of scientific analysis.

Shephard, Corey, Renzland, and Cox (1982) overcame some of these limitations by using a stronger research design. They presented more solid evidence for a participant reduction in medical care costs by comparing the number of hospital days and number of medical claims between two major insurance companies. One company served as a test site in which an employee fitness program was implemented, while the other company was promised a similar program a year later. Results indicated that employees at the test site "tended to have fewer hospital days and fewer medical claims of all types relative to employees of the control company" (p. 259). The authors suggested that the total savings resulting from this program "substantially" outweighed the operating costs. However, the direct costs of the program were not reported in this study, so this benefit-to-cost conclusion seems rather premature.

A more in-depth benefit-to-cost analysis was performed by Golaszerski, Snow, Lynch, Yen, and Solomita (1992). Their analysis focused on 36,000 employees of The Travelers Insurance Company from 1986 to 1990. This study was unique in terms of its careful assessment of total program costs;

these costs included staff salaries, materials, capital expenses, and, where applicable, rent. In addition, the estimated additional pension liability due to increased lifespan of program participants was included as a cost. Program benefits were calculated in terms of savings in health care costs, reductions in absenteeism, life insurance savings, improved productivity, and program-generated income. A variety of assumptions were used in calculating benefit-to-cost ratios; the most conservative assumptions led to an estimated benefit-to-cost ratio of 1.4; the most liberal assumptions led to a benefit-to-cost ratio of 14.0. The basic model led to a benefit-to-cost ratio between these two extremes of 3.4; thus, even the most conservative set of assumptions suggest support for the economic benefit of this program. In fact, the authors stated that, "In total, a net cumulative benefit of over \$146 million is accrued on an overall investment of \$60 million over a 15-year period" (p. 1169). While some of the assumptions made in this analysis are questionable (e.g., the estimate of improved productivity due to health promotion programs was extrapolated from the literature rather than empirically calculated), this study presents the strongest evidence to date of the economic value of employee fitness programs.

In addition to lower health care costs among program participants and overall monetary gain, organizations may also benefit from several other outcomes related to employee

fitness, among which are decreased absenteeism and turnover, and increased productivity.

With respect to absenteeism and turnover, there have been reports of decreased absence due to illness among exercisers compared to non-exercisers (Baun et al., 1986), and measures of physical fitness have significantly predicted absenteeism among police officers aged 35 and older (Boyce, Jones, & Hiatt, 1991). Baun et al. (1986) reported similar results which, in the authors' words, indicated a "...trend for exercisers to have fewer sick hours than nonexercisers" (p. 19). While this trend was demonstrated for both male and female employees, only within the female sample was this difference statistically significant (47 v 69 hours, $p=.05$). Song, Shephard, and Cox (1981) reported that "...over the first 6 months of an employee fitness programme, high adherents to the programme showed a substantial reduction in absenteeism and turnover relative to poor adherents in the same company and to employees in a control company" (cited in Song et al., 1982, p. 392). A replication of these results performed one year later supported this conclusion; "persistent high adherers" showed a progressive decrease in absenteeism over the study year (Song et al., 1982). To date, the mechanism by which fitness programs may reduce absenteeism is unknown. Regardless of the mechanism, however, these results suggest yet another benefit employers may gain from the

implementation of fitness programs.

The evidence is less clear for the effect of fitness on productivity. According to Falkenberg (1987), the majority of studies examining this relationship have used subjective comments rather than objective measures. A study by Bernacki and Baun (1984) is an exception to this general rule, in that it examined the relationship between exercise and a pre-established supervisory rating of job performance in a sample of 3,231 white collar workers. Results of their cross-sectional study revealed that above-average performance was significantly and positively associated with increasing exercise adherence levels, and that poor performance was significantly and negatively associated with increasing exercise adherence levels. While this study provides stronger evidence for the relationship between exercise and performance than simple subjective reports of performance improvements, the correlational design used here makes it inappropriate to conclude that exercise adherence causes high performance.

Rosenfeld, Tenenbaum, Ruskins, and Halfon (1989) utilized a true experiment to assess the relationship between physical training and productivity. In their study, one group of workers was exposed to a 15 minute physical activity program five times per week for seven months, while a control group was exposed to social activity for the same period of time. Their results provided less support for the

exercise-productivity link in that objective measures of productivity remained constant in both groups throughout the study. However, in terms of subjective measures, subjects in the physical activity group reported increased perceptions of workload and decreased perceptions of fatigue. It should be noted that there was no improvement in measures of physical fitness from pretest to posttest in the physical activity group; a more intense exercise program might have produced stronger results.

Thus, in addition to the psychological and physical benefits reviewed earlier, organizations may expect to derive several economic benefits from exercise programs, such as reductions in health care costs for participants, acceptable benefit-to-cost ratios, potentially lower absenteeism, and at least self-reports of improved productivity.

Typical Fitness Programs in Organizations

Due to above benefits, several authors have suggested that the worksite is an ideal setting in which to implement fitness programs (Fielding, 1984; Cohen, 1985; Iverson, Fielding, Crow, & Christenson, 1985; Sciacca, 1987; Ilgen, 1990). To date, however, there is little general agreement as to what constitutes a "typical" fitness program; in fact, according to Fielding (1984) there is no "typical" fitness program that can be described across organizations. He stated that, "Programs vary from a few lectures on nutrition

or how to exercise to extensive multicomponent programs with considerable staffing and the construction of large physical plants to accommodate exercise programs and other health promoting activities" (p. 250). In general, exercise programs in organizations developed during the 1980s have tended to more comprehensive than earlier in their history, to establish on-site fitness facilities, and to focus on a variety of health-related behaviors.

Iverson et al. (1985) categorized corporate fitness programs by using the following four categories: 1) Facility (i.e., does the company offer on-site or off-site facilities?), 2) Staffing (i.e., is the program implemented by in-house staff or by outside personnel?), 3) Scope (i.e., is physical activity part of a comprehensive program or the sole focus?), 4) Focus (i.e., is the focus on cardiorespiratory fitness, strength, flexibility, or specific at-risk populations?). When worksite fitness programs were categorized by these criteria, Iverson et al. noted that there was a great deal of variance between programs; this variance makes it quite difficult to identify which "types" of programs are most effective. According to the authors, "...in the end we are left with a plethora of program descriptions and no credible way to make valid and reliable judgements about which program characteristics or program strategies are most important" (p. 216).

Gebhardt and Crump (1990) used a different

categorization system, describing fitness programs in terms of three functional levels. Level I programs are simply "awareness" programs, and include newsletters, health fairs, screening sessions, etc. In contrast, Level II programs focus more on actual life-style modifications, "by providing specific programs...that last a minimum of 8 to 12 weeks or are available to employees on an ongoing basis" (p. 263). Examples of such programs might include on-site fitness programs, memberships to local gyms, or specific classes targeting work-related physical movements. Level III programs represent the most comprehensive type of fitness programs, and "...have as their goal the creation of an environment that assists individuals in sustaining their healthy life-styles and behaviors...by providing equipment, space, or locker facilities at the worksite for a fitness center, making available healthy food (e.g., low cholesterol), and removing unhealthy temptations (e.g., candy)" (p. 263).

The diversity of fitness programs in the workplace does not appear to have affected their prevalence. Indeed, according to Gebhardt and Crump (1990), "it was estimated in 1987 there were some 50,000 companies (with 100 or more employees) providing some type of employer-sponsored health promotion program" (p. 263). A survey by the U.S. Public Health Service of worksite programs indicated that 66% of worksites with 50 or more employees offered at least one

health promotion activity; 22.1% offered fitness programs (cited in Gebhardt & Crump, 1990). The sponsors of such programs are diverse, including Fortune 500 companies, public safety agencies, insurance providers, and manufacturers.

Perhaps the most well-known example of health promotion in the workplace is the "Live for Life" program sponsored by Johnson & Johnson. According to Fielding (1984), the objectives of this program are "to provide the means for Johnson & Johnson employees to become the healthiest in the world" and "to control and reduce the spiraling illness and accident costs to the corporation" (p. 251). The program includes a health screen, a lifestyle seminar that is used to introduce the concepts of the Live for Life programs, and component programs including smoking cessation, exercise, stress management, nutrition, weight control, and general health knowledge. As such, it includes Gebhardt and Crump's (1990) Level I through Level III categories of health promotion in one comprehensive program.

The Problem

Despite the apparent benefits to be derived from exercise and the growing prevalence of exercise programs in the workplace, only a small percentage of employee populations actually participate in these programs.

According to Fielding (1982), participation rates are generally reported in the range of 20% to 40% for on-site

programs, with off-site company-sponsored programs showing lower rates, generally 10% to 25%. In addition, employees who do participate in worksite fitness programs are typically those who are already at a low risk for coronary heart disease; prior to participation, these workers are less likely to smoke, tend to weigh less, and have lower age-adjusted blood pressure and cholesterol levels than those who choose not to participate. Eakin, Gotay, Rademaker, and Cowell (1988) for example, reported that employees who joined a corporate fitness center were "...more likely to have engaged in prior fitness activity, to consider fitness a high priority, and to have more positive attitudes about keeping fit" (p. 633).

Even among those who initially choose to participate, there tends to be a very high drop out rate. Indeed, 50% of people who begin exercise programs discontinue/drop out of these programs within the first three to six months (Dishman, 1981; Morgan, 1977; Oldridge, 1979). Dishman (1981) reported that adherence rates in exercise programs have been reported to be as low as 30%, and that "...these figures indicate a substantial dropout percentage among individuals who voluntarily enroll in an exercise program" (p. 144). According to Gale, Eckhoff, Mogel, and Rodnick (1984), a recent study of the effect of a 6-month corporate fitness program on cholesterol levels had a 66% drop out rate; their follow-up study designed to identify the

predictors of dropout had a similarly high dropout rate of approximately 50%.

The healthier nature of those who do volunteer for fitness programs compared to those who do not volunteer, along with the high dropout rate even amongst these healthier volunteers may preclude the accrual of any significant benefits from corporate fitness programs. The literature to be reviewed in this paper has been devoted to the "dropout" problem; in this literature, the problem has been discussed under the rubric of "exercise adherence".

The research problem addressed by this paper involved the testing of hypotheses concerning interventions to increase exercise adherence. This problem is especially relevant to exercise programs within organizations for two main reasons. First, as discussed earlier, organizations can derive significant benefits from employee participation in such programs (e.g., improvements in the psychological and physical health of employees; improvement in the economic health of supporting organizations). Second, organizations may invest considerable resources in the creation and maintenance of fitness centers; if employees do not utilize such facilities, these resources are wasted.

This paper will review contextual as well as person and environmental-level variables which have been found to be related to exercise adherence. Both static and process-based models which have been developed from the combination

of these variables will be described. Particular attention will be paid to one heavily researched process model, the transtheoretical model. This model suggests that people may be described in terms of several "stages" with respect to their attempt to change a problem behavior. These stages, in turn, may be related to several personal and environmental level variables. Several interventions which have been utilized in an attempt to increase exercise adherence will be described. These interventions will be discussed with regard to their applicability to elements of the transtheoretical model.

Based on this literature review, a study is described which tests the hypothesis that people at different "stages of exercise adoption" may require different types of interventions to activate and maintain their exercise behavior. This research is designed to fill several theoretical gaps in the exercise adherence literature.

Context Variables

As discussed earlier, there is much variance between worksite fitness programs in terms of facilities, staff, scope and focus; Iverson et al. (1985) stated that we do not currently know which particular characteristics, or what program "context" produces the best effects. While many variables have been deemed important in shaping exercise adherence, prior to discussion of these variables this program context must first be addressed.

Research investigating the context of exercise programs has often involved surveys to determine variables which act as barriers to exercise among both program dropouts and general populations. Results in general suggest the following contextual determinants of exercise behavior: ability to incorporate exercise into daily routine, ability to exercise during working hours, exercise in/close to home, time availability, lack of unexpected disruptions, physical environment (weather, distance to facilities), and adequate facilities (King, Taylor, Haskell, & DeBusk, 1990; Dishman, Sallis, & Orenstein, 1985; Wankel, 1988; Dishman, 1982). Several models of exercise adherence (Becker & Maiman, 1975; Davis, Jackson, Kronenfeld, & Blair, 1984) also incorporate these barriers as determinants of exercise.

As these context variables have been repeatedly cited as potential constraints on exercise, attention should be paid to their adequacy in the design and evaluation of corporate fitness programs. The effect of individual or cultural determinants of exercise is likely to be minimal if these physical and/or resource requirements are not met. Such requirements may thus be viewed as necessary but not sufficient to promote adherence; they should be measured and carefully evaluated prior to the implementation of an exercise program. The present study will measure subjects' perception of both the presence and the importance of the above context variables on exercise.

While context variables are essential to the success of exercise programs, research in the area of exercise adherence has also identified several variables and interventions which may increase exercise above and beyond the effects of these context variables; we will now review this research.

Variables influencing Exercise Adherence

A previous literature review (Peters, 1993a) examined the factors which, in part, may encourage adherence to exercise programs; these factors were described in terms of two broad categories: person characteristics and environmental characteristics. The following two sections will discuss the specific variables within each of these categories, along with research evaluating their usefulness in predicting exercise adherence. In addition, those variables which appear to provide useful sites of intervention to increase exercise adherence will be noted.

Person Characteristics

"Person characteristics" are defined here as individual-level variables which have been found to enhance exercise adherence; such variables include: self-motivation for exercise (SM), self-efficacy for exercise (SEE), and biological characteristics. In addition, the need for the exercise program is also believed to play a role in the adherence rates of participants to corporate fitness programs. Each of these variables is discussed in more

depth below.

Self-Motivation

Self-motivation (SM), as defined by Dishman and Ickes (1981) is "...a behavioral tendency to persevere independent of situational reinforcements" (p. 421).

Dishman and Ickes (1981) investigated the relationship between SM and adherence to programs of habitual physical activity. In order to operationally define SM, they developed a 40-item scale, the Self-Motivation Inventory (SMI), which was later validated on samples of both male and female undergraduates, as well as on male adults in preventative medicine or adult fitness programs; results of this research indicated that the SMI had a test-retest reliability ranging from .86 to .92, correlated with self-reports of exercise frequency, and predicted adherence to exercise. In addition, SM was the only significant predictor of exercise adherence when entered in a stepwise multiple regression containing both the SMI measure and measures of social desirability and ego strength (Dishman, Ickes, & Morgan, 1980). Further, SM was found to be the best predictor of aerobic power in a sample of undergraduate males in a cardiovascular and muscular strength conditioning class (Dishman & Ickes, 1981).

While the above results provide support for the reliability, validity, and predictive power of the SMI and the self-motivation construct, it is important to note that

the above studies all employed retrospective designs. While scores on the SMI did predict adherence, no attempt was made to change levels of self-motivation. Indeed, such an attempt would seem doomed to failure, given the apparent stability of this construct (as indicated by the SMI's high test-retest reliability).

Other than these initial validation studies, only a few studies have utilized the SMI in predicting exercise adherence. Dishman (1983) performed a field study of 17 to 24 year-old volunteers in a walk/run program. He compared the "commitment variables" of self-motivation, signing a contract to exercise, commitment to running, and evaluation of costs and benefits with "attitude to exercise" variables. Results indicated that the group of commitment variables predicted number of minutes walked/ran better than the attitudinal variables. This study was flawed, however, in that it did not employ a control group, and did not report any changes in physical fitness per se.

In contrast to these positive findings, Garcia and King (1991) found SM less useful in predicting exercise than SEE. In particular, their study of older sedentary adults enrolled in a 12-month exercise program found that SEE explained 17% of the variance in adherence, while SM explained only 2%. This population was older than that in the studies described earlier in this section; thus, this result may indicate that the role of SM differs across

different age groups. Of greater importance is the fact that this study compared the predictive value of SM to another predictor, and found it to be less useful.

Despite the lack of a large body of experimental evidence relating SM to exercise adherence, many authors continue to mention it's importance in literature reviews (e.g., Dishman, 1982; Dishman et al., 1985; Shephard, 1988; Wankel & Thompson, 1977) and to include it in models of exercise adherence (e.g., Becker & Maiman, 1975). This continued interest seems to be based primarily on the validation studies reported earlier. Further evidence is necessary in order to justify the high status accorded to SM (and the SMI) in predicting exercise adherence. At this point, research evidence supports the contention that the SMI predicts exercise adherence with a probability better than chance; however, we are not concerned with predicting adherence - we are concerned with enhancing it. Given the high test-retest reliability of the SMI, SM does not appear very amenable to change, and thus would not be useful in attempts to enhance adherence. Therefore, SM will not be discussed further, and will not be used as a variable in the present research.

Self-Efficacy for Exercise

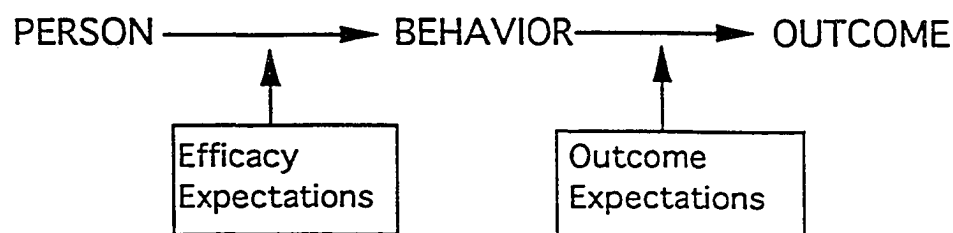
In contrast to SM, SEE has shown consistently positive relationships with exercise adherence and seems to be amenable to change.

Bandura's (1977; 1986) social cognitive theory posits that behavior is determined in part by expectations of personal efficacy, or one's sense of personal mastery in performing a given behavior. Efficacy expectations are presumed to affect both choice of initial settings, as well as the length of time a person will persist in the face of obstacles and aversive experiences. As defined by Bandura (1977), efficacy expectations are not simply hopes for positive outcomes, but instead concern one's sense of personal mastery in performing a given behavior.

Bandura's diagrammatic representation of the difference between efficacy expectations and outcome expectations is shown below in Figure 1. Efficacy expectations are differentiated from outcome expectations as indicated in Figure 1 in that efficacy expectations are defined as the conviction that one can successfully execute the behavior required to produce a given outcome, while outcome expectations concern the estimate that a given behavior will lead to certain outcomes.

Figure 1

Bandura's (1977) "diagrammatic representation of the difference between efficacy expectations and outcome expectations" - The Model of Self-Efficacy.



The relationship between efficacy expectations, or self-efficacy (SE) and exercise adherence will be of most concern here. According to Bandura (1977), SE is developed through four potential mechanisms: 1) performance accomplishment, 2) vicarious experience, 3) verbal persuasion, and 4) emotional arousal (see Bandura (1977) for a more complete description of these sources). Research has indicated that performance accomplishment and vicarious experience produce the strongest changes in SE.

According to Karoly (1993), "...the theory of self-efficacy has generated a considerable body of research that has illuminated the role of one major type of self-referent thought...across an impressive variety of applied domains" (p. 38). And, while the notions of SE were developed within the framework of psychotherapy and avoidance behavior, Bandura (1977) emphasized that SE "...is generalizable...to other psychological phenomena involving behavioral choices and regulation of effort in activities that can have adverse effects" (p. 204). Exercise, for those who are not habitual exercisers, usually has such adverse effects, including muscle soreness, feelings of tiredness, and the utilization of time that could be spent doing other activities.

Several researchers have utilized Bandura's concept of self-efficacy in an attempt to explain why some "persist in the face of obstacles" to exercise (i.e., adhere) while others do not. Results indicate that self-efficacy beliefs

with respect to exercise (SEE) have been found to be significantly related to adherence to exercise programs (Garcia & King, 1991), to intrinsic motivation toward exercise (McAuley, Wraith, & Duncan, 1991), and to positive affect (McAuley, 1991; McAuley & Courneya, 1992).

In addition, individuals who exercised more frequently were found to exhibit higher levels of SEE than those who exercised less frequently (McAuley, 1991). SEE was also shown to predict the adoption of exercise behavior in prospective studies of exercise in middle-aged adults (McAuley, 1992).

Even more important for those interested in increasing adherence to fitness programs, Ewart, Taylor, Reese, and Debusk (1984) reported that SEE was increased as a result of exercise in men who had had a myocardial infarction, predicted both the duration and intensity of self-reported home activity, and was correlated with subsequent treadmill exercise performance (cited in Strecher, DeVellis, Becker, & Rosenstock, 1986). Kaplan, Atkins, and Reinsch (1984) further reported that subjects in a walking program increased judgements of walking efficacy as compared to a control group, and that there were significant correlations between actual walking behavior and efficacy. In particular, the authors concluded that "walking efficacy is a function of successfully adhering to a regular exercise program" (p. 235). Finally, Holloway, Beuter, and Duda

(1988) reported increases in weight training efficacy following a 12-week strength training program for untrained adolescent female volunteers. Two control groups of subjects who did not participate in the strength training program showed no improvements in weight training efficacy. While the authors did not investigate the relationship between weight training efficacy and future weight training participation, it would be expected that subjects reporting higher efficacy would be more likely to participate in weight training in the future.

The results of this group of studies are consistent with Bandura's (1977) social cognitive theory, which suggests that efficacy for a given behavior may develop through the "performance accomplishment" of that behavior. However, while the above studies appear to support the impact of SEE on exercise behavior, it is important to note that SEE has been operationalized quite differently in each of these studies.

According to Strecher et al., (1986), Bandura has suggested that SE be operationalized in a two-step measurement process. In the first step, subjects indicate the "magnitude" of their SE beliefs; persons having low magnitude expectations feel capable of performing only the simpler of a series of tasks graded in terms of difficulty. In the second step, subjects indicate the "strength" of their SE beliefs; subjects with low SE strength indicate

lower certainty that they will be able to perform a given task.

Studies employing SEE heed Bandura's suggestions to varying degrees. Garcia and King (1991), for example, measured only strength of SEE beliefs by asking subjects to "...rate from 0 to 100% how confident they were that they would exercise under a variety of potentially conflictual situations" (p. 401). Magnitude of SEE was not measured in this study because a "graded" series of tasks was not specified. McAuley (1991; 1992) and McAuley et al. (1991) also measured only SEE strength; subjects were asked to indicate only their perceived capability to exercise three times per week in the face of barriers to participation.

These studies did not operationalize SE according to Bandura's (1977) recommended two-step measurement process (i.e., each operationalization measured only "strength" of SE, rather than strength and magnitude). However, we might suspect that subjects themselves rate the difficulty levels of each task, thus grouping the tasks into graded levels of difficulty. Since the scales utilized to measure strength of SE did include a 0% probability, it may be that subjects who didn't believe themselves capable of performing their "perceived most difficult tasks" would have selected this 0% probability. This would effectively indicate magnitude as well as strength of SEE.

McAuley and Courneya (1992) more explicitly measured

both strength and magnitude of SEE by operationalizing it as subjects' belief in their capability to exercise at their target heart rate for a given duration of time, three times per week. The measurement scale utilized here was composed of five items, beginning with subjects' belief in their ability to exercise for ten minutes, increasing in ten-minute intervals, to their belief in their ability to exercise for fifty minutes. It would be expected that increasing the length of time spent exercising is equivalent to increasing the difficulty of exercise; thus, this scale measured "magnitude" of SEE reasonably well by operationalizing it in terms of a series of tasks graded in difficulty level. Since subjects were also asked to rate their confidence in this prediction of "magnitude" of SEE on a scale ranging from 10 to 100, this study also operationalized "strength" of SEE as recommended by Bandura. The operationalization of SEE in this study is more consistent with Bandura's recommendations than the studies by Garcia & King (1992) and McAuley (1991; 1992) and McAuley et al. (1991).

Although these measurement issues are of concern for future research, the results of this group of studies has led to the inclusion of SEE in both literature reviews of exercise adherence (e.g., Knapp, 1988; Becker & Maiman, 1975; Shephard, 1988; Dishman et al., 1985; and Dishman, 1982) and in several models of exercise adherence (e.g.,

Davis et al., 1984; Sonstroem, 1988); both these sources have emphasized the importance of SEE. Indeed, SEE appears to hold great potential due to both its relationship with exercise and its potential malleability. The present study will examine the relationship between SEE and exercise behavior.

Later, the use of interventions to enhance SEE and thus attempt to increase exercise adherence will be discussed.

Biological Characteristics

In addition to differences in SM and SEE, several studies have indicated that program adherers and program dropouts differ in initial biological characteristics. For example, Gale et al. (1984) found that early dropouts (male) were slightly more fit than adherers, and early dropouts (female) weighed less and had lower percentage body fat than adherers. These results, however, only explained a small portion of the variance in adherence.

In contrast to the above results, Dishman's (1981) retrospective study on adult males found that dropouts weighed more, had a higher percentage body fat, and were less fit than adherers. In a later review of the literature, Dishman (1982) again reported these results; his explanation for the finding that dropouts were typically fatter and heavier was that they had a harder time exercising and were simply not used to it.

In contradiction to both the finding that dropouts

weighed less (Gale et al, 1984) and the finding that dropouts weighed more (Dishman, 1981), Blumenthal, Williams, Wallace, Williams, and Needles (1982) found no differences between adherers and dropouts on initial body weight or cholesterol. They did find that dropouts tended to be less fit initially than adherers, as evidenced by shorter initial treadmill times.

To explain these apparently contradictory results, the interaction of program participants with the type of program offered must be considered. Both Dishman (1981) and Blumenthal et al. (1982) utilized participants with histories of cardiac problems; Gale et al. (1984) did not. It could be that biological characteristics have different effects on exercise adherence depending upon the prior health history of the subjects. In addition, a program which is of low intensity will be of little value to a highly-fit person; thus they would exhibit higher dropout rates, as in the study by Gale et al. (1984).

At this stage, the role of biological characteristics such as weight, cholesterol level, and fitness level remains unclear. While it might be assumed that heavier, fatter and less fit people would be more likely to drop out, this assumption must be verified by further specifications of the exact program situations in which people drop out. Further, by utilizing personally tailored exercise prescriptions appropriate for each person's initial biological

characteristics/fitness level, the influence of these characteristics on dropout from exercise programs may be minimized. Indeed, Franklin (1978) suggested that moderate exercise prescriptions be utilized for all participants, for the joint goal of enhancing motivation and preventing injuries. Given this suggestion, biological characteristics will not be used as a predictor of exercise in the present research; rather, the present author supports the suggestion that such characteristics be measured in order to supply the most appropriate exercise prescription for all subjects.

Need for Exercise Program

Some employees may not have access to exercise facilities outside of the organizational setting. These employees are thus higher in "need for exercise programs" than employees who do have such access.

The need for an exercise program is particularly important in the context of corporate fitness programs. Those employees able to exercise outside of the company may exhibit lower utilization rates within the company fitness program. While this outside exercise may result in the same individual and organizational-level benefits, it may also result in lower utilization of on-site fitness facilities. If we were to measure exercise adherence in the employee population as the percentage of employees utilizing the on-site fitness facility, we could underestimate the percentage of employees adhering to exercise.

The need for a program is presumed to enhance adherence to corporate-sponsored fitness facilities in that those employees who have less access to exercise outside of the corporation (i.e., who have a greater need for the program) are expected to be more likely to adhere to exercise within the corporation. The present study measures exercise behavior at both on-site and off-site locations.

Summary of Person Characteristics

Several "person characteristics", and their roles in predicting exercise adherence have been reviewed. This review has indicated that only SEE appears both amenable to change and useful in increasing adherence to exercise programs.

In contrast, SM may play a useful role in predicting potential dropouts, but does not appear as amenable to change. The role of biological characteristics in exercise adherence is too ill-defined at this time to be of use, except perhaps for the design of individual exercise prescriptions (i.e., intensity and duration of exercise recommended for the individual exerciser). The need for an exercise program may affect reported adherence to corporate fitness programs, and thus should be assessed prior to the reporting of adherence data.

Thus, of this group of person characteristics, only SEE appears useful to measure in the context of the present research. The potential usefulness of SEE as an

intervention will be discussed in a later section.

Aspects of the environment which may affect exercise adherence will now be discussed.

Environmental Characteristics

Three types of environmental characteristics have been found important in the design of fitness programs to encourage exercise adherence within organizations (Peters, 1993a): 1) characteristics of employee groups (i.e., "social support through group exercise norms"), 2) characteristics of the organization itself (i.e., "support of exercise through organizational culture"), and 3) characteristics of the exercise program (i.e., "activity choice"). The influence of these groups of characteristics will be discussed below.

Social Support through Group Exercise Norms

Until now the relationship between individual-level variables and exercise adherence has been discussed; Allen (1982) suggested that it is important to consider both individual-level and cultural-level variables. Cultural level variables can be described as the norms of behavior among the groups to which one belongs. According to Allen, the dropout problem in corporate fitness programs may be partially dependent upon such "cultural variables". In particular, he stated that, "Change in [research subjects is] difficult to sustain because investigators have not yet successfully combined individual motivation with cultural

support systems" (p. 71). In addition, he stated that "...most failed organizational health promotion programs are not the victims of poor management or of lack of corporate willpower but, rather, the victims of powerful organizational and community norms that have undercut their goals" (p. 72).

One "cultural-level" variable that may be relevant in encouraging exercise adherence is social support. According to Wortman and Conway (1985), interest in social support among researchers in the field of health psychology grew rapidly in the 1970s. Wallston, Alagna, DeVellis and DeVellis (1983) stated that there are multiple definitions of social support, but in general, it "...describes the comfort, assistance, and/or information one receives through formal or informal contacts with individuals or groups" (p. 369).

Due to the multidimensional nature of social support, several authors have attempted to categorize it in terms of its various component parts. Social support has been categorized as either quantitative, using various "structural indexes" (e.g., the number of people with whom one interacts, the frequency of interaction, marital status, involvement in social activities) or qualitative (e.g., "goodness" measures, or perceptions about the adequacy of interpersonal contacts). It has also been categorized according to the functions that support may provide; the

function of support has been described as either a) instrumental (e.g, the provision of material aid and information) or b) expressive (e.g., acting as a confidant and providing acceptance and understanding).

With the recognition of these multiple definitions of support, Wallston et al. (1983) reviewed the literature describing the relationship between various aspects of health and social support, including the relationships between social support and: illness onset, stress-buffering, utilization of health services, adherence behavior, and recovery from disease. They concluded that, "...the best evidence for the importance of social support derives from the literature on recovery, rehabilitation, and adaptation to illness" (p. 381). With respect to adherence behavior, these authors reported that "...contradictory results are encountered most often among the correlational studies" (p. 377). In particular, some studies have found a direct relationship between support and adherence, while others have failed to find any relationship at all. In contrast, studies of the effect of social support interventions have revealed stronger and more consistent results, with interventions typically having a positive impact upon adherence behavior.

Other authors report more directly on the relationship between social support and exercise adherence. In a recent literature review, Dishman et al., (1985) stated that within

supervised exercise programs, several studies have revealed that social support for exercise can increase exercise adherence. In particular, the following elements of social support have been linked with exercise adherence: spousal support for clinical exercise programs, "personalized social reinforcement from program staff", and the presence of a workout partner. With respect to spontaneous physical activity outside of structured programs, Dishman et al. (1985) suggested that both family members and peer group members may act as a source of influence through mechanisms of both modeling and social support/social influence for exercise. However, the authors stated that these social influence variables have been "insufficiently explored". This literature review implicates the social influence of various groups as a potential determinant of exercise adherence.

Other authors appear to support this contention. For example, Franklin (1978) made eleven "practical suggestions to increase interest and enthusiasm" for exercise; three of these eleven suggestions emphasized using social support to increase motivation (e.g., by emphasizing group participation, including the spouse in periodic functions, and cultivating personal relationships among participants). King et al. (1990) reported data from a survey of 604 randomly selected members of a 22,000-person aerospace industry workforce in northern California. This survey

asked subjects to categorize themselves as a "current regular aerobic exerciser", a "past exerciser", or a "nonexerciser". Results indicated that "42% of current and 35% of past exercisers rated the people they lived with as currently helpful concerning physical activity"; only 16% of nonexercisers reported perceptions of such support. Rated support from coworkers and friends revealed a similar pattern of results; both sets of results were significant at the $p < .001$ level. This survey data indicated that exercisers either perceived or received greater levels of "qualitative" social support for exercise.

Wankel (1985) surveyed actual program participants and dropouts from a university-based cardiovascular fitness program. This study improved upon King et al.'s (1990) survey work because the actual exercise status of study participants was more certain. Wankel asked both continuing participants and dropouts to indicate on 7-point Likert scales their: a) reactions to the program, b) the degree of social support they received for involvement, c) their reasons for initially joining, and d) the aspects they liked and disliked about the program. Four social support variables (i.e., friendship within the program, encouragement from supervisor, encouragement from work friends, and encouragement from nonwork friends) significantly differentiated continuing participants from dropouts; only "encouragement from family" did not add

significantly to this differentiation.

Two studies appear to contradict the hypothesis that social support is helpful in encouraging exercise adherence. First, Garcia and King (1991) reported that a home-based exercise condition in older adults led to greater adherence than a group exercise condition. Second, in King et al.'s (1990) survey, employees indicated a preference for exercise on their own (versus exercise in a class), and for exercise at home (versus in the workplace); it might be expected that these preferences would lead employees to choose environments within which to exercise which provide relatively little social support. These contradictory results make it difficult to draw general conclusions from the social support literature. If social support were indeed important in encouraging exercise adherence, we would expect group-based exercise programs to produce greater adherence than home-based exercise programs, and we would expect people to indicate preferences for exercising in a class or in the workplace.

To explain these contradictions, these studies should be more carefully analyzed. Garcia and King's (1991) study utilized an older population than studies which found social support to enhance exercise adherence; in addition, there was no evidence that the group condition in this study actually provided social support. The same may be said for the work of King et al. (1990); while people may express a

preference for exercise at home, this may be more for the sake of convenience than in the interest of enhancing exercise adherence. Indeed, it has been argued all along that exercise adherence is determined by multiple factors, one of which is the context of exercise. Thus, the contradictory evidence in this literature does not appear that strong.

While there is thus some evidence linking social support to health, and potentially linking social support to exercise adherence, Wortman and Conway (1985) advised caution in interpreting this evidence for several reasons. First, most studies in this area have utilized cross-sectional, retrospective, or case-study designs; longitudinal designs following the same group of subjects over time would be more interpretable. Second, any associations between social support and health may be the result of other variables associated with both support and health (i.e., the "third-variable problem"). Most important, however, is the fact that studies suggesting a relationship between social support and health do not specify the mechanism by which this effect may occur. Wortman and Conway stated this quite strongly in their conclusion that, "Taken as a whole, this research suggests social support may be a variable worthy of serious consideration among researchers interested in physical illness. However, previous studies have provided little

insight into the processes through which social support may influence health outcomes" (p. 285).

Thoits (1986) represents one attempt to describe this process; in particular, she described a possible mechanism by which social support may function as a buffer to stressful life events and strains. This mechanism was described by reconceptualizing social support as a form of "coping assistance", or the "active participation of significant others in an individual's stress-management efforts" (p. 417).

Another potential mechanism of action for social support was proposed by Berman (1985); she suggested that the mechanism of social support may be related to social control and peer pressure. She stated that, "Individuals in a network frequently feel constrained to behave like other network members. Thus, people who have ties with people who smoke cigarettes, drink alcohol, are physically active, or maintain certain dietary practices may follow the patterns set forth by their group simply to maintain their group identity" (p. 258).

Another way to state Berman's proposed mechanism of action is that social support functions through the influence of group norms of behavior. In fact, Allen (1982) suggested that groups have shared expectations about accepted and supported group behaviors; these expectations may be quite influential in determining exercise behavior.

Such group expectations of behavior have been termed "norms" by organizational theorists, and have been implicated as important determinants of behavior. McGrath (1984) stated that norms are sets of expectations about what someone ought to do under a given set of conditions; the violation of such expectations is negatively sanctioned. One specific type of norm is important here - those McGrath termed "social reality norms". These norms, according to McGrath, are "...broadly shared beliefs, attitudes and values about reality. What is true, what is right (moral), what is valuable" (p. 202). When such social reality norms are held with respect to exercise, they may be an important determinant of exercise behavior; they may in fact be the mechanism through which social support operates to encourage exercise adherence.

Fishbein and Ajzen (1975) also supported the idea that norms may be important behavioral determinants (cited in Sonstroem, 1988). Their "theory of reasoned action" suggests that behavior is determined from a person's intention to perform a specific behavior. This intention, in turn, is determined by two sources. The first source, the person's attitude toward performing the behavior is less relevant in this context than the second source, the "subjective norm". According to Fishbein and Ajzen, this subjective norm is defined as the persons perception of what generalized important others believe about the subject

performing the specific behavior. According to Sonstroem (1988), the theory of reasoned action has been useful in predicting immediate and subsequent short-term exercise behavior.

Thus, researchers both in the field of organizational psychology and in the health literature deem norms to be important behavior determinants. As discussed earlier, researchers in the health field have categorized social support as either quantitative or qualitative, and as either instrumental or expressive; while these operationalizations have supported relationships between social support and health, they have been unable to adequately explain the mechanism by which social support impacts health. In addition, researchers who have specifically investigated the link between social support and exercise adherence have focused more on aspects of group dynamics than upon support per se.

Future research should attempt to address the issues of the mechanism of action of social support, and focus more explicitly on replicating these group dynamics-based findings. The present study will attempt to reach these two interrelated goals by examining the impact of social support on exercise behavior, where social support is operationalized as employee perceptions of group norms concerning exercise behavior.

Even given the limited knowledge of the mechanism of

action of social support, several studies have utilized this variable to design interventions to increase exercise adherence. These interventions will be examined at a later point in this paper.

Support of Exercise through Organizational Culture

In addition to the social support of exercise through group norms, the nature of the organization which sponsors a corporate fitness program may have an effect on exercise behavior; one such organizational-level determinant may be organizational culture.

According to Van Maanen and Barley (1985), the term "culture" has its roots in both anthropology and sociology; organizational scholars have adopted the term of culture in an attempt to describe the "...shared attitudes, values, beliefs, and customs of members of a social unit or organization" (Walter, 1985, p. 301). These aspects of culture are viewed as elements of an unseen force that shapes overt behavior; the underlying culture may thereby "predetermine" behavior within organizations. In particular, unquestioned assumptions held by members of the organization are believed to drive behavior; rather than being controlled by formal rules, authority, and norms of rational behavior, this perspective suggests that behavior is controlled by cultural norms, values, beliefs and assumptions.

Trice (1993) described cultures in terms of two major

ingredients: ideologies, or "sets of taken-for-granted, emotionally charged beliefs", and cultural forms, or "mechanisms for expressing and affirming these beliefs" (p. 20). Schein (1990) described these underlying ideologies and overt forms in slightly different language, suggesting that organizational culture manifests itself at three increasingly "deep" levels. The first level, artifacts, represent the most overt and visible level of culture. Examples of artifacts include "...the physical layout, the dress code, the manner in which people address each other, the smell and feel of the place, its emotional intensity" (Schein, p. 111). The overt nature of artifacts makes them easy to see; however, artifacts can be difficult to decipher accurately. This artifactual level is akin to Trice's (1993) "cultural forms". Schein's second level of culture, values, represents a deeper and less visible level of culture; values can be revealed through interviews, questionnaires, and survey instruments and can be described in terms of norms, ideologies, charters and philosophies. Assumptions represent the third and deepest level of organizational culture to Schein, and are akin to Trice's "ideologies". Assumptions can be discovered only through "involving motivated members of the group in intensive self-analysis" (Schein, p. 112). These underlying assumptions are presumed to determine perceptions, thought processes, feelings, and behavior.

One complication to the above discussion of organizational culture revolves around the current and vigorous debate as to whether organizations are host to one or to multiple cultures. Deal and Kennedy's (1982) groundbreaking work in the area of corporate culture suggested that organizations be viewed as having "strong" or "weak" cultures; the implication was that an organization has only one culture. Kotter and Heskett (1992) reflect this tradition in current research with their description of the effect of "strong cultures" on organizational performance. A strong culture, according to Kotter and Heskett, is one in which "...almost all of the managers share a set of relatively consistent values and methods of doing business" (p. 16).

In contrast to the view that organizations have a unitary "strong" or "weak" culture, other authors suggest that organizations may be host to several cultures/subcultures. Schein (1989), for example, stated that, "...within each company's corporate culture there [are] a variety of subcultures" (p. 5). He discussed these in terms of "levels" of culture, and suggested that different groups of people might reflect these different levels of culture. Within a given organization, for example, blue collar workers might report different attitudes and viewpoints than white collar workers. The same might be true for scientists as compared to

salespeople.

Other authors in the culture literature describe organizational "subcultures" in terms of the "sites" of these cultures within organizations rather than as "levels" of culture. Louis (1985), for example, suggested that there are several sites at which a culture may develop within a single organization, including the top levels of management, vertical slices or divisions of an organization, horizontal slices or hierarchical levels of an organization, particular departments, or within any particular group of workers. All that is required for these various sites to serve as sources of culture are that they be regularly convening, they impose structural dependencies among people, they provide a chance for affiliation between people, and they serve as sites for common purposes.

Trice (1993) represented a compromise between these two extreme positions in that he suggested that, while organizations may develop a "core culture" that is embraced by almost all the employees, they also usually contain "subcultures". Trice was particularly interested in occupations as the source of these various subcultures since occupations themselves include persons who share a common knowledge base, perform common tasks, and hence might develop a unique set of ideologies which would be different from those of the organization as a whole.

Whether multiple cultures within a given organization

are viewed as "levels" of culture, "sites" of culture, or as "subcultures", the underlying message is that there may be more than one culture within a given organization. The relevant question in the present research, however, concerns whether culture, either unitary or multi-level, affects exercise behavior.

Recent work by Sloan and Gruman (1988) provides a preliminary affirmative answer to this question. They examined the effect of perceptions of "general work climate", including perceptions of supportiveness of supervisor, relationships with co-workers, perceived control over matters at work, heavy workload, and clarity of responsibilities on participation in a health promotion program. There is a theoretical link between organizational culture and climate; Schein (1990) suggests that climate "...is only a surface manifestation of culture". "Climate" research may thus be considered to involve the artifactual level in Schein's description of culture. Results of Sloan and Gruman's work revealed that employees' perceptions of "supportiveness of supervisor" significantly predicted participation in the worksite health promotion program. This study provides some preliminary support for the role of organizational-level variables in predicting participation in worksite health promotion. However, it is limited in that it assessed only general climate; assessment of climate with respect to support of exercise participation may be a

more useful way to operationalize organizational climate. The present study will expand upon this work by examining the supportiveness of the organizational culture, a "deeper" cultural-level variable, with particular respect to exercise.

In particular, what Trice (1993) has described as "cultural forms" and what Schein (1990) has described as "values" will be examined. The "forms" and/or "values" will be revealed by surveying employee perceptions of the supportiveness of their organization's culture with respect to exercise using the "Organizational Support Indicator" (Allen, 1982). Ostwald (1989) utilized this instrument in a study designed to "...test the degree of intervention needed to produce the desired life-style changes among blue collar employees in a small company" (p. 91). Results indicated that the Organizational Support Indicator had acceptable levels of face and content validity as well as reliability (Cronbach's coefficient alpha ranged from .76 to .96; test-retest reliability ranged from .89 to .91). In addition, it was able to document an increase following intervention in the perception of organizational support for health practices. These results suggest that an organization can change employee perceptions of support for exercise by implementing certain interventions.

The present study will expand upon the use of this survey by using it to predict exercise behavior, rather than

by measuring changes in perceptions of support. The expectation is that, to the degree that employees perceive an organizational culture supportive of exercise, they will be more likely to exercise. However, given the current belief that organizations have multiple subcultures, it might be expected that more than one "exercise culture" may also exist. The first aim then, is to determine whether there is one overarching exercise culture, or whether, in fact, multiple versions of exercise cultures exist within a single organization. To the extent that a unitary exercise culture is perceived by all employees, this "variable" will become more a part of the overall context of the fitness program than a useful predictor of exercise. The reason for this lack of predictive power would lie in the fact that unitary perceptions of an exercise culture by all employees would lead to a lack of variance in the data collected by the Organizational Support Indicator. If this were the case, there would be range restriction and a corresponding lack of predictive power.

To the extent that multiple "exercise cultures" exist within a single organization, and there is thus less range restriction, it will be more feasible to investigate the predictive power of this variable in encouraging exercise. Since the role of culture in terms of fostering exercise behavior has not been studied to date, this will be an exploratory investigation.

With the exception of Sloan and Gruman's (1988) work, the exercise adherence literature has not focused enough attention on this "cultural or climate-level" behavioral determinant. The present study will serve an important function in examining this cultural-level determinant of behavior.

Activity Choice

In addition to social support through group exercise norms and support through organizational culture, the exercise activity itself may also affect adherence.

One of the most frequently mentioned reasons for dropout from exercise is boredom/lack of motivation (Wankel, 1985; King et al., 1990; Wankel, 1988; Shephard, 1988). Given this fact, it is not surprising that studies of exercise adherence have such a high drop-out rate. These studies provide subjects with little choice or range of activity. Most involve walking or jogging programs; these programs are consistently rated lowest in terms of preference in surveys of exercise behavior. It would be expected that subjects would be bored by such programs, and would drop out.

Thompson and Wankel (1980) found that allowing subjects to indicate activity preferences, and telling these subjects that their program had been tailored to their individual choices increased attendance to a six-week program. This study compared the attendance rates of a choice and control

group matched by activity preference. Subjects in the choice group were led to believe that their choices were the basis for their programs, while subjects in the control group were informed that they had been assigned a standardized program. One interesting feature of this study is that subjects in both groups were actually given the activities that they had chosen; thus, the increased attendance of the choice group compared to the control group was due to perceptions of choice rather than actual choice. Pollack (1988) found that running, walking and bicycling all lead to the same changes in aerobic capacity, body weight, and fat loss. Taken together, these two studies indicate that giving subjects a choice of activities could increase adherence without disrupting physiological benefits. Surveys also indicate that people have different activity preferences, with running/jogging usually rated as least appealing (Wankel, 1988; King et al., 1990).

Finally, several authors have investigated the seemingly innocuous variable of "fun". Franklin (1978) recognized the importance of fun; he stated we should "avoid overemphasis of regimented calisthenics" (p. 14). Participants recognized the role of fun as well; they reported "fun" as an important goal in joining and staying with programs (Wankel, 1985; Dishman, 1982). Although making exercise fun would seem an intuitively obvious way to increase exercise adherence, researchers have

not attempted to build fun into their programs.

Thus, giving participants a choice among various activities which they deem interesting and fun may increase the fit between participants and activity, and thereby increase adherence. Most programs reported in the scientific literature can not emphasize free choice as it would decrease the validity of studies. However, this de-emphasis on choice and fun may be partially responsible for the high dropout rates found in such studies. While activity choice is not a relevant variable in the present study, future research should attempt to incorporate this variable into programs designed to increase exercise adherence.

Models of Exercise Adherence

Until this point in this paper, variables have been discussed in a way that seems to imply their independence. While most studies do consider these variables in isolation, a few authors have proposed complex models incorporating several variables at once. These models will be considered in terms of both static and process models of exercise adherence.

Static Models of Exercise Adherence

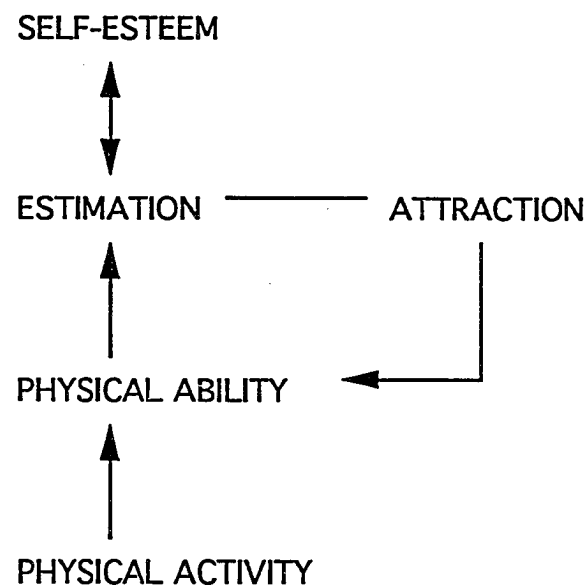
Two models of exercise adherence discussed by Sonstroem (1988) were described earlier in this paper - SM and SEE. Sonstroem reviewed the first of these under the heading of the "Self-Motivation and Psychobiologic Model". This

combined model incorporated the SMI with biological variables (i.e., % body fat and body weight). While this model has been useful in predicting adherers to exercise, it has been less useful in predicting dropouts. Sonstroem recommended that SMI scores be used as a prediction or screening measure for adherence.

Sonstroem (1988) also reviewed Bandura's SE model. Some results of research using this model indicate the following: 1) pre-program SEE levels can predict weight loss, 2) those whose SEE level is enhanced lose more weight than those with a weight loss program alone, and 3) SEE responds positively to counseling and performance feedback.

Sonstroem (1988) also described his own model (the "Psychological Model for Physical Activity Participation"). As shown in Figure 2, this model is concerned with the manner in which exercise and consequent physical fitness contribute to the psychological benefit of enhanced self-esteem.

Figure 2
Sonstroem's (1988) Psychological Model for Physical Activity Participation

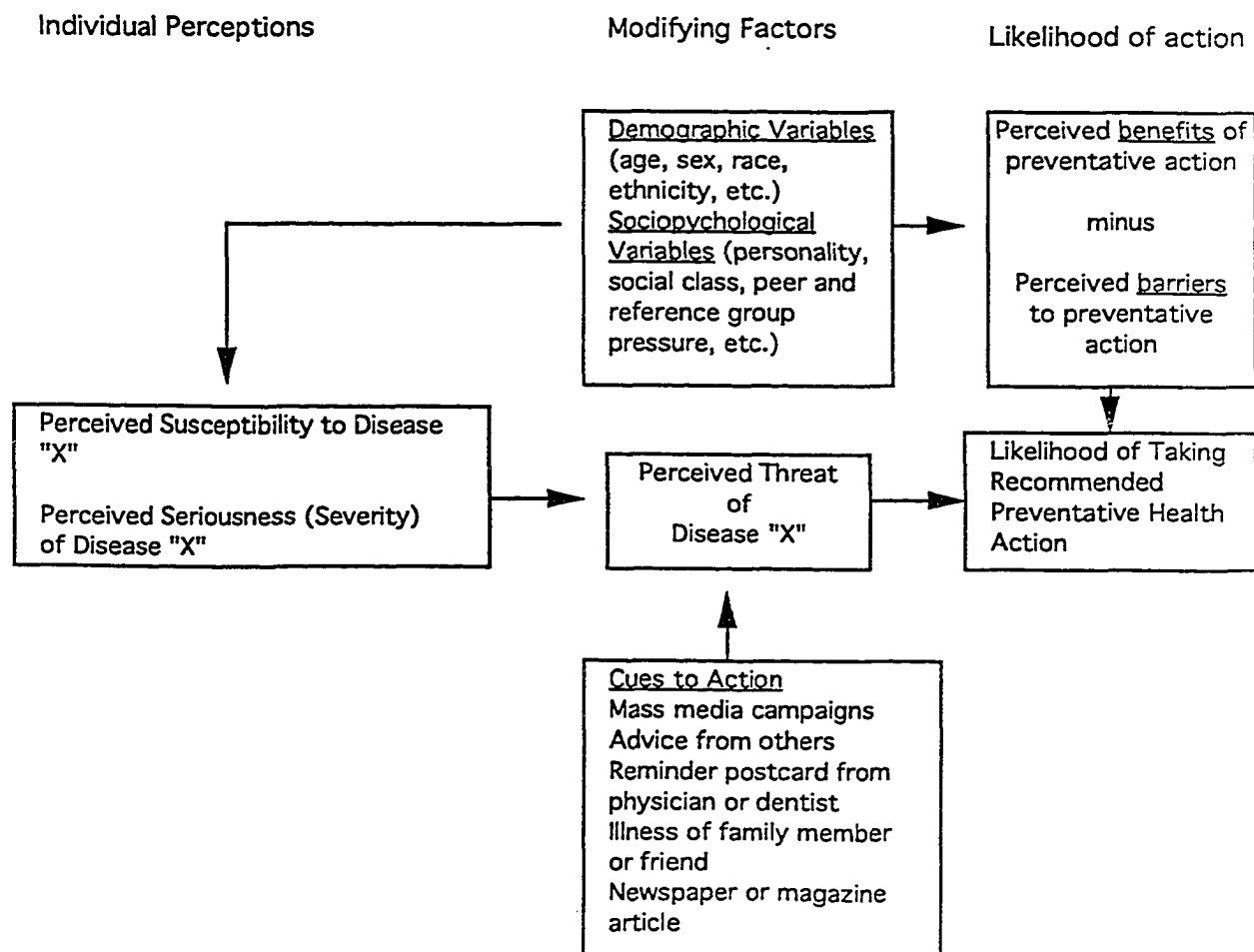


The author has developed Physical Estimation and Attraction Scales to measure the variables in this model; the Attraction Scale has been useful in predicting who initially volunteers for programs, but both scales have been less effective in predicting actual exercise behavior. The Estimation Scale might conceivably be replaced by a SE scale, as it purports to measure "self-perception of physical abilities".

Another model which incorporates several variables is the health belief model of Becker and Maiman (1975), diagrammed in Figure 3.

Figure 3

Becker and Maiman's (1975) Health Belief Model

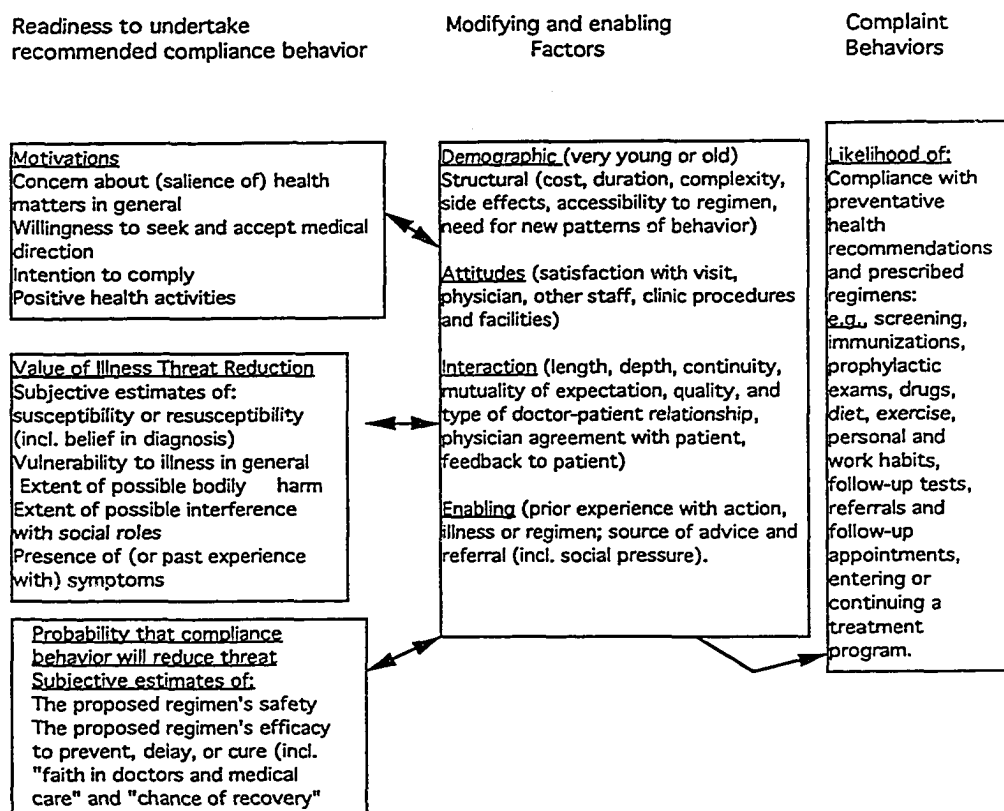


This model was designed to determine why people failed to utilize screening tests for the detection of asymptomatic diseases. While results of this model in the area of preventative health behavior are satisfactory (Becker & Maimen, 1975), it does not appear as useful in exercise settings (Sonstroem, 1988). The problem with using this model in exercise settings may be that it was developed to predict a single instance of one specific behavior (e.g., going for a dental checkup). Exercise, in contrast, encompasses a variety of behaviors carried out repeatedly over time; it may thus be more appropriately captured by a more process-oriented model. Also, the health belief model emphasizes the motivation to avoid illness - there may be other sources of motivation which enhance adherence to exercise. The constructs underlying several of the variables in this model (e.g., the perceived benefits of preventative action and the perceived barriers to preventative action) as well as several of the "psychosocial" variables (e.g., peer and reference group pressure) have been successful in predicting exercise adherence. Thus, while the health belief model itself has not been very useful in predicting long-term exercise adherence, elements of this model could be useful in a more process-oriented model of exercise adherence.

Becker and Maiman (1975) presented such a model, but again the focus was upon "...explaining and predicting

compliance with health and medical care recommendations" (p. 20); this model is presented in Figure 4.

Figure 4
Becker and Maiman's (1975) Model for predicting and explaining compliance behavior.



In contrast to the health belief model, this model includes subject motivations other than illness reduction (e.g., positive health activities). The model proposed that the readiness to undertake recommended compliance behavior is jointly determined by certain "motivations", the "value of illness threat reduction", and "the probability that compliant behavior will reduce the threat". In addition, demographic, structural, attitudinal, interactional, and enabling factors are presumed to modify the relationship between readiness to take action and actual compliant behavior. Again, this model has several useful elements; however, there has been no research utilizing this model within the framework of exercise adherence. This makes it difficult to evaluate it's utility in predicting compliance with respect to exercise. Like the original health belief model, this model is probably limited by the context in which it was developed - predicting one-shot preventative health behaviors.

An alternative model for the prediction of health-enhancing behavior was discussed earlier in the context of social support - Fishbein & Ajzen's (1975) theory of reasoned action" (cited in Sonstroem, 1988). The theory of reasoned action predicts behavior from a person's intention to actually perform the specific behavior in question. Behavioral intention is influenced by two components: the person's attitude toward performing the behavior (Aact) and

by the subjective norm (SN), or the perception of what generalized others believe about the subject's performing the specific behavior. Sonstroem (1988) reviewed the evidence relating this model to exercise adherence. As discussed earlier, we might reconceptualize SN as social support; evidence indicates that social support is a good predictor of adherence. In addition, attitudes (Aact) appear predictive of behavior when attitude and behavioral measures are congruent in terms of action, target, context, and time (Ajzen & Fishbein, 1977). The theory of reasoned action has not been used to examine long-term exercise behavior. According to Sonstroem (1988), however, "Behavioral intention has been demonstrated to be one of the most important and one of the most consistently relevant predictors of continued participation in health improvement programs" (p. 137). This element of the theory of reasoned action may be useful in the prediction of exercise adherence.

Process Models of Exercise Adherence

An underlying assumption in the models described above is that exercise adherence is a static process: "once an adherer, always an adherer". However, these static models of exercise have had limited success in predicting or increasing adherence to exercise. According to Marcus, Rakowski, and Rossi (1992), "Although many studies have been conducted to address the problem of exercise relapse, and

some have shown positive effects on short-term adherence to relatively brief exercise programs, little success has been attained in improving long-term maintenance of exercise behavior" (p. 257).

Sonstroem (1988) suggested that one possible reason for this lack of success may have been an early focus on the above static models rather than on process models. In particular, Sonstroem stated that, "Delineating how change occurs is required of a process model, and this implies the initial use of a relatively complete model predicting relationships among background, personal, and situational variables" (p. 144). Rather than viewing exercise adherence as a static event, a more useful way to view it may be in terms of a process that delineates how change occurs (Sonstroem, 1988).

Dishman et al. (1985) echoed this sentiment when they declared that we need to "...determine if definable stages or patterns of participation exist in which different determinants operate or vary their influence, making specific interventions effective at different times" (p.169). To support the utility of this search, Dishman (1982) noted that dropout rates tend to be around 50% in the first 3 to 6 months of a program, then tend to plateau or stabilize, and then gradually decline. This may indicate the existence of distinct stages of exercise behavior.

Indeed, several models take this approach by viewing

exercise adherence in a series of stages; this group of process-based models will now be reviewed.

Both Baun and Bernacki (1988) and Knapp (1988) described corporate fitness programs in terms of stages. Baun and Bernacki emphasized that different motivators are required at program initiation, during program maintenance, and during relapse prevention. Knapp placed several models which we have already discussed within such a stage perspective, as diagrammed in Figure 5.

Figure 5

Knapp's (1988) stage-based delineation of exercise adherence models.

Stage 1 - Decision to initiate exercise

- Health belief model
- Self-regulatory model
- Decision-making model
- Self-efficacy enhancement model

Stage 2 - Behavior change and habit acquisition

- Setting variables
- Goal setting, contracting, feedback, social support

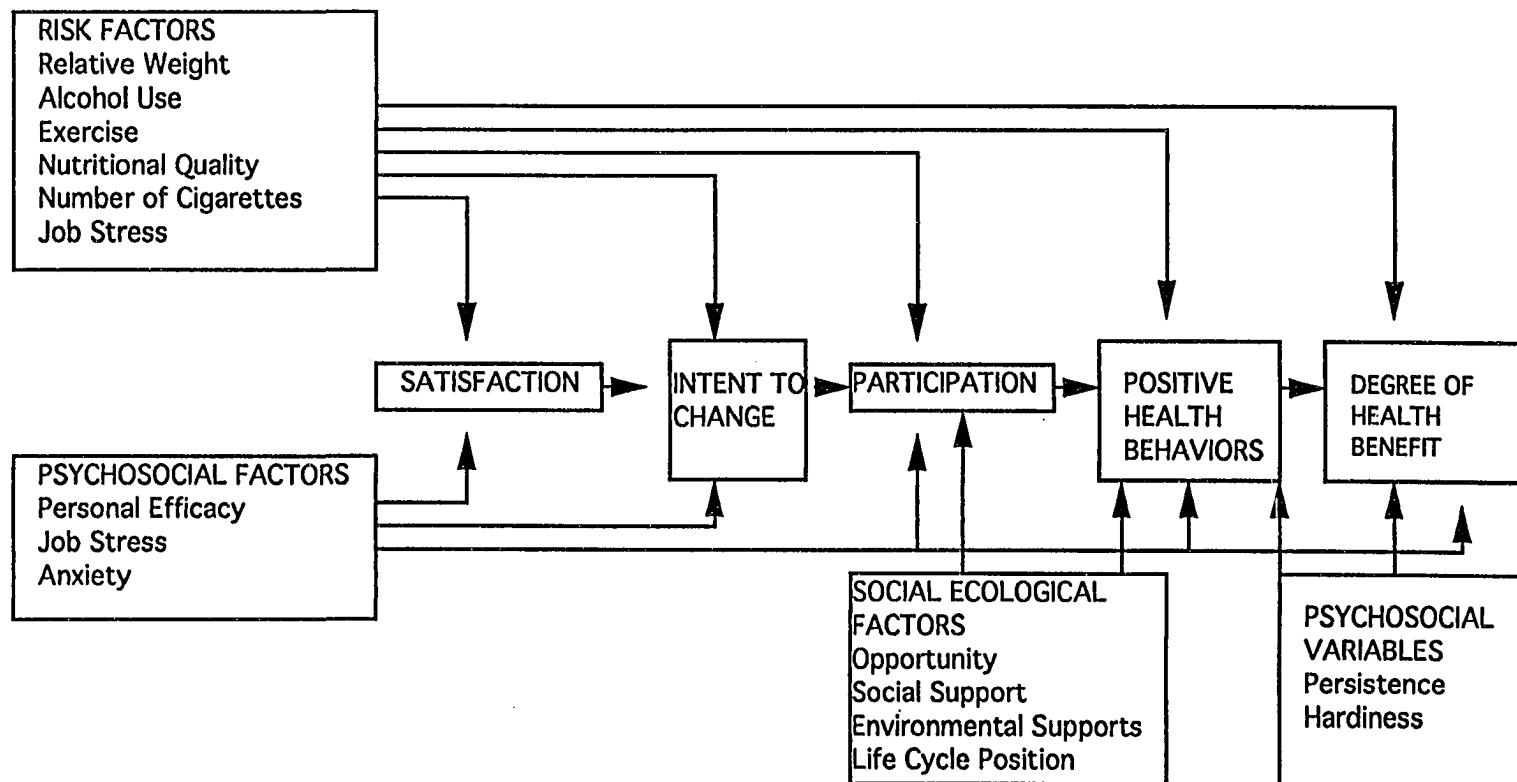
Stage 3 - Maintenance

- Rewards
- Relapse models

Figure 5 suggests that certain models of exercise adherence may be more appropriate at some stages of exercise than at others. For example, SE enhancement may only be relevant for subjects who are making the decision to initiate exercise; for subjects at the maintenance state, SE enhancement may be a less useful intervention.

Other authors have developed their own models, choosing several of the variables we have discussed. Davis et al. (1984) developed a comprehensive model which incorporates most of the variables deemed important in the exercise adherence literature; they also utilized a stage approach. This model is presented in Figure 6.

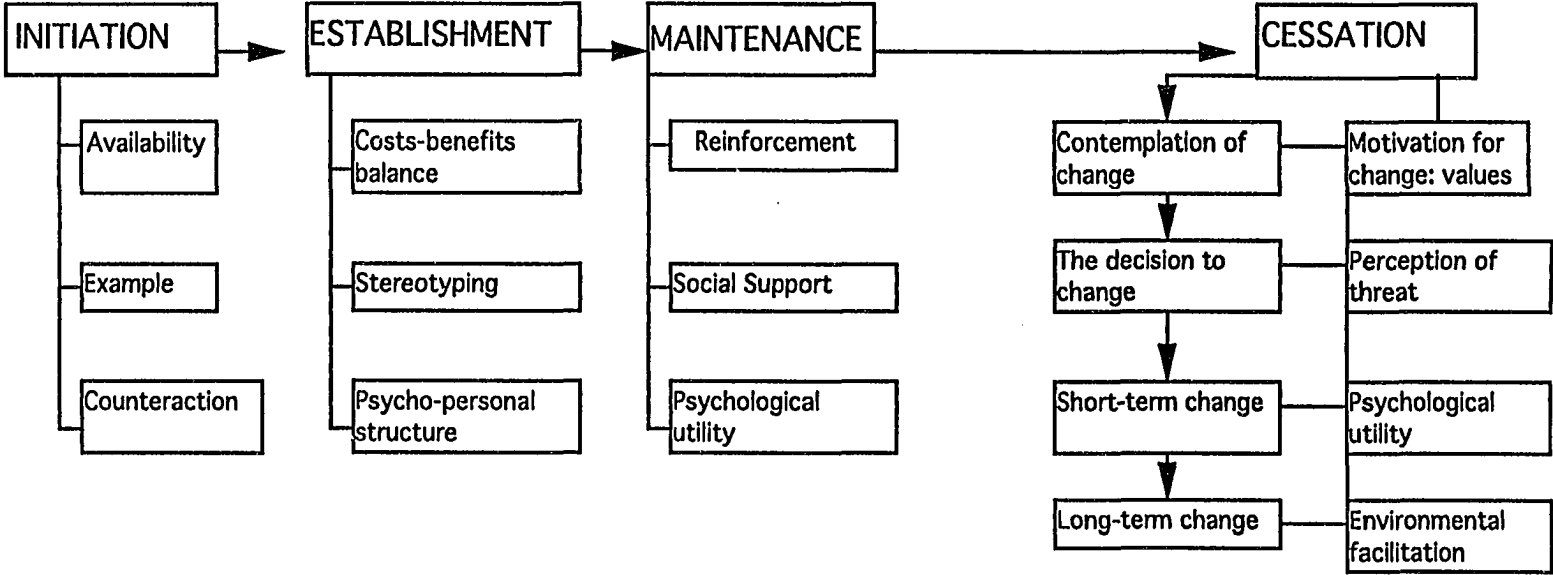
Figure 6
Davis et al.'s (1984) Model of modifiers of participation in health promotion programs



This model suggests that various "risk factors" and "psychosocial factors" act in concert to influence satisfaction with current behavior, intent to change, participation, positive health behaviors, and the degree of health benefit derived from such behaviors. Other "social ecological factors" and "psychosocial variables" are presumed to act as modifiers in this model. The authors of this model evaluated part of it, and found that: 1) risk factors could predict both satisfaction with one's current health status and intent to change, and 2) psychosocial predictors (SE, job stress, anxiety) could predict dissatisfaction with health status. The authors did not examine the social ecological factors in this study, nor did they examine actual behavior (they instead examined behavioral intentions). Given the inclusiveness of this model, it warrants future research. It might be even more beneficial to further divide "positive health behaviors" into stages.

Horn (1976) also utilized stage theory in the development of the "personal choice health behavior model", presented in Figure 7.

Figure 7
Horn's (1977) Personal Choice Health Behavior Model



This model focuses more directly upon the stages of initiation, establishment, maintenance and cessation of behavior. Again, several of the same variables reappear that have been described in other models, such as social support and cost/benefit balance. However, no research has been reported using this model to predict exercise adherence.

The Transtheoretical Model.

The most fully researched "process" or "stage-based" model within the context of health-related behaviors is Prochaska and DiClemente's (1982; 1983) transtheoretical model, which was developed to study smoking cessation. Due to the more solid theoretical and empirical support accorded to this stage-based model, it will be used as the framework for the present study.

According to Prochaska and DiClemente (1983), traditional studies of smoking cessation categorized subjects as either smokers or nonsmokers; in contrast, Prochaska and DiClemente's work suggests that there are between four and five distinct "stages of change" through which a smoker progresses in becoming a nonsmoker. These stages include precontemplation (subjects who currently smoke and have no plans to quit), contemplation (subjects who currently smoke but plan to quit in the near future), action (subjects who had quit in the last six months), and maintenance (subjects who had not smoked for more than six

months). For those subjects who had quit in the last six months and later returned to smoking, a fifth stage, relapse, is also identified. According to DiClemente et al. (1991), "...stages of change have been identified in a variety of settings with a wide range of problems or target behaviors" (p. 295). Settings and subject populations have included outpatient psychotherapy clinics, outpatient alcoholism treatment patients, weight control program participants, and head injury rehabilitation patients. In addition, stage classifications have been found to be related to SE for smoking cessation and to decision-making with respect to smoking.

In addition to the specific stages of change described above, Prochaska and DiClemente (1983) suggested that subjects at different stages use different "processes of change". In particular, the transtheoretical model "...involves ten processes of change receiving differential application during the five stages of change...the ten processes of change are as follows: consciousness-raising, self-liberation, social liberation, self-reevaluation, environmental reevaluation, counterconditioning, stimulus control, reinforcement management, dramatic relief, and helping relationships" (p. 391). Prochaska, Velicer, DiClemente, & Fava (1988) developed a 40-item questionnaire to measure the ten processes of change by having subjects "...indicate the frequency of these 40 activities or events

within the last month on a 5-point Likert scale from (1) never to (5) repeatedly" (p. 297). A sample item referring to the process of consciousness raising, for example, reads "I recall articles dealing with the problem of quitting smoking" (p. 523). The processes of change measure has been demonstrated to have high reliability, internal validity, discriminative validity, and predictive validity (DiClemente et al., 1991).

Prochaska and DiClemente (1983) performed a study of 873 volunteers to validate the predictions of the transtheoretical model. Subjects were classified into the stages of precontemplation, contemplation, action, maintenance, or relapse based on self-reports of smoking status, and were then asked to rate on a 5-point Likert scale how frequently they had employed each of the ten processes of change in the last month. Results indicated significant differences in how frequently subjects at each stage used each of the ten processes of change. In particular, precontemplators reported using 8 of the 10 processes of change significantly less than any other group. Subjects in the contemplation stage reported using consciousness raising more than subjects in other stages, while subjects in the action stage reported using self-liberation, helping relationships, and reinforcement management; both contemplators and action subjects reported using self-reevaluation. Subjects in both the action and

maintenance stage used counterconditioning and stimulus control as well. Thus, subjects at different stages of change reported using different processes. Although these data did not elucidate the mechanism by which subjects move from one stage of change to the next, they did indicate that subjects at different stages relied on different processes once in a given stage. According to the authors, "The model and data ...could be used to increase the effectiveness of smoking cessation programs to maximize self-help approaches. Rather than assume that all smokers coming for treatment are ready for action, as is the case in most behaviorally-based programs, clients would be grouped according to which stage of change they are in" (p. 394).

DiClemente et al. (1991) extended the results of the above study by examining the relationships between stages of change and several other variables; for our purposes, the relationships between stages of change and SE, decision balance, and processes of change seem most relevant. DiClemente et al. utilized a group of subjects who volunteered for a minimal smoking cessation intervention; subjects were classified as precontemplators (subjects not seriously considering quitting in the next 6 months), contemplators (subjects considering quitting smoking in the next 6 months but not the next 30 days), or preparers (the "preparation" stage represents a division of the "contemplation" stage, in which subjects are considering

quitting in the next 6 months and are planning to quit within the next 30 days). Subjects were then randomly assigned to one of four minimal interventions, stratified by stage. Results indicated that preparers had higher levels of SE with respect to confidence in their ability to stop smoking or maintain nonsmoking, and higher efficacy to abstain from smoking across various cues to smoke than either contemplators or precontemplators; contemplators in turn exhibited higher efficacy than precontemplators. With respect to decision making, or an "individual's evaluation of the pros and cons of a particular behavior" (p. 299), the importance of the "pros" of smoking were found to decrease significantly across stages, while the importance of the "cons" of smoking increased significantly across stages. With respect to use of the various "processes of change", precontemplators were the least active in using almost every process, while prepared subjects were the most active in using almost every process. In addition, stage-specific differences in both cessation attempts and likely success at such attempts were predicted and supported in this study. In particular, subjects in later stages were found to be more likely to make a cessation attempt and to succeed at such an attempt at both 1-month and 6-month follow-up. Again, the authors noted the importance of these results in the design of future interventions, suggesting that, "...later stage subjects may benefit from more intensive,

shorter action-oriented types of interventions. Subjects earlier in the process of change may need less intense and more extensive types of programs to be able to follow them through a quitting cycle and move them to successful action" (p. 302). These results further support the usefulness of the concept of stages of change.

While the transtheoretical model was initially developed within the context of smoking cessation, Marcus and colleagues have successfully extended this model to the area of exercise. To do this, it was necessary for them to develop exercise-specific instruments to measure stages of change, processes of change, decision making and SEE as they were described in the original transtheoretical model.

With respect to the stages of change in exercise behavior, termed here "stage of adoption of exercise", Marcus and colleagues (Marcus, Selby, Niaura, & Rossi, 1992; Marcus, Rakowski, & Rossi, 1992) developed a self-report scale in the shape of a ladder; this 11-point instrument asked subjects to pick a rung on the ladder that most accurately described their current exercise behavior. The rungs on the ladder depicted a 10-point scale that indicated the various stages of adoption of exercise. These authors adopted the stages of change from the smoking literature to define precontemplators as subjects who do not exercise and do not intend to start in the next 6 months, contemplators as subjects who do not exercise but intend to start in the

next 6 months, preparers as subjects who exercise some but not regularly (where regular exercise = three or more times per week for twenty minutes or longer), actors as subjects who exercise regularly but have done so for less than 6 months, and maintainers as subjects who exercise regularly and have done so for 6 months or longer; the rungs on the instrument's ladder reflected these categories. The Kappa reliability index for this scale over a 2-week period was reported as .78 (N=20; Marcus et al., 1992), and scores on this scale were found to be significantly related to the Seven Day Recall Physical Activity Questionnaire (Marcus & Simkin, in press).

Marcus, Rossi, Selby, Niaura and Abrams (1992) also developed a 39-item questionnaire to measure each of the ten processes of change described in Prochaska and DiClemente's work. Their definitions of the ten processes of change are shown in Table 1 below.

Table 1
Definitions of the Processes of Change with Respect to
Exercise.

Consciousness raising	efforts by the individual to seek new information and to gain understanding and feedback about the problem.
Dramatic relief	affective aspects of change, often involving intense emotional experiences related to problem behavior.
Environmental reevaluation	consideration and assessment by the individual of how the problem affects the physical and social environments.
Self-reevaluation	emotional and cognitive reappraisal of values by the individual with respect to the problem behavior.
Social liberation	awareness, availability, and acceptance by the individual of alternative, problem-free live styles in society.
Counterconditioning	substitution of alternative behaviors for the problem behavior.
Helping relationships	trusting, accepting, and utilizing the support of caring others during attempts to change the problem behavior
Reinforcement management	changing the contingencies that control or maintain the problem behavior
Self-liberation	the individual's choice and commitment to change the behavior, including the belief that one can change
Stimulus control	control of situations and other causes that trigger the problem behavior.

Validation of this questionnaire revealed that the ten subscales used to measure the ten proposed processes of change all achieved adequate alpha reliability (the average across all ten subscales was .80). Confirmatory factor analysis revealed that a 10-correlated factors model fit the data better than several other possible models, indicating that the scale measures ten somewhat intercorrelated processes of change.

Marcus, Rakowski, and Rossi (1992) also developed a Decisional Balance measure with respect to exercise. This 40-item measure was developed to assess the importance of 20 pros and 20 cons of exercise with respect to subjects' decision to exercise or not to exercise. A principal-components analysis with a varimax rotation was used to judge the number of components measured by these items; items were retained if they received a loading of .50 or greater and the item did not load on another component. This procedure led to the retaining of 16 items - 6 con and 10 pro items - which were found to account for 60.4% of the total item variance; coefficient alpha for the Pros scale was .95, while for the Cons scale it was .79.

Finally, Marcus and Owen (1992) developed a five-item SEE scale, in which items "represented the areas of negative affect, resisting relapse, and making time for exercise" (p. 6); internal consistency for this measure was found to be .85 in a sample of subjects from four Rhode Island

worksites.

The development of this group of measures enabled Marcus and colleagues to investigate the transtheoretical models' predictions with respect to exercise; results support the extension of this model to exercise. In particular, subjects were able to categorize themselves into the different stages of adoption of exercise using the stage of change instrument (Marcus et al, 1992; Marcus & Owen, 1992; Marcus, Rakowski, et al. 1992). Of more significance was the fact that subjects at different stages of change reported using different processes of change. In particular, precontemplators reported using all 10 processes of change substantially less often than all other subjects. When the processes of change were grouped in terms of experiential processes (i.e., consciousness raising, dramatic relief, environmental reevaluation, self-reevaluation, and social liberation) and behavioral processes (i.e., counterconditioning, helping relationships, reinforcement management, self-liberation, and stimulus control), stage-based differences were also revealed. In particular, the use of experiential processes of change appeared to peak at the action stage, while the behavioral processes of change increased steadily from precontemplation to action and then leveled off. These results support the idea that subjects at different stages of exercise report using different processes of change (Marcus et al., 1992).

Research using the stages of change instrument has also revealed stage-specific differences in both SEE and decision-making. Marcus and Owen (1992) surveyed subjects in both United States and Australian worksites. In both samples, subjects at earlier stages of adoption of exercise (i.e., precontemplators) scored significantly lower on measures of SEE, and rated the cons of exercise as more important in their decision of whether to exercise than the pros of exercise. In contrast, subjects in the maintenance stage scored highest on SEE, and rated pros as more important in their decision of whether to exercise. A decision balance index was also calculated by subtracting the sum of the Pro scale from the sum of the Con scale; subjects' decision balance scores at earlier stages of exercise were significantly lower than those of subjects at later stages of exercise. These results further support the application of the transtheoretical model to exercise, and elucidate some stage-specific individual differences in SEE and decision-making.

Marcus and Owen (1992) utilized a 6-item Decision Balance scale of questionable validity; Marcus, Rakowski, and Rossi (1992) replicated the results for decision balance and stage of adoption of exercise with a more carefully developed instrument. Results using this instrument with subjects in a worksite health promotion program replicated the stage-specific differences in reports of the importance

of the pros, the cons, and the decision balance index described earlier.

Lee (1993) provided an independent replication and extension of the above results. She surveyed Australian women with respect to their exercise knowledge, attitudes towards exercise, exercise preferences, and stage of adoption of exercise. It should be noted that a different method was utilized in this study to identify subjects' stage of change. Rather than having subjects classify themselves with the ladder instrument described earlier, subjects were guided through a one-week activity recall adapted from the Stanford Physical Activity Recall. Judges classified the subjects into three stages (precontemplators, contemplators, and action/maintenance) based on data from these interviews. Subjects in the precontemplation stage were significantly different from the other stages in that they were older, had less knowledge of exercise, exercised fewer times per week, perceived more psychological and physical barriers to exercise, and perceived less family support for exercise. Again, these results indicate the importance of stage of adoption of exercise in discriminating among several key variables.

The transtheoretical model thus appears to represent the most useful model with which to examine the determinants of exercise adherence, and was used as the framework in the present study. However, in the present study, the stage

measure was expanded to incorporate six new stages of exercise. This was done in order to ensure that all subjects would be able to accurately categorize their exercise behavior. Later, these additional stages were collapsed into the previously described five stages. The exception to this general rule was a sixth stage termed "super-maintenance". Research has revealed that "super-maintainers", or people who adhere to rigorous and time-consuming exercise programs, differ from the normal population in terms of several personality characteristics. These include, as measured by the Personality Research Form, achievement, endurance, and dominance (Clingman & Hilliard, 1987). Therefore, the super-maintenance stage was maintained as a separate stage in addition to the original five stages of adoption of exercise. Subjects in this stage reported exercising between four to seven times per week, and having exercised at this level for greater than six months. As this stage has not been previously studied in the exercise adherence research, this particular type of subject appeared interesting to study.

Areas of Intervention and Their Results

The above discussion of the transtheoretical model, a process model of exercise, has suggested that it may be possible to design stage-specific exercise adherence interventions. Several interventions designed to increase exercise adherence have already been tested in the

literature; these interventions will be described with an eye towards the effectiveness of each intervention.

Preliminary hypotheses as to which interventions may be appropriate for which stage of adoption of exercise will be provided.

The interventions to be discussed will include those person and environmental characteristics described earlier as possible sites for intervention (i.e., SEE; social support through group exercise norms), as well as several other interventions which have been found useful in encouraging adherence to exercise programs. This second group of interventions includes contracting, decision balance, goal-setting, rewards, and lapse management.

Self-Efficacy for Exercise Enhancement (SEEE)

SEE was discussed earlier as a potential determinant of adherence to exercise; several authors have attempted to increase exercise adherence by enhancing levels of SEE.

Thompson, Wyatt and Craighead (1984), for example, performed an eight week study of adherence to cardiorespiratory exercise; subjects were assigned to either a control group, a social-learning theory intervention group, or a social-learning theory/short-term psychodynamic therapy group. Although there were no differences between these groups in terms of number of weeks adherent to exercise or in frequency of exercise, the two groups exposed to social learning theory showed a trend toward greater

change in cardiorespiratory fitness. This study provides preliminary evidence for the utility of enhancing social learning theory variables; however, it is unclear whether SEE per se was modified, and it is also unclear whether subjects were randomly assigned to conditions.

Fruin, Pratt, and Owen (1991) also attempted to enhance levels of SEE, but within the framework of protection motivation theory - a "...theoretical framework which has the potential to account for some of the major determinants of exercise participation" (p. 56). The authors manipulated three components of this theory in a sample of high school students (i.e., response efficacy, SEE, and response costs) by presenting subjects with one of eight essays designed to modify the level of each of these three variables.

Participants who read essays presenting high SEE (a common statement in such an essay was "it has been suggested that anyone can exercise regularly once they decide they want to") reported significantly higher beliefs in their ability to exercise regularly and were more likely to endorse an item stating that they intended to "stick to" an exercise program for the next 2 weeks. Again, these results are suggestive of the utility of enhancing SEE to encourage exercise adherence.

Other authors have utilized protection motivation theory to attempt to explain maladaptive coping responses to health threats. Rippetoe and Rogers (1987), for example,

investigated the effect of modifying levels of SE with respect to the efficacy of breast self-exam (BSE) in detecting breast cancer. Again, SE was manipulated through the use of an essay, where subjects in the high SE condition read essays which "...stressed the importance of BSE and its efficacy in detecting breast cancer early" (p. 599). Women who read this high SE essay reported stronger confidence in their ability to perform BSE correctly, and a greater belief in their ability to examine their breasts than did subjects in the control group. In addition, subjects who read the high SE essays reported higher intentions to practice BSE, and stronger beliefs in rational problem solving strategies for coping with breast cancer than did subjects who read the low SE essays. While this study does not address exercise per se, it does provide additional support for the utility of enhancing SE to potentially regulate health behavior.

Taken together, these three studies suggest that levels of SE can be enhanced, and that this enhancement may have an effect on later health-related behaviors.

Research has shown that people who exercise exhibit higher levels of SEE (McAuley, 1991) than those who do not exercise. With respect to the transtheoretical model, therefore, it is expected that subjects in later stages of adoption of exercise exhibit higher levels of SEE than subjects in earlier stages. Given this supposition, it is expected that an intervention designed to enhance SEE would

be perceived as more motivating for subjects in the earlier stages of adoption of exercise.

Social Support through Group Exercise Norms

Social support was discussed earlier as an environmental characteristic; alternately, it can be discussed as a potential intervention. Several authors have attempted to utilize social support interventions to enhance exercise adherence.

King and Frederiksen (1984) examined the effect of both relapse prevention and social support on exercise adherence. They defined social support as "...the presence of interpersonal liking, attraction, and group cohesiveness of individuals exercising together"; to justify this operationalization of support, they stated that previous work has revealed that perceptions of group cohesiveness seem to facilitate perceptions of social support and later participation in group activities (note that this definition of support does not coincide with definitions of support in other areas of the health literature - it is hard to categorize as quantitative or qualitative, or as instrumental or expressive). This study employed four conditions: a "group/relapse" condition, a "group only" condition, a "relapse only" condition, and a control condition. To increase cohesiveness and familiarity within the group conditions, team-building exercises which stressed intragroup cooperation and intergroup competition were

employed. Subjects in these conditions were asked to jog with at least one member of the group during the course of this five-week study. Subjects in the relapse conditions received information on the runner's "relapse effect". Subjects in the "group only" condition and the "relapse only" condition initiated more exercise sessions than either the "group/relapse" condition or the control group. While it would be expected that the combined group/relapse condition would produce the most exercise, the authors reported that this group evidenced less cohesion than other groups, where cohesion was defined as the "...degree of liking and attraction for group members, and the extent to which members felt they would like to exercise as a group" (p. 11). This lends backing to the idea that cohesion is an important determinant of exercise. The strong research design of this study (i.e., the use of random assignment, a control group, and manipulation checks) lends credence to the finding that social support, defined as group cohesiveness, may be an important determinant of exercise.

Kravitz and Furst (1991) investigated the influence of both social support and rewards on exercise adherence. Subjects were allowed to self-select into one of three groups: Group 1 subjects worked for the rewards of exercise clothing based on individual attendance; Group 2 subjects were assigned into one of eighteen 2 or 3-person groups which competed against each other for the rewards of

exercise clothing (this condition was considered the social support condition). Both groups of subjects were participants in aerobic dance classes. The instructor of the social support group's classes "...verbally encouraged camaraderie and social support among group members" (p. 425). Group 3 was a control group. Group 1 (reward only) and Group 2 (social support) achieved significantly better attendance than the control group. However, Group 1 and Group 2 did not differ from one another in terms of attendance. The conclusions of this study are limited by two factors. First, subjects were not randomly assigned to conditions, and no test was made for selection effects. Second, there was no manipulation check on the effectiveness of the social support intervention; an appropriate check might have been on the degree of group cohesion, or members degree of attraction to one another. Thus, it is difficult to interpret the results of this intervention.

Stoffelmayr et al. (1992) utilized social support as one aspect of their multifaceted attempt to increase exercise adherence during a worksite program. Subjects were divided into teams of four to six people; these groups were encouraged to exercise together and to exchange telephone numbers. In addition, a monetary contract led to competition between the teams, which was presumed to enhance group cohesion. Adherence to the program across nine study repetitions ranged between 90 to 100%; however,

"accountability to team" and "contact with others" was not ranked highly by subjects in terms of the importance of these elements for program success. In fact, five other program elements were ranked more highly. Again, this study appeared to operationalize social support more as group cohesion than as "...the comfort, assistance, and/or information one receives through formal or informal contacts with individuals or groups" as social support is defined in the health literature in general (Wallston et al., 1983, p. 369).

These three "social support" interventions thus all appear to focus on aspects of group dynamics rather than on social support per se; while social support may be one aspect of group dynamics, it has not been adequately demonstrated to be the causal variable in these studies.

As in the earlier discussion of social support as a "person characteristic", therefore, social support will be considered here to be a function of group norms which support exercise behavior. This operationalization of support seems appropriate, given that group norms in highly cohesive groups are believed to exert stronger influences on individual behavior than in less cohesive groups.

With respect to the transtheoretical model, interventions to increase social support for exercise might be expected to be most effective for subjects in the earlier stages of adoption of exercise. Subjects in the later

stages might be expected to already have adequate group support to maintain their exercise habit. Therefore, it is expected that an intervention designed to enhance social support for exercise would be perceived as more motivating for subjects in the earlier stages of adoption of exercise.

Contracting

Another intervention that may be useful in encouraging exercise adherence in the generation of such short-term commitments to exercise by the use of contracting techniques. In general, contracting techniques require subjects to sign a contract describing the amount of exercise they plan to accomplish per week; often, a monetary deposit is made which is refundable given that the subject adheres to the contract. An additional component of contracting is to have another individual sign or witness the subject's contract.

An example of such an intervention is apparent in a study by Kau and Fischer (1974); by utilizing a written contract of the exercise plan, these authors were able to enhance adherence to an exercise program. This study is limited by the fact that a reward system intervention took place concurrently with the contract; also, this was simply a case study and hence did not control for many threats to validity.

Epstein, Wing, Thompson and Griffen (1980) found positive results for contracting in a more rigorously

designed study. They found that both a group of "contracting" students (i.e., students who contracted to exercise a certain amount), and a group of "lottery" students (i.e., students who could win a lottery through attendance to exercise sessions) attended more exercise sessions than a control group. Several factors across these three groups of students were held constant, including time of meetings, amount of contract, and feedback, thus controlling for several potential threats to validity.

Stoffelmayr et al. (1992) also reported support for the usefulness of a multifaceted intervention which employed a contracting procedure, group competition, monitoring, and social support to enhance adherence to a work-site-based fitness program. The majority of the subjects in this study were regarded as sedentary, as evidenced by a survey of their exercise habits prior to program implementation. The contracting portion of the intervention "...committed the person to exercise aerobically four times a week and to devise a system for monitoring compliance with the contract" (p. 158). The contracts were signed by the participant, the program leader, and a witness. In addition, participants deposited \$40, of which funds were lost if they did not comply with the contract. The study was replicated nine times; adherence to exercise, defined as exercising four times per week, was remarkably high across these nine replications, ranging from 90 to 100%. These results lend

support to the success of this multifaceted intervention. However, when participants were asked to rank ten program components in terms of their importance to their exercise adherence, the contract was ranked at nine; thus, the contract was viewed as less important than eight other aspects of the program. The fact that no control or comparison groups were used in this study limits the conclusions which may be drawn, and further research is necessary to clarify the role of the contract in this study.

The results of these studies provide preliminary support for the hypothesis that contracting to exercise may be a useful strategy to enhance exercise adherence. It is expected that subjects at later stages will not need a contract to motivate their exercise behavior. Subjects in earlier stages are thus expected to endorse this intervention as more motivating than subjects in later stages.

Decision Balance

The influence of evaluating the importance of the pros and cons of exercise on subject's decisions to exercise has also been a focus of intervention; when pros and cons are measured on Likert scales, the score which results from subtracting the sum of the pro items from the sum of the con items has been termed a measure of "decision balance".

Wankel (1988) reviewed the literature focusing on decision balance and concluded that decision balance

approaches based on a cost/benefit analysis could facilitate exercise behavior. Dishman et al. (1985) supported this conclusion; they stated that rationally evaluating costs and benefits "...has consistently facilitated increased participation or a return to activity among people who had been active but subsequently became inactive" (p. 166).

Wankel and Thompson (1977) performed an experiment to directly investigate the effect of a Decision-Balance Sheet intervention. Their work is based in the decision-making approach of Janis and Mann (1977); extending upon this work, Wankel and Thompson suggest that, "Prior to deciding to embark upon a particular course of action, an individual evaluates the anticipated gains and losses resulting from making such a decision" (p. 333). Four major types of consequences are presumed to enter into such decision making processes. Janis and Mann describe these as: 1) utilitarian gains and losses for self - "all the expected instrumental effects of the decision with regard to personal utilitarian objectives", 2) utilitarian gains and losses for significant others - "...considerations in this category pertain to the goals of persons and groups with which the decision maker is identified or affiliated", 3) self-approval or self-disapproval, and 4) approval or disapproval by significant others (p. 139). Wankel and Thompson used these tenets of decision making to study 100 female members of a commercial fitness club who had not attended the club in one month.

Subjects were randomly assigned to one of four conditions: 1) a control group, 2) a group which received the standard motivational health club phone call, 3) a group which completed a Decision-Balance Sheet by recording during a telephone interview "...the anticipated gains and losses which might result from their participating in exercise sessions at the health club" (p. 335), and 4) a group who were asked during a telephone interview to think of and report only the positive outcomes to be expected from participation. Attendance following the intervention was higher for the group which completed the Decision-Balance Sheet and for the group evaluating only the pros of attendance than for the control group and the regular call group. These increases in attendance were statistically significant; however, in terms of magnitude the effect was quite small (i.e., only 2 sessions were attended in one month).

As discussed earlier, Marcus, Rakowski et al. (1992) applied the concept of decision balance to the transtheoretical model of exercise. Subjects were asked to rate pro and con statements pertaining to exercise in terms of how important each statement was in their decision of whether to exercise; patterns of response to these pro/con statements differed significantly depending on the subject's current stage of exercise behavior. In particular, according to the authors, "...pros scores were significantly

higher for subjects in maintenance compared to precontemplation and contemplation; action compared to precontemplation, contemplation, and preparation; and preparation and contemplation compared to precontemplation...con scores were significantly lower for subjects in maintenance compared to action; action and maintenance compared to preparation; maintenance compared to precontemplation; and all stages compared to contemplation" (p. 259).

Taken as a whole, these studies indicate that using a decision balance approach prior to program implementation may help increase future exercise behavior. The study by Marcus et al. (1992) indicates the importance of helping "precontemplators" and "contemplators" to realize the benefits and downplay the costs of exercise; this might be done by getting them to commit to exercise for a short period of time. It is expected that subjects in earlier stages of change will endorse a decision balance intervention as more motivating in encouraging their exercise adherence than subjects in later stages of change, since subjects in the later stages would already be expected to evaluate the pros of exercise as most important in their decision to exercise.

Goal Setting

According to Latham and Locke (1991), goal setting theory "...states that the simplest and most direct

motivational explanation of why some people perform better than others is because they have different performance goals" (p. 213). Goal setting theory has generated a great deal of empirical support for the proposition that specific, difficult goals lead to higher performance than vague, do-your-best goals; these results have been found to generalize across a wide variety of tasks and subject populations. With respect to exercise adherence, adhering to a specific amount of exercise over a long period of time might be considered a more difficult goal than not adhering. Likewise, adhering might be considered evidence of higher "performance" than lack of adherence.

Pinder (1984) suggested that several variables might moderate the goal difficulty-performance relationship. First, in order for specific, difficult goals to produce higher performance, it is necessary that individuals be committed to those goals. Latham and Locke (1991) defined goal commitment as "The degree to which the individual is attached to the goal, considers it significant or important, is determined to reach it, and keeps it in the face of setbacks and obstacles" (p. 217). Two factors have been found to enhance goal commitment: 1) the belief that the achievement of a goal is possible - also considered the individual's expectancy of success, or SE, and 2) the belief that achieving a goal is important or appropriate. Thus, an individual who has high SE for attaining a given goal and

who believes that goal to be important will be more likely to be committed to and thus achieve that goal.

As discussed early, SE itself is believed to have a powerful effect on behavior; in addition, SE, like commitment, may act as a moderator in the goal difficulty-performance relationship in terms of actual choice of goal difficulty. In particular, individuals who are higher in SE are more likely to choose difficult goals than those who are lower in SE. Also, people with high SE may view the same task as less difficult than people with low SE, and are more likely to persist on a given task in the face of challenges.

A third proposed moderator of the goal difficulty-performance relationship is feedback about the effectiveness of performance. According to Locke and Latham (1991), goals and feedback act in concert to increase performance; neither goals nor feedback alone are sufficient to increase performance. In particular, research has indicated that feedback alone has no motivational effect on performance; likewise, goals without feedback do not enable increased performance. It is believed that feedback provides information to subjects about the degree to which the performance standard has been attained; if feedback suggests the goal has been attained, performance is typically maintained. If feedback suggests that performance has fallen short of the goal level, future performance may be modified and improved.

Goal setting is believed to have its effect on performance through three mechanisms (Pinder, 1984). First, goals direct attention and action; according to Locke and Latham (1991), "A goal directs activity toward actions which are relevant to it at the expense of actions which are not goal-relevant" (p. 227). Second, goals regulate effort or energy expenditure - a difficult goal will require people to increase the amount of energy they devote to that goal. Finally, goals affect persistence or duration, either through increasing the rate of work in time-limited situations, or through increasing the time spent on work in situations without time limits. In addition, specific, challenging goals may require the generation of new strategies in order to attain complex goals. It is through these four mechanisms that goal setting appears to function.

The abundance of empirical evidence supporting the goal difficulty-performance relationship has encouraged many researchers to apply goal setting theory to enhance performance in a diverse range of research areas; included in this group are several researchers interested in exercise adherence.

In particular, several authors have suggested that encouraging subjects to contract to achieve specific goals might be a useful method to enhance exercise adherence. Wankel (1988), for example, stated that testing skills and competencies against realistic challenges may be important

to intrinsic interest and enjoyment in exercise; to be motivating, these challenges must be realistic and must provide clear feedback. Such challenges can be created through goal setting. Franklin (1978) also supported this sentiment; he recommended that participants in exercise programs be provided with records of their goal achievement, and that they set their own goals based on their ability. Such records could be provided through means of a prominently placed progress chart which records goals and goal achievement for each participant.

According to Dishman (1982), goal setting has also been utilized by several authors as an intervention; such interventions have led to increased exercise adherence. In their later literature review, Dishman et al. (1985) echoed the statement that goal setting is a useful strategy in increasing adherence, particularly among those who do exercise.

An example of such an intervention is a study conducted by Kaplan et al. (1984); this study revealed that subjects who received a combination of goal setting, functional analysis of reinforcers, behavioral contracts, contingency management, and relaxation training exhibited greater increases in SEE and future expectations about exercise than a control group. Due to the multifaceted nature of this intervention, however, it is difficult to know the exact effect of goal setting itself.

Kau and Fischer (1974) also utilized a multifaceted intervention to increase exercise adherence, of which goal-setting was one component. In this case, a goal was set to achieve a certain number of points per week (points were awarded based on Cooper's (1979) aerobic points system). As in Kaplan et al. (1984), this intervention was also deemed successful in enhancing exercise.

Finally, Seidman, Sevelius, and Ewald (1984) reported that self-set weight loss goals significantly affected the weight loss of employees in a worksite program-contest (cited in Locke & Latham, 1991).

In summary, theoretical arguments and preliminary evidence promote goal setting as a useful intervention to increase exercise adherence. While the research evidence to date does not suggest a specific stage at which goal setting may be most effective, the theoretical prescriptions of goal setting theory do suggest stage-specific effects. As discussed earlier, there are several proposed moderators of the goal difficulty-performance relationship, including goal commitment, SE, and feedback. Since subjects at later stages of exercise are expected to have higher levels of SEE, they may also be more likely to commit to the difficult goal of maintaining exercise. A goal setting intervention at early stages of change (i.e., precontemplation, contemplation, preparation) would be less likely to be effective since these subjects would have lower SEE and thus

be less likely to commit to the difficult goal of adhering to exercise.

It is therefore expected that subjects in the later stages of change will endorse a goal setting intervention as more motivating in encouraging their exercise adherence than subjects in earlier stages of change.

Rewards

Because the intrinsic rewards of exercise are slow to develop (such rewards consisting of weight loss, increased energy, and psychological improvements), the provision of external rewards may be a useful intervention, especially in the initial stages of exercise programs. Franklin (1978) recognized such rewards as important motivational strategies; he recommended rewarding participant accomplishments through recognition and through promotional items like t-shirts and trophies. Feedback of progress can also be viewed as a type of reward. Shephard (1988) stated that such reward systems are "...particularly helpful in the early stages of participation" (p. 213). Knapp (1988) stated this in even stronger terms when he claimed that such reinforcement is crucial - that the person must get something positive out of the behavior now. He suggested rewards like simple feedback, goal-setting, self-monitoring, material reinforcement, behavioral contracts, and social reinforcements. It is clear that there is a great deal of overlap in the motivators we are discussing (i.e., goal-

setting may act as a motivator through the provision of the reward of goal achievement).

Keefe and Blumenthal (1980) performed a rewards-based intervention. They allowed three subjects to develop their own reward systems; their only recommendation to subjects was that rewarding stimuli be chosen which were relevant to the exercise behavior itself (e.g., running shoes). Thus, subjects chose their own potential rewards and set their own criterion level for self-administration of each set of rewards. Results indicated that subjects increased their exercise levels over baseline exercise levels, and maintained this increase for a one-year period. While this study was a 3-person case study and thus was unable to evaluate the statistical significance of the results, it is, perhaps, illustrative of the power of reward systems. As subjects were chosen for this study who specifically "had a chronic problem in exercise maintenance" (p. 32), and as they all were initially in very poor physical condition, it might be expected that they would fall into either the precontemplation or contemplation stages of change. Indeed, the authors of this study noted that, "...the reinforcement contract was important during the early phases of the program, but that over time the more intrinsically rewarding aspects of exercise assumed control over [the subject's] exercise behavior" (p. 33).

Kau and Fischer (1974) also utilized rewards as part of

their multifaceted intervention to increase exercise; rewards were chosen by the subject but were administered by the subject's husband. These authors also noted that rewards were most effective in the early stages of the exercise program: "Formal reinforcement was terminated before the long-term goal was reached...as the natural environment had taken over and begun to maintain the desired behavior" (p. 214).

Kravitz and Furst (1991) also reported significant effects for rewards on exercise adherence. Their study utilized adults who enrolled in aerobic dance classes at a large university. Subjects were allowed to self-select into groups in which they either exercised independently to earn the rewards of exercise clothing, exercised as a group in competition with other groups to earn rewards, or did not compete for rewards at all. Subjects who chose to compete for rewards exhibited significantly higher attendance than those who did not compete for rewards. Again, the authors emphasized that such rewards tended to be particularly helpful in the early stages of exercise.

This group of studies suggests that reward-based interventions will be most useful in the early stages of adoption of exercise. It is thus expected that subjects in earlier stages of exercise adoption will endorse this intervention as more motivating in encouraging their exercise adherence than subjects in later stages of change.

Lapse Management

While several of the above strategies may be useful in promoting initial exercise behavior, other strategies must be proposed for subjects in the later stages of adoption of exercise. It is common for one lapse in behavior (where a lapse is defined as missing one exercise session) to derail an entire exercise program; thus, relapse prevention, or lapse management, may be an important intervention to encourage longer-term exercise adherence.

Knapp (1988) derived a strategy of relapse prevention from Marlatt's (1972) model. It involved the following: educating subjects regarding the process of relapse, identifying high-risk situations, improving coping responses, correcting positive outcome expectancies to be more realistic, planning for slips, minimizing effects of lapses, correcting lifestyle imbalances, preventing/coping with urges to lapse, and recognizing apparently irrelevant decisions. This is a multifaceted approach to lapse management; such a complete program is quite costly and can usually be applied only to small groups.

King and Frederiksen (1984), in contrast, used a more cost-effective method by exposing larger groups to relapse prevention. They applied a relapse prevention intervention to female college student volunteers for a study on exercise who were currently not participating in aerobic exercise. The relapse effect and its influence on exercise adherence

was described to these volunteers, and subjects were instructed to think of instances when relapse might occur. They then rehearsed (both individually and as a group) cognitive-behavioral coping strategies. Subjects given this intervention initiated jogging twice as often as a control group.

Belisle, Roskies, and Levesque (1987) found similar positive results for a lapse prevention intervention. The experimental group in this study was taught strategies of self-management in high-risk situations, and the management of temporary lapses. Two exercise sessions per week were performed with the exercise group, and subjects were told to exercise a third time each week by themselves. This third exercise session was suggested to ensure that the subjects would be able to motivate themselves away from the experimental setting (the exercise group) and generalize their behavior to the home environment. Results indicated that the experimental group did indeed learn the relapse prevention techniques. They also adhered more to exercise prescription than did a control group.

These studies suggest that relapse prevention, or lapse management, may be a useful strategy in increasing exercise adherence in the preparation, action, and maintenance stages of change. As subjects must actually be exercising to experience a relapse, this strategy would not be expected to be as useful in the precontemplation or contemplation stages

of change. Thus, it is expected that subjects in the later stages of change will endorse this intervention as more motivating in encouraging their exercise adherence than subjects in earlier stages of change.

Summary of Interventions

Several interventions designed to enhance exercise adherence have been discussed. While the quality of studies employed here ranges from poor (one-shot case studies) to excellent (true experiments with control groups), most of the interventions discussed here have enough theoretical or empirical support to warrant their future use in combination in an appropriately designed study.

It has also been proposed that these different interventions may be more useful at certain stages of exercise than at others. In particular, SEEE, social support, contracting, decision balance, and rewards are expected to be endorsed as more motivating by subjects at earlier stages of adoption of exercise, while goal setting and lapse management are expected to be endorsed as more motivating by subjects at later stages.

Summary of Literature Review

This literature review began by describing the psychological, physical, and economic benefits of exercise, and by describing the "typical" exercise programs within organizations. Next, the problem of maintaining adherence to exercise received attention. Several "context" variables

were described which represented necessary but not sufficient conditions to enable employees to adhere to exercise in corporate fitness centers.

Two classes of variables which have been found to be related to exercise adherence, person and environmental characteristics, were described. Under the heading of person characteristics, SM, SEE, biological characteristics, and need for an exercise program were discussed. Under the heading of environmental characteristics, social support through group exercise norms, support of exercise through organizational culture, and activity choice were discussed. It was concluded that SEE would be a useful variable for the present research, due to both it's relationship with exercise and it's malleability. It was also concluded that future research should focus more on the influence on environmental characteristics; two such characteristics will be focused upon in the present study - social support and organizational culture.

Both static and process models of exercise adherence were also described. The transtheoretical model developed by Prochaska and DiClemente (1982) and applied to exercise by Marcus and colleagues was deemed the most useful framework to approach exercise adherence interventions. Several groups of interventions were reviewed and categorized according to their potential stage-specific sites of action.

In summarizing the results of interventions to enhance exercise adherence research to date, Marcus and Owen (1992) made the following statement:

"Stage-specific interventions have been successful in the area of smoking cessation...it is probable that this will also be the case for exercise adoption. Tailoring interventions to the specific needs of the population of interest will most effectively serve the goal of increasing the level of physical activity and thereby working toward attaining the fitness objectives that have been established for the year 2000. It is particularly important to tailor exercise interventions, given that the reason so many people drop out of exercise programs may be due to mismatches between their stage and the typical action-oriented programs that are offered" (p. 13).

THE PRESENT STUDY

The ultimate goal of exercise adherence research is to describe and apply interventions which will be maximally effective for each stage of adoption of exercise. Before this goal can be achieved, however, hypotheses concerning stage-specific differences in several of the above variables must be confirmed; this confirmation was the goal of the present study. The relationships between these variables were examined in a worksite and a student sample by determining the relationship between stage and: 1) context

variables, 2) person and environmental characteristics, including SEE, social support through group exercise norms, and support of exercise through organizational culture, 3) processes of change, 4) the pros and cons of exercise, 5) previously utilized interventions, and 6) demographics. The confirmation of stage-specific differences in this group of variables will permit the description of more effective stage-specific interventions to increase exercise adherence.

With this goal in mind the following set of hypotheses was proposed:

Hypotheses

It was hypothesized that there were stage-specific differences in all of the above variables. In particular, when the stages of adoption of exercise were ordered from precontemplation (the "earliest" stage), contemplation, preparation, action, maintenance, to super maintenance (the "latest" stage), the following were hypothesized to be true:

1) Person Characteristics:

Subjects in later stages of adoption of exercise are higher in SEE than subjects in earlier stages.

2) Environmental Characteristics:

a) Subjects in later stages of adoption of exercise have greater perceptions of social support through group exercise norms than subjects in earlier stages.

b) Subjects in later stages of adoption of exercise have greater perceptions of support of exercise through organizational culture than subjects in earlier stages. This hypothesis is contingent on the degree to which this measure achieves sufficient variance.

3) Processes of Change

Subjects in earlier stages of adoption of exercise use all processes of change less than subjects in later stages.

4) Pros and Cons

Subjects in earlier stages endorse con items more strongly, and pro items less strongly, than subjects in later stages of adoption of exercise.

5) Interventions

a) SEEE, social support through group exercise norms, contracting, decision-balance, and reward-based interventions are endorsed by subjects in the earlier stages of adoption of exercise as more useful than by subjects in the later stages.

B) Goal setting and lapse management interventions are endorsed by subjects in the later stages of adoption of exercise as more useful than by subjects in the earlier stages.

[Note: no stage-specific hypotheses were proposed for the context variables or for demographics due to the exploratory nature of these variables].

A series of single factor MANOVAs, including a procedure which tests for significant polynomial contrasts between stages, were used to test each of the above hypotheses. It was hypothesized that significant linear trends would be revealed for each of the above variables.

Method

Subjects

Data for this study was gathered from three separate research sites by administering to all subjects the "Orientation to Exercise Questionnaire" (the "Questionnaire") which was comprised of items designed to measure the above constructs, and the "Diary of Exercise Behavior" (the "Diary") which enabled subjects to record their exercise behavior for a two week time period (See Measures Section below for a more complete description of these measures). In total, 504 subjects responded to these measures. Outlined below are the characteristics of subjects at each site.

Student Sample.

Three hundred and sixty eight students from various undergraduate psychology courses were surveyed, including Industrial and Organizational Psychology, Social Psychology, and Introductory Psychology. Three hundred and forty nine students responded to both the Questionnaire and the Diary, producing a response rate across all groups of students of 95%; the response rate ranged from 87 to 100% within each individual class. Within each class, students were offered extra credit on class assignments or exams for choosing to participate in this research. Within one Introductory Psychology class, students were required to participate in psychological research in order to fulfill class

requirements; this experience also allowed students to gain greater exposure to psychological research. Students in this course could elect to: a) participate in approved research projects, b) attend pre-existing library workshops, or c) write a proposal for a simple experiment. Participation in this experiment fulfilled elective (a) for this subsample.

Sixty two percent of subjects in the student sample were female, and 77% reported their ages to be between 18 and 29; in addition, 77% of subjects were single. Twenty five percent of students reported that the highest educational level they had completed was High School, while 28% reported having completed some college, 26% reported having completed two years of college, and 21% reported having completed four years of college. Thus, subjects in this group were relatively young, well-educated, and unmarried.

In terms of health habits and cardiac history, 19% of subjects in this sample reported that they were currently smoking, 12% reported having had quit smoking, and 67% had never smoked. Ninety four percent of subjects reported having no personal history of cardiac disease.

Organizational Populations: Organization A and B.

Organization A.

Subjects from Organization A consisted of 354 employees of a major magazine publisher in New York City. Of these

354 potential subjects, 126 returned questionnaires (123 usable), producing a response rate of 36% for the Questionnaire. The response rate for the Diary was somewhat lower (i.e., 83 of 354 potential respondents or 24%). When only those employees who returned Questionnaires are considered, the response rate was much higher (i.e., 83/126, or 66%).

Fifty percent of subjects from Organization A were female, and 66% were between the ages of 20 to 39; in addition, 49.6% of these subjects were single. Subjects in this sample were highly educated, with 82% reporting that they had completed either four years of college or Graduate School.

In terms of health habits and cardiac history, 12% of subjects in this sample reported that they were currently smoking, 32% reported having had quit smoking, and 56% had never smoked. Ninety seven percent of subjects reported having no personal history of cardiac disease.

Organization A has an ongoing Level III fitness program maintained by employees of the magazine publisher. It includes an on-site fitness facility with both aerobic and strength training equipment, bi-annual motivational programs to encourage use of the facility, aerobic exercise classes, and a variety of health and wellness classes. While membership is open to all employees at this company, only approximately 200 employees are currently members of the

fitness center. Adherence rates (defined as the number of members utilizing the fitness facility in a one-month period) have ranged from 30 to 60%.

Organization B.

Subjects at this site were 570 attorneys at a large law firm in New York City. Of these potential 570 subjects, 29 returned usable surveys, producing a response rate of 5% for the Questionnaire. The response rate for the Diary was also 5%. Due to this low response rate, data from Organization B and Organization A are combined in the multivariate analyses to follow.

In terms of subjects at Organization B, 58.6% were female, and 62% were between the ages of 20 to 39; also, 48.3% were single. Subjects in this group had all completed four years of college or Graduate School. In terms of smoking behavior, 10.3% reported that they were currently smoking, while 17.2% had quit smoking, and 72.4% had never smoked. The vast majority (96.6%) of subjects reported having no personal history of cardiac disease.

Organization B also maintains an ongoing Level III fitness program, with many similarities to the fitness program at Organization A. Both aerobic exercise and weight training equipment is available, aerobics classes and one-on-one training are offered, and the site holds a yearly Health Fair including blood pressure and cholesterol screenings.

Unlike Organization A, however, the Fitness Center at Organization B is staffed by members of an outside organization hired to set up, maintain, and evaluate the center. In addition, the facility is open to only Attorneys and Directors at no charge; it is not available for use by support staff.

Adherence rates (again defined as the number of members utilizing the fitness facility in a one-month period) range from 27% to 30%.

Measures

[See Appendix A for the items comprising all of the following measures.]

1. Stages of Adoption of Exercise:

Since the stage measure was vital to assessing the hypotheses in this study, it was decided that multiple measures of stage should be gathered. Thus, "stage" was measured with three separate strategies described below.

Self-Report Measure:

In the Self-Report Measure of stage, stage was assessed using a revised version of Marcus and Owens' (1991; 1992) "Stages-of-Adoption of Exercise" instrument. Originally, this instrument required subjects to pick a rung on an 11-rung graphically-presented ladder that most accurately described their current exercise behavior; the rungs on the ladder represented a scale that indicated the five stages of adoption of exercise, with 0 labeled "I currently do not

exercise and I do not intend to start exercising in the next 6 months" (precontemplation), 2 labeled "I currently do not exercise, but I am thinking about starting to exercise in the next 6 months" (contemplation), 5 labeled "I currently exercise some, but not regularly" (preparation), 8 labeled "I currently exercise regularly but I have only begun doing so within the last 6 months" (action), and 10 labeled, "I currently exercise regularly and have done so for longer than 6 months" (maintenance). The Kappa reliability index for this scale over a 2-week period has been reported to be .78 ($N=20$; Marcus et al., 1992). It has been found to be significantly related to the Seven Day Recall Physical Activity Questionnaire (Marcus & Simkin, in press), as well as to SEE and decision making (Marcus & Owen, 1992; Marcus, Rakowski, & Rossi, 1992; Marcus, Selby et al., 1992).

As discussed earlier, in the present study, this instrument was revised to allow subjects to classify themselves into one of eleven separate stages of exercise. The original anchors for stage classifications formed the basis for this scale (i.e., "I currently do not exercise and I do not intend to start exercising in the next 6 months", etc.), with the addition of the following stages: a) intending to exercise, b) low preparation, c) low action, d) low maintenance, e) medium maintenance, and f) super maintenance. The purpose of this more fine-grained scale was to allow for the possibility that some subjects might

not fit into any of the five original categories. Expanding these categories would thus allow more subjects to accurately categorize their exercise behavior. Once all data was collected, these eleven stages were collapsed into Marcus et al's five original stages. As discussed earlier, the sixth stage, termed "super maintenance", was also included.

The Questionnaire with the revised Self-Report Measure was administered to a class of 29 undergraduates. The Self-Report Measure consisted of a list of eleven statements; subjects were asked to choose the one that best described their current exercise behavior (See Appendix A, Exhibit 1a). It was discovered that 4 of 27 respondents incorrectly classified themselves into more than one category using this scale. Based on these results, a minor revision was made of the measure in order to prevent similar problems in Organization A (See Appendix A, Exhibit 1b). While results were improved and seemed less likely to potentiate this error, again, several subjects chose illogical options (e.g., choosing both "I currently do not exercise" and "I currently exercise about 1 time per week"). A third minor revision was administered to another class of 32 undergraduates (See Appendix A, Exhibit 1c) and proved successful in eliminating this type of error. In this version, exercise was defined more specifically using the following statement:

"Please note: Exercise is defined here as any type of activity that elevates the heart rate, including but not limited to brisk walking, running, cycling, tennis, swimming, etc. Please do not include non-aerobic activities such as slow walking, gardening, etc. Please include exercise both in and outside of the Fitness Center".

This statement was included because it became apparent that subjects had questions regarding this issue during data collection at Organization A.

This third and final measure was used for Organization B and for the remaining student groups.

Thus, among the student groups, all three revisions of the Self-Report Measure of stage were used. Within the organizational groups, Organization A was tested with Revision 2 and Organization B was tested with Revision 3. It was deemed feasible to combine this data because revisions were minor, and because a test was performed to determine the comparability of these measures. In particular, the class of 32 undergraduates to whom Revision 3 was administered were provided with both Revision 2 and Revision 3 to test whether they would classify themselves the same on both. Results indicated that 92% of respondents (23 of 25) were able to do this, making a combination of data collected using Revision 2 and Revision 3 more reasonable (6 subjects neglected to fill out both measures;

their data is excluded from this calculation).

In general, both Revision 2 and Revision 3 allowed subjects to classify themselves into one of eleven stages of exercise behavior. They first checked off a box to indicate how many times per week they currently exercised, ranging from 0 to between 4 and 7 times per week. They next checked a box to indicate how long they had been exercising at that level.

As noted earlier, stage was then collapsed to the 6 stages which will be discussed here, including precontemplation, contemplation, preparation, action, maintenance, and super maintenance. Stage was determined by a combination of the above two questions, and then collapsed based on Table 2 (See Table 2 for the details of this calculation).

Table 2 Method used to group subjects into stages based on Self-Report Stage Measure.		
ANSWERS INDICATED BY SUBJECT (# of times exercising per week and length of time exercising at this level)	11-STAGE CLASSIFICATION	6-STAGE CLASSIFICATION
0 and no intention to start.	1 Precontemplation	1 Precontemplation
0 and thinking about starting.	2 Contemplation	2 Contemplation
0 and intend to start.	3 Intention	
1 time for less than 6 months	4 Low Preparation	3 Preparation
2 times for less than 6 months	5 High Preparation	
3 times for less than 6 months	6 Action	4 Action
4 to 7 times for less than 6 months	7 Super Action	
1 time for longer than 6 months	8 Low Maintenance	5 Maintenance
2 times for longer than 6 months	9 Medium Maintenance	
3 times for longer than 6 months	10 High Maintenance	
4 to 7 times for longer than 6 months	11 Super Maintenance	6 Super Maintenance

Within the organizational sample, it was necessary to further collapse the stage measure due to insufficient sample size in both the precontemplation and the preparation stages. Where possible (i.e., pros and cons, interventions 1-7) the six stage categories were used to allow a clearer interpretation of the consistency of results between the student and the organizational samples.

Diary Measure:

The Diary Measure of stage measured stage through the use of a 2-week diary of exercise behavior (see Appendix A, Exhibit 2). This measure allowed subjects to record their exercise behavior over a 2-week period of time following the administration of the Questionnaire. Subjects were asked to indicate whether they exercised or not on each day (yes/no), the amount of time that they exercised in minutes, and the intensity of that exercise. They were also asked to indicate whether the amount that they had exercised in those two weeks was more, equal to, or less than the amount they had exercised for the last six months. Diaries were returned to the author at the end of the two week period.

Subjects were classified into stages using the following strategy:

1. The average number of times exercised per week was calculated for each subject, adding all occasions of exercise of 20 minutes or more and dividing by the number of weeks that the diary was kept.

2. Note was taken of whether the subject reported that this exercise was more (m), equal to (e), or less (l) than was typical for the subject in the last six months.
3. The above data was compared to Table 3 to determine stage (See Table 3). Again, stage was then collapsed from the original 11 to a 6 stage categorization.

Table 3 Method used to categorize subjects into stages based on Diary and Computer recorded exercise data.				
11-Stage Classification	6-Stage Classification	Average number of times exercised over 2 week Diary or 3 month Computer Record	Level of exercise reported during diary	Shift in exercise behavior over 3 months
1 Precontemplation	2 Non-exerciser	0		
2 Contemplation		0		
3 Intention		0		
4 Low Preparation	3 Preparation	1	Exercised more in the last 2 weeks than in the last 6 months	>1 Stage shift in 3 months
5 High Preparation		2	More	>1
6 Action	4 Action	3	More	>1
7 Super Action		4 to 7	More	>1

Table 3 (Continued) Method used to categorize subjects into stages based on Diary and Computer recorded exercise data.				
8 Low Maintenance	5 Maintenance	1	Exercised equal in the last 2 weeks to the last 6 months	Less than or equal to 1 Stage shift in three months.
9 Medium Maintenance		2	Equal	<1
10 High Maintenance		3	Equal	<1
11 Super Maintenance	6 Super Maintenance	4 to 7	Equal	<1

Note. Subjects who indicated that they exercised "less" in the 2 week Diary than in the last 6 months were categorized as if they had indicated "equal"; this was taken into account in the validation of the self-report Stage measure to follow. Stage 1, 2, and 3 were grouped together to categorized subjects who indicated no exercise; it is impossible to differentiate between these 3 stages using a behavioral measure, as differences in these stages are cognitive rather than behavioral.

Computer Recorded Exercise:

The Computer Recorded Measure of stage was utilized for a subset of subjects in Organization A. Here, stage was operationalized through the use of computerized records of exercise which were customarily input by gym members immediately following the exercise session (See Appendix A, Exhibit 3 for an example of this record). Members were able to determine these values by reading the output from each machine that they utilized. For example, at the end of each exercise session on a step-climbing machine, this machine displayed to the member a record of intensity and duration of exercise. Members then input the data from these machines into a computer terminal available in the fitness center.

Records were converted monthly into several summary statistics by the "Fitness Evaluation Program" used by the organization. Records were obtained for the three months prior to the survey in Organization A. Each subject's average number of exercise sessions per month was calculated, including only those sessions which were greater than or equal to 20 minutes in length. These averages were used to calculate stage of exercise by the use of Table 3 (see Table 3 above), which categorized subjects based on both the average number of times they exercised over the three-month measurement period, and whether they maintained a consistent level of exercise across those three months

(i.e., "maintained" their exercise behavior). To determine whether subjects were "maintainers", the meaning of the "maintenance" stage was considered. A subject was deemed to be at one of the maintenance stages only if they had exhibited one or fewer shifts in stage over the three month measurement period. For example, if a subject shifted from exercising 3 times a week to exercising 2 times a week, but averaged 3 times per week over the 3 month period, they would be staged at the high maintenance stage. If however, the subject shifted from exercising 3 to 0 times per week, and still averaged 3 times per week over the entire 3 month period, they would be "staged" at action. The theory behind this placement is that maintenance entails maintaining the same pattern of exercise behavior over a period of time.

2. Context Variables:

Context variables were described earlier as necessary but not sufficient to lead to exercise adherence. The presence and importance of these context variables was assessed by asking subjects to indicate whether each of the following context variables are adequate in their worksite (Yes/No), and evaluating the importance of these variables in their decision to exercise or not to exercise on a 5-point Likert scale (1=very important, 5=not at all important) (See Appendix A, Exhibit 4). The context variables included were:

- a) ability to incorporate exercise into daily routine,

- b) ability to exercise during working hours,
- c) ability to exercise in/close to home,
- d) perceptions of time availability,
- e) the need for a regular exercise routine, and
- f) perceptions of whether facilities were adequate.

Mean scores for each item are described, as well as the perceptions of the relative importance of these items in determining the subject's decision to exercise or not to exercise. The use of this measure was exploratory, and no specific hypotheses were proposed or tested.

3. Self-Efficacy for Exercise (SEE):

SEE was assessed by a revised version of McAuley and Courneya's (1992) 10-item exercise-specific self-efficacy scale, designed to measure subjects' perceived capabilities to exercise three times per week in the face of barriers to participation (See Appendix A, Exhibit 5). Subjects were asked to indicate on a rating scale (ranging from 0 to 10) their degree of confidence in being able to exercise in the event that they had to overcome each barrier or obstacle presented in this scale. This measure was reported to have acceptable levels of internal consistency ($\alpha=.85$, McAuley, 1992); reliability was confirmed in a pilot study of personal and environmental determinants of exercise which utilized this measure ($\alpha=.88$, $N=71$) (Peters, 1993b). Peters (1993b) also reported that this measure significantly correlated with the number of calories expended during a

six-week exercise and weight-loss contest ($r=.25$, $N=75$, $p<.05$). Results from Peters (1993b) also revealed, however, several items with low item-total correlations; these items were removed from the scale. Replacement items were borrowed from Marcus and Owen's (1992) self-efficacy for exercise scale, which assessed subjects confidence that they could continue to exercise if they were in a bad mood, they were tired, or they felt they didn't have enough time.

In the present study, this revised measure had acceptable internal consistency ($\alpha=.82$, $N=478$), and item-total correlations ranged from .40 to .62.

4. Social Support through Group Exercise Norms:

In an attempt to address both the issue of the mechanism of action, as well as to replicate the operationalizations of support in the exercise adherence literature, social support was operationalized here in terms of the supportiveness of group norms for exercise. In particular, items were used from a survey developed by Allen (1982) which measures perceptions of norms that are interfering with positive health practices (the Life-Gain Health Practices Norm Indicator) (See Appendix A, Exhibit 6). These items measure the extent to which the various groups to which subjects belong support certain health norms. It was expected that, if group norms were supportive of exercise, group members would be more likely to adhere to exercise. Since individuals are likely to be members of many

groups, this instrument assessed the supportiveness of all groups combined. Subjects indicated whether each item was true or false for them (e.g., "Typically, people in one or more of the groups that I belong to (e.g., family, friends, work groups) exercise three times a week). Two items represented positive health norms, while eight items represented negative health norms. Subjects were awarded 1 point for checking "true" to a positive health norm and 1 point for checking "false" to a negative health norm; thus scores could range from 0 to 10, with higher scores indicating that subjects belonged to groups more supportive of exercise. Alpha reliability for this scale was acceptable in this study ($\alpha=.73$, $N=447$).

5. Support of Exercise through Organizational Culture:

Organizational culture with respect to exercise was operationalized here at the "forms" and/or "values" level of culture; it was measured by surveying subject's perceptions of the supportiveness of their organization's culture with respect to exercise, using two items from the "Organizational Support Indicator" (Allen, 1982) (See Appendix A, Exhibit 7). The Organizational Support Indicator asks employees to rate how well their organizations are doing in providing positive and constructive support for people who are attempting to improve their health practices (Allen, 1982). Ostwald (1989) reports that this measure has acceptable levels of

reliability (Alpha ranging from .76 to .96), and that scores on this measure increased when an organization implemented a group of health promotion interventions. Items were scored on a 5-point scale, where 1 indicated the organization was doing very well in supporting health, and 5 indicated it was doing very poorly; all items were later recoded to maintain a consistent direction with the other measures in this study, such that 1=very poor and 5=very well. Alpha reliability for this two-item scale was quite high ($\alpha=.94$, $N=453$).

As discussed earlier, it is unclear whether perceptions of "exercise culture" will be uniform across all subjects; therefore, the variance of this measure was evaluated prior to its use in predicting stages of adoption of exercise. Results revealed some evidence of range restriction, but not so severe as to prohibit hypothesis testing using this measure.

6. Processes of Change:

35 items from the 39-item Processes of Change Questionnaire (PCQ) developed by Marcus et al. (1992) were used to measure the strategies and techniques that people use as they progress through the different stages of exercise adoption. This instrument measures each of the following 10 change processes: consciousness raising, dramatic relief, environmental reevaluation, self-reevaluation, social liberation, counterconditioning,

helping relationship, reinforcement management, self-liberation, and stimulus control (see Table 1 for a more complete definition of each of these processes); social liberation was not measured here, as these items did not appear to fit the scale anchors. Each item was measured on a 5-point Likert scale ranging from never (1) to repeatedly (5); subjects were instructed to think back over the past month and to rate the frequency of occurrence of each item (see Appendix A, Exhibit 8). Alpha reliabilities for the 9 scales in this study ranged from a high of .82 ($N=484$) for consciousness raising, to a low of .63 ($N=481$) for stimulus control; all other scales fell within these ranges.

7. Pros and Cons of exercise:

The pros and cons of exercise were assessed by Marcus et al.'s (1992) 16-item Decisional Balance measure (see Appendix A, Exhibit 9). This measure consists of 6 "con" items that highlight unfavorable perceptions and reasons not to exercise, and 10 "pro" items that highlight a positive perception of exercise. The tense of all items was revised to fit scale anchors more appropriately (e.g., from "I have more energy for family and friends" to "Having more energy for family and friends"). Subjects were asked to indicate, on 5-point Likert scales ranging from not at all important (1) to extremely important (5), how important each statement was with respect to their decision to exercise or not to exercise. Internal consistency estimates for both cons and

pros in this study were acceptable (Cons=.72, N=469; Pros=.87, N=471).

8. Perceptions of motivational power of interventions in encouraging exercise adherence:

Perceptions of the motivational power of this set of interventions was assessed by asking subjects to rate the degree to which they believed each intervention would be motivating in helping them to begin or to continue to exercise. This measure was developed specifically for the present study by creating one-paragraph descriptions of each intervention from the literature on exercise adherence. Subjects were asked to read each description, and to rate, on a 7-point Likert scale, the degree to which they believed the intervention would be motivating in encouraging them to start or continue to exercise, where 1=not at all motivating and 7=very motivating (see Appendix A, Exhibit 10).

9. Demographics:

Subjects were asked to indicate their age, marital status, educational level, smoking status, and history of cardiac disease (see Appendix A, Exhibit 11).

Procedure

During the Spring of 1994, the Questionnaire and the Diary were administered to a group of 29 undergraduates enrolled in an Industrial & Organizational Psychology course in order to verify the quality of the proposed measurement instruments. Students were informed that their participation was strictly voluntary, that all results would be kept confidential, and that they were free to withdraw from the study at any time. They were offered 10 points of extra credit on their final exam as an incentive to encourage participation, and an alternative library assignment was proposed for those students who wished to earn extra credit but did not wish to participate in psychological research. All students were provided with a Questionnaire and a dated Diary; they were instructed to return all materials within two weeks.

Following analysis of this data, the Self-Report Measure of stage was revised as described in the "Measures" section above.

The Questionnaire with this revised stage instrument was used to collect data at Organization A. The CEO of Organization A was approached by the author and the Fitness Director at Organization A and encouraged to provide a cover letter to accompany the measures. He volunteered another member of senior management to write this letter, as this individual currently utilized the fitness center and was

well known by the staff. This letter, and an informed consent letter created by the author (See Appendix B) were combined with the Questionnaire and the Diary. All materials were then hand distributed or left in the offices of employees by the author with the permission of senior management during a one-week period. Materials were handed out on Thursday, Friday, Monday, and Tuesday, and were either picked up at employee's desks by the author, or returned to the fitness center via interoffice mail. Employees who were present while the materials were handed out were told a) the purpose of the study, b) what they were being asked to do, and c) information concerning confidentiality and the voluntary nature of this research.

Results were analyzed from Organization A, and it was determined that there was a strong under-representation of subjects at earlier stages of exercise. As the hypotheses in this research revolved around the stage measure, it was deemed necessary to collect additional data. It was also noted that several employees asked for clarification of the definition of exercise, and queried whether to include exercise both in and outside of the fitness center. Finally, it was noted that several subjects classified themselves into illogical categories. Therefore, the Self-Report measure of stage was revised as described above (See "Measures" section).

The Questionnaire with Revision 3 of the stage

instrument was administered to a summer session Industrial & Organizational Psychology course, consisting of 32 junior and senior level students. Results indicated that the minor revision led to fewer illogical answers, and that subjects classified themselves at the same stage in both Revision 2 of the instrument and Revision 3.

The Questionnaire with Revision 3 of the stage measure was utilized at both Organization B and for the larger sample of undergraduates.

At Organization B, the author was not authorized to hand-deliver the materials. Therefore, all materials were delivered to attorneys via interoffice mail. The Director of Administration volunteered to provide an accompanying cover letter, explaining the nature of the materials; this was attached to an informed consent letter and form created by the author (See Appendix C). All materials were also returned via interoffice mail, to the Fitness Center. These data are combined with the data from Organization A in the analyses to follow.

During the fall of 1994, data were also collected on five other groups of students for the purpose of testing the generalizability of the results across academic and organizational settings. The same procedure was followed in each group, which consisted of explaining the nature of the research, providing information regarding confidentiality of data, and collecting informed consents from each student

(see Appendix D). All students filled out the Questionnaire in class, and were given a Diary to fill out for the next two weeks. Diaries were either returned to the class instructor or to a prearranged drop-off site. All students in these groups were provided with a written debriefing regarding the nature of the experiment (See Appendix E).

Based on their responses to this questionnaire, subjects were classified according to their stage of adoption of exercise; the relationship between stage of exercise and each of the variables described above was then determined using a series of MANOVAs which included tests for polynomial contrasts (i.e., trend analysis).

RESULTS

Results will be presented in several sections, beginning with descriptive statistics, and followed by discussion of the validation of the Self-Report Measure of stage, as well as a series of factor analyses used to provide further evidence regarding the meaning of several scales revised for this study. Next, a group of hypothesis tests will be described for both student and organizational samples, and finally, an exploratory analysis using the demographic variables of gender, age, and educational level will be described.

Descriptive statistics

Table 4 reports the means, standard deviations, and sample sizes for all independent and dependent variables

broken down by student and organizational samples.

Table 4 Descriptive Statistics						
	Student Sample			Organizational Sample		
	Mean	S.D.	n	Mean	S.D.	n
Stage ^a	3.40	1.54	328	4.49	1.41	152
Computer Recorded Stage ^a	-	-	-	4.09	1.07	78
Diary Measured Stage ^a	4.30	1.50	276	4.74	1.37	103
SEE ^b	5.0	2.0	328	5.7	2.0	150
Social Support ^c	3.9	2.5	319	5.2	2.7	127
Organizational Culture ^d	2.5	1.2	304	4.2	0.9	149
Consciousness Raising ^e	2.9	1.1	335	2.7	1.0	149
Dramatic Relief ^e	2.8	1.0	334	2.5	1.0	150
Environmental Reevaluation ^e	2.3	1.0	333	1.8	0.8	149
Self- Reevaluation ^e	3.6	0.9	336	3.4	1.0	149
Counter Conditioning ^e	3.1	1.0	338	3.5	0.9	148
Helping Relationships ^e	2.3	1.0	336	2.2	1.0	145
Reinforcement Management ^e	3.0	0.9	338	2.9	0.8	146

Table 4 (Continued) Descriptive Statistics						
	Student Sample			Organizational Sample		
	Mean	S.D.	n	Mean	S.D.	n
Self-Liberation ^e	3.5	0.9	335	3.6	0.9	147
Stimulus Control ^e	2.2	0.8	332	2.1	0.8	149
Pros ^f	3.9	0.7	322	3.7	0.9	149
Cons ^f	2.9	0.8	320	2.4	0.8	149
Self-Efficacy Enhancement ^g	4.2	1.7	334	3.0	1.8	148
Social Support Intervention ^g	5.3	1.6	335	3.6	2.3	149
Contracting Intervention ^g	3.8	2.1	335	2.8	2.1	149
Decision Balance Intervention ^g	4.2	1.7	334	2.9	1.8	148
Goal Setting Intervention ^g	4.8	1.6	334	4.1	2.0	149
Rewards Intervention ^g	4.7	1.8	335	2.9	1.9	147
Relapse Prevention Intervention ^g	4.1	1.7	334	3.0	1.9	147

Table 4 (Continued) Descriptive Statistics						
	Student Sample			Organizational Sample		
	Mean	S.D.	n	Mean	S.D.	n
Could fit exercise into daily routine ^h	0.8	.04	315	0.9	0.3	123
Could exercise during working hours ^h	0.2	0.4	310	0.8	0.4	120
Could exercise in or close to home ^h	0.9	0.3	311	0.8	0.4	118
Have enough time to exercise ^h	0.8	0.4	311	0.9	0.3	118
Need a regular exercise routine ^h	0.8	0.4	312	0.7	0.5	118
Would have adequate facilities ^h	0.5	0.5	311	0.9	0.3	117
Importance of being able to fit exercise into daily routine. ⁱ	4.0	1.1	334	4.4	0.9	145
Importance of being able to exercise during working hours. ⁱ	2.6	1.4	315	3.4	1.4	146

Table 4 (Continued) Descriptive Statistics						
	Student Sample			Organizational Sample		
	Mean	S.D.	n	Mean	S.D	n
Importance of being able to exercise in or close to home. ⁱ	4.2	1.1	333	3.4	1.3	143
Importance of having enough time to exercise. ⁱ	4.3	1.0	330	4.5	0.8	145
Importance of having a regular exercise routine. ⁱ	3.8	1.3	331	3.7	1.3	143
Importance of having adequate facilities . ⁱ	3.5	1.4	332	4.0	1.2	145

Note. ^aStage was collapsed from an 11 to a 6-point scale (1=Precontemplation, 2=Contemplation, 3=Preparation, 4=Action, 5=Maintenance, 6=Super Maintenance). ^bSEE judgements were made on an 11-point scale (0=not at all confident, 10=completely confident). ^cSocial Support judgements were made on a 2-point scale (1=true, 0=false) and later converted to a summary scale ranging from 0 (no social support) to 10 (high social support). ^dJudgements for Organizational Culture were made on a 5-point scale, in response to the question "How well is X Organization doing in actively, constructively, and consistently supporting people in their efforts to 1) exercise regularly and 2) attain and maintain a good state of fitness?" (1=very poor, 5=very well). ^eJudgements for all Processes of Change were made a 5-point scale in response to the question "Rate how frequently each of the following occurs for you by circling the number for each item which best describes your experience" (1=never, 5=repeatedly). ^fBoth Pros and Cons of Exercise were rated on a 5-point scale in response to the question "How important is each of the following in your decision to exercise or not to exercise?" (1=not at all important, 5=extremely important). ^gAll interventions were rated on a 7-point scale in response to the question "...rate how motivating you feel this method would be in encouraging you to continue or to exercise" (1=not at all motivating, 7=very motivating). ^hAll Context variables were rated as either adequate (Yes=1) or inadequate (No=0). ⁱThe importance of all Context variables was rated on a scale from 1 to 5, where 1=not at all important and 5=very important.

An examination of Table 4 reveals that subjects in the student sample achieved a mean stage score of 3, the preparation stage, while subjects in the organizational sample achieved a mean stage score of 4, the action stage. In both samples, subjects who returned Diaries appeared to be at somewhat later stages than subjects who returned the Questionnaire alone. Perceptions of SEE, social support, and organizational culture also appear to be somewhat higher in the organizational than the student sample.

A potential range restriction existed in the organizational culture measure. Within the organizational sample, scores on organizational culture were reported across the full range of the scale (i.e., from 1 to 5); however, 75.2% of subjects scored between 4 and 5. These scores indicate the 75.2% of subjects who responded to the questionnaire believed their organizational cultures to be supportive or highly supportive of exercise. The variance in this measure was .83, no lower than several of the other measures used in this study (e.g., the variance of self-liberation was .72).

Within the student sample we would expect less range restriction in perceptions of organizational culture, as students worked in a variety of organizations. Results indicated that the student sample, in contrast to the organizational sample, was more positively skewed, with 46.1% of subjects scoring between 1 and 2, indicating that

they believed their organizational cultures to be very poor or poor in terms of supporting exercise. The variance here, as expected, was larger than in the organizational sample (1.54), which appears large enough to prevent range restriction.

Given these results, the hypothesis that organizational culture was related to stage of adoption of exercise was tested. It is more likely that this will be true among the student rather than the organizational sample, given the more obvious negative skew to the organizational data.

Validation of the Self-Report Measure of Stage of Adoption of Exercise

The Self-Report Measure of stage serves as the basis for the analyses to follow. Therefore, it was important to determine the validity of this measure. Convergent validity was determined by examining the relationship between this measure and the two other operationalizations of stage (the Diary measure, and the computer recorded exercise measure) using both correlations and repeated measures t-tests.

To assess the relationship between the Self-Report Measure and the Diary measure, a correlation was calculated between subjects' stage for each measure. Only subjects who reported that the exercise they recorded during the Diary period was "about equal" to the exercise they had performed over the last six months were used for this analysis. Results of this analysis revealed that the Diary was

significantly correlated with the Self-Report Measure ($r=.54$, $p<.001$, $n=187$).

A similar strategy was used to determine the relationship between the Self-Report Measure of stage and the computerized measure. Again, the two measures were significantly correlated ($r=.47$, $p<.001$, $n=77$). The smaller sample size in this correlation is due to the fact that only members of Organization A could record their exercise via computer terminal in their fitness facility.

Both these correlations are sufficiently high to provide some evidence for the convergent validity of the Self-Report Measure of stage.

Another method of investigating the validity of the Self-Report Measure was to determine whether mean stage score on this measure were significantly different from mean stage score on the Diary and computer recorded measure. A repeated measures t-test was used to determine whether subjects who returned Diaries reported the same mean stage scores on both the Diary and the Self-Report Measure. A similar analysis was performed for the computer measure. Among subjects who returned the Diary, mean stage score was 4.42 ($n=358$); within this same group of subjects, however, Self-Report stage score was 3.87 ($n=358$); the mean Diary stage score was significantly higher than the Self-Report stage score, $t(358)=7.14$, $p<.001$.

It should be noted that this result included all

subjects who returned Diaries. A more appropriate validation of the Self-Report Measure can be performed by looking at three subsamples of subjects - those who reported that their exercise during the 2 week Diary was equal to their exercise over the last 6 months ("equal exercise"), those who reported that their exercise was less in the last 2 weeks than in the last 6 months ("less exercise"), and those who reported that their exercise was more in the last 2 weeks than in the last 6 months ("more exercise"). No significant difference would be expected between Self-Report and Diary stage in the "equal exercise" group. Contrary to this expectation, however, there was a significant difference in Diary stage and Self-Report stage, such that Diary stage was higher, $t(187)=7.38$, $p<.001$. In contrast, for subjects in the "less exercise" group, a significant mean differences in Diary and Self-Report stage would be expected. Results, however, did not support this expectation (i.e., there was no significant difference between Diary and Self-Report stage in this subsample). There was a significant difference, however, between Diary and Self-Report stage in the "more exercise" group, $t(65)=2.85$, $p<.01$, such that Diary stage was higher than Self-Report stage. In total, this group of t-tests suggests that the Diary and Self-Report measures are not completely convergent.

A similar repeated measures t-test was performed for

those subjects who recorded their exercise via computer. Mean Self-Report stage and mean computer recorded stage would be equal if these measures were completely convergent. Results, however, indicated that mean Self-Report stage was significantly higher than mean computer recorded stage, $t(77) = -6.13$, $p < .001$. Thus, subjects reported significantly higher stages via the Self-Report measure than via computerized records of exercise behavior. Like the Diary measure, these results suggest that the Self-Report measure is not completely convergent with the other measures of stage.

Factor Analysis

Both exploratory and confirmatory factor analysis were performed to examine and to verify the factor structure of two of the measures utilized in this study, including SEE and social support. While exploratory factor analysis is appropriate for testing the factor structure of scales, it does not provide any index of the "fit" between a proposed factor structure and the true factor structure; it is useful to explore factor structure when we are unsure as to how many factors exist. In contrast, confirmatory factor analysis provides fit indices comparing our model of the covariance between items or the factor structure, and the true covariance between items. It was expected that both SEE and social support scales would load on only one factor. Therefore, it was deemed necessary to confirm this

structure.

In the exploratory analysis, each set of items was subjected to principal axis factoring with a varimax rotation. Only factors with eigenvalues greater than 1 were retained. For SEE, 3 factors were revealed, accounting for 47.6% of the total item variance. This was contrary to expectations. Exploratory analysis, however, does not provide a measure of how well a one-factor model would fit this data. Therefore, confirmatory factor analysis was carried out to evaluate the fit of one and two-factor models.

Confirmatory factor analysis was performed using the LISREL computer program, version 7.16. Three models were compared, and evaluated for fit.

1. Null Model. A null model was created as a baseline against which other models could be evaluated. In this model, Sigma, or the 10x10 covariance matrix among the items, was constrained to be a diagonal matrix. Thus, this model evaluated the fit of a ten-factor model, as if all the items were mutually uncorrelated and there were no common factors.
2. 1-Factor Model. This model tested the fit of a one-factor model.
3. 2-Factor Model. This model tested the fit of a two-factor model.

Because the third factor in the exploratory analysis

was composed of only one item, a three-factor model was not tested here. Table 5 provides the fit statistics for all three models.

Table 5 Comparative Fit Indices for Alternate Self-Efficacy for Exercise Factor Models					
	χ^2	df	RNI	RMSEA	GFI
Null Model	1443.15	45	-	-	.494
1-Factor Model	369.08	35	.761	.141	.845
2-Factor Model	99.42	26	.947	.077	.958

Note. N=478.

RNI=relative homocentrality index, an index of relative fit as compared to the null model. Values of .90 and above indicate good fit.

RMSEA=root mean square error of approximation, an index of absolute fit of the model being tested. Values of .08 or below indicate acceptable fit, while values of .05 or below indicate good fit.

GFI=goodness-of-fit, an index of the absolute fit of the model being tested. Values of about .90 and higher indicate good fit.

Based on the above fit indices, a 2-factor model seemed to provide the best fit. The correlation between the two factors was .50. The exception was item 4, "I would exercise if I had to exercise alone", which loaded almost equally on the 2 factors, but slightly higher on Factor 2. Factor loadings mirrored the results in the exploratory analysis, with the exception of the items "I would exercise if I felt I didn't have the time" (loaded on Factor 3 in the exploratory analysis) and "I would exercise if I had to exercise alone" (loaded on Factor 1 in the exploratory

analysis). Table 6 presents the completely standardized factor loadings for all ten items on the two factors for the confirmatory analysis.

Table 6 Factor Loadings for Confirmatory Factor Analysis for the Self-Efficacy for Exercise Scale		
	Factor 1 loading	Factor 2 loading
I would exercise if I was bored by the program or activity.	.66	
I would exercise if I felt I didn't have the time.	.39	
I would exercise if I felt discomfort when exercising.	.38	
I would exercise if it were not fun or enjoyable.	.80	
I would exercise if I didn't like the particular activity or program.	.84	
I would exercise if I felt self-conscious about my appearance when I exercised.	.31	
I would exercise if I had to exercise alone.		.26
I would exercise if I was in a bad mood.		.78
I would exercise if I was tired.		.57
I would exercise if I was under personal stress of some kind.		.79

Note. Factor 1 = "Self-efficacy for overcoming cons of exercise", and
Factor 2 = "Self-efficacy for overcoming personal discomforts in order to exercise".

As revealed by Table 6, the first SEE factor is composed of items which appear to represent the cons or drawbacks that may be experienced when exercising. Therefore, this factor was termed "Self-efficacy for

overcoming the cons of exercise". The second factor was composed of those items derived from the three items chosen from the Marcus and Owen's (1992) self-efficacy for exercise scale, and from one item which loaded almost equally on both factors, "I would exercise if I had to exercise alone". This factor was termed "Self-efficacy for overcoming personal discomforts in order to exercise". While two factors were thus revealed for the SEE measure, the internal consistency and item-total correlations reported earlier justify using this measure as a single scale. Future research using this scale may benefit by testing the relationships between each factor and stage.

For the social support measure, factor analysis also revealed three factors, accounting for 35.2% of total item variance. Factor 1 was comprised of 3 items, while Factor 2 was comprised of 6 items. The third factor consisted of only one item and thus will not be discussed further.

Confirmatory factor analysis was then performed on this scale, using a method similar to that for the SEE scale. In particular, a null model was first tested which did not allow for correlations between items, and thus tested a ten-factor model. This model was used as a baseline against which to compare a one and a two-factor model. Comparative fit indices for these three models are presented in Table 7.

Table 7
Comparative Fit Indices for Alternate Social Support
Factor Models

	χ^2	df	RNI	RMSEA	GFI
Null Model	799.68	45	-	-	.651
1-Factor Model	175.80	35	.813	.095	.915
2-Factor Model	38.92	26	.983	.033	.983

Note. N=447.

RNI=relative homocentrality index, an index of relative fit as compared to the null model. Values of .90 and above indicate good fit.

RMSEA=root mean square error of approximation, an index of absolute fit of the model being tested. Values of .08 or below indicate acceptable fit, while values of .05 or below indicate good fit.

GFI=goodness-of-fit, an index of the absolute fit of the model being tested. Values of about .90 and higher indicate good fit.

The fit indices in Table 7 indicate that the a two-factor model fits the data relatively well. Table 8 presents the standardized factor loadings for all items.

Table 8
Factor Loadings for Confirmatory Factor Analysis for the
Social Support for Exercise Scale

	Factor 1 loading	Factor 2 loading
...exercise three times a week.	.89	
...make exercise a priority in their daily schedules.	.55	
...are a few pounds overweight.		.57
...look on exercise as a grind.		.61
...skip exercise due to other pressures.		.40
...drive short distances rather than walk.		.70
....don't exercise much.		.52
...use the elevator instead of the stairs		.48
...think of being "slightly" overweight as natural.		.33
...don't balance their food intake with their physical exercise.		.70

Note. N=447. Factor 1 = "Positive norms of exercise behavior" and Factor 2 = "Negative norms of exercise behavior". All items began with the phrase: "Typically, people in one of more of the groups that I belong to...".

As revealed by Table 8, Factor 1, termed "Positive norms of exercise behavior", was composed of two items which were worded to indicate group norms which were supportive of exercise. In contrast, Factor 2, termed "Negative norms of exercise behavior", consisted of eight items which were worded to indicate group norms which were unsupportive of exercise. The correlation between the two factors was .67.

This factor structure thus appears to be due to the

direction of the items, which may be of less theoretical interest than if the items loaded on a different type of category. This result somewhat mirrored the exploratory analysis, with the exception of item 9, "...think of being slightly overweight as natural", which loaded by itself on a third factor, and item 6, "...don't exercise much", which loaded on Factor 1.

Like the SEE scale, factor analysis revealed greater than one factor underlying the social support scale. However, internal consistency estimates were sufficiently high to justify using this set of items as one scale. In addition, the two factors underlying the social support scale may be due more to method of measurement than to any theoretically interesting characteristic of these two factors.

This series of factor analyses provides further data regarding the validity and factor structure of these measures. Next, we will proceed to test the hypotheses of interest in this study.

Tests of Hypotheses

A series of single-factor MANOVAs were used to calculate the significance of a main effect for the Self-Report Measure of stage for several theoretically grouped variables as follows: 1) organizational culture, social support, and SEE;; 2) the 9 processes of change; 3) pros and cons; and 4) interventions 1-7. A trend analysis was

performed within each MANOVA which tested for the presence of significant fifth, fourth, third, second, and first order trends. It should be noted that a linear trend was hypothesized for each variable. In addition, the description of subjects' perceptions of their "contexts for exercise" and the importance of this context will be described. Finally, the exploratory analysis of the relationship between stage and three demographic variables will be described.

Hypotheses were tested separately for student and organizational samples; students results are reported first. Stages in the student sample were grouped as described in the Measures Section, including precontemplation, contemplation, preparation, action, maintenance, and super maintenance stages. Among the organizational sample, it was necessary to collapse these stages further into four or five-stage models. The details of this grouping will be reported for individual hypotheses.

Student Sample

Organizational Culture, Social Support and Self-Efficacy for Exercise.

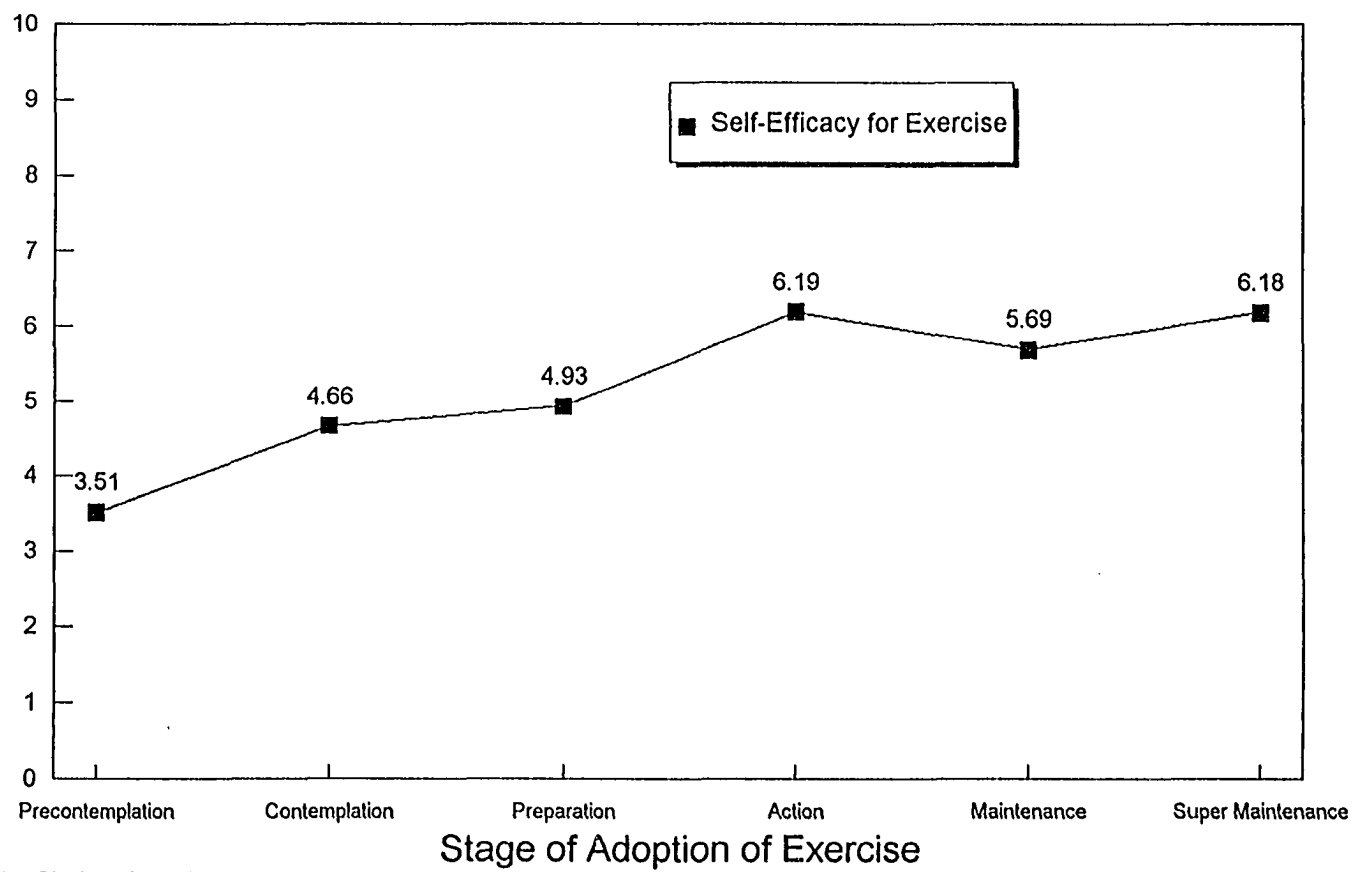
A single-factor MANOVA with stage as the factor and three dependent variables (organizational culture, social support and SEE) was run, along with a test to explore the significance of several polynomial contrasts. This test revealed a significant linear trend for stage, Wilk's

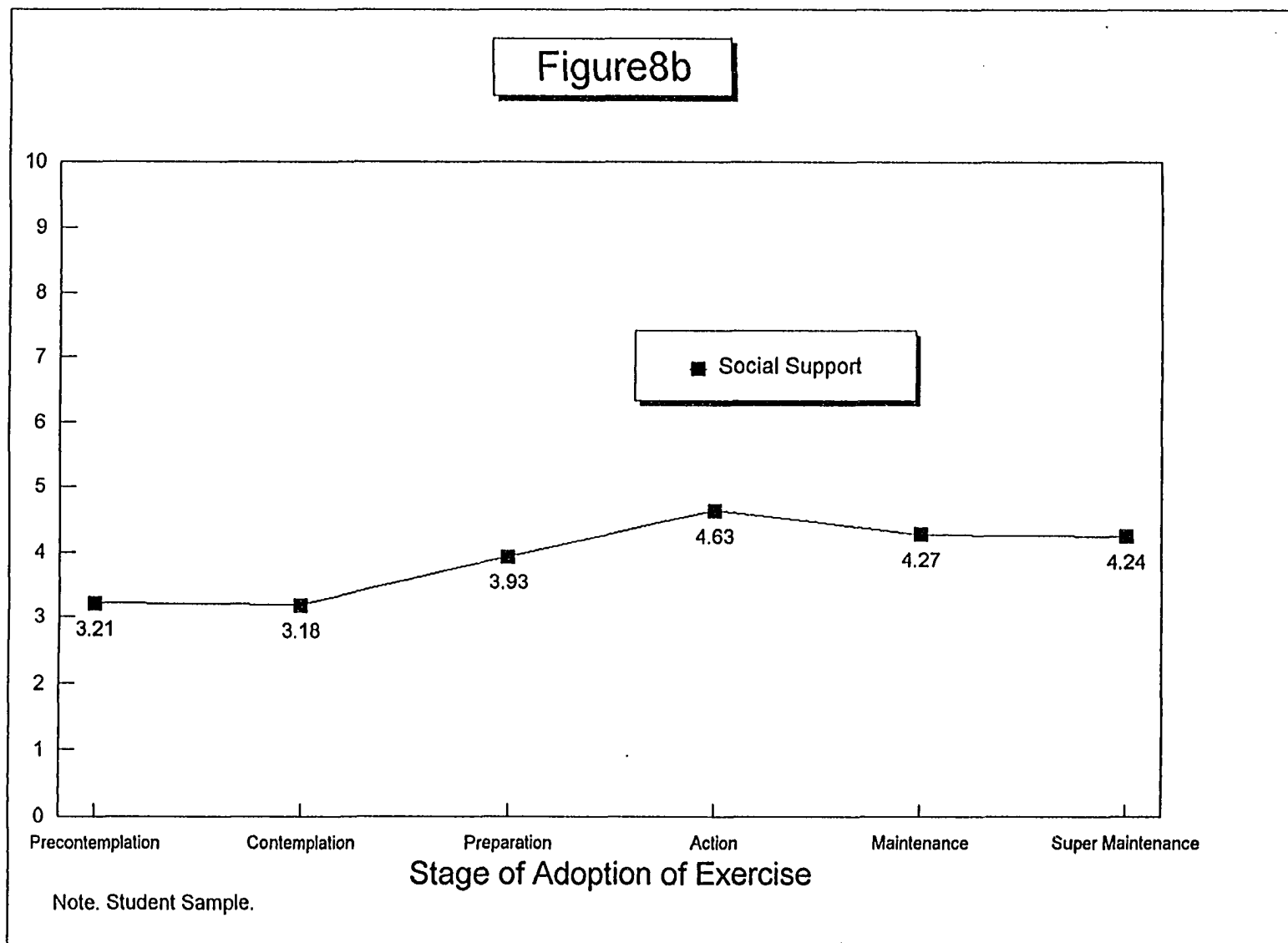
$\lambda=.894$, approximate $F(3,255)=10.06$, $p<.001$. No other polynomial contrast was significant.

Individual univariate tests for significant trends indicated that both social support and SEE exhibited significant linear trends, $F(1,257)=4.30$, $p<.05$, and $F(1,257)=27.25$, $p<.001$, respectively. Organizational culture did not exhibit any significant trends.

Means for SEE and social support are graphed in Figures 8a and 8b.

Figure 8a





9 Processes of Change.

The MANOVA main effect for stage, with stage as the factor and the nine processes of change as the dependent variables, was significant for several different polynomial contrasts.

Fifth, third, second, and first-order trends were all found to be significant. For purposes of discussion, only the third, second, and first-order trends will be described here. According to Keppel, Saufley, and Tokunaga (1992), the search for more complex trends is often pointless in psychology, as such trends tend to confuse more than illuminate the interpretation of an experiment.

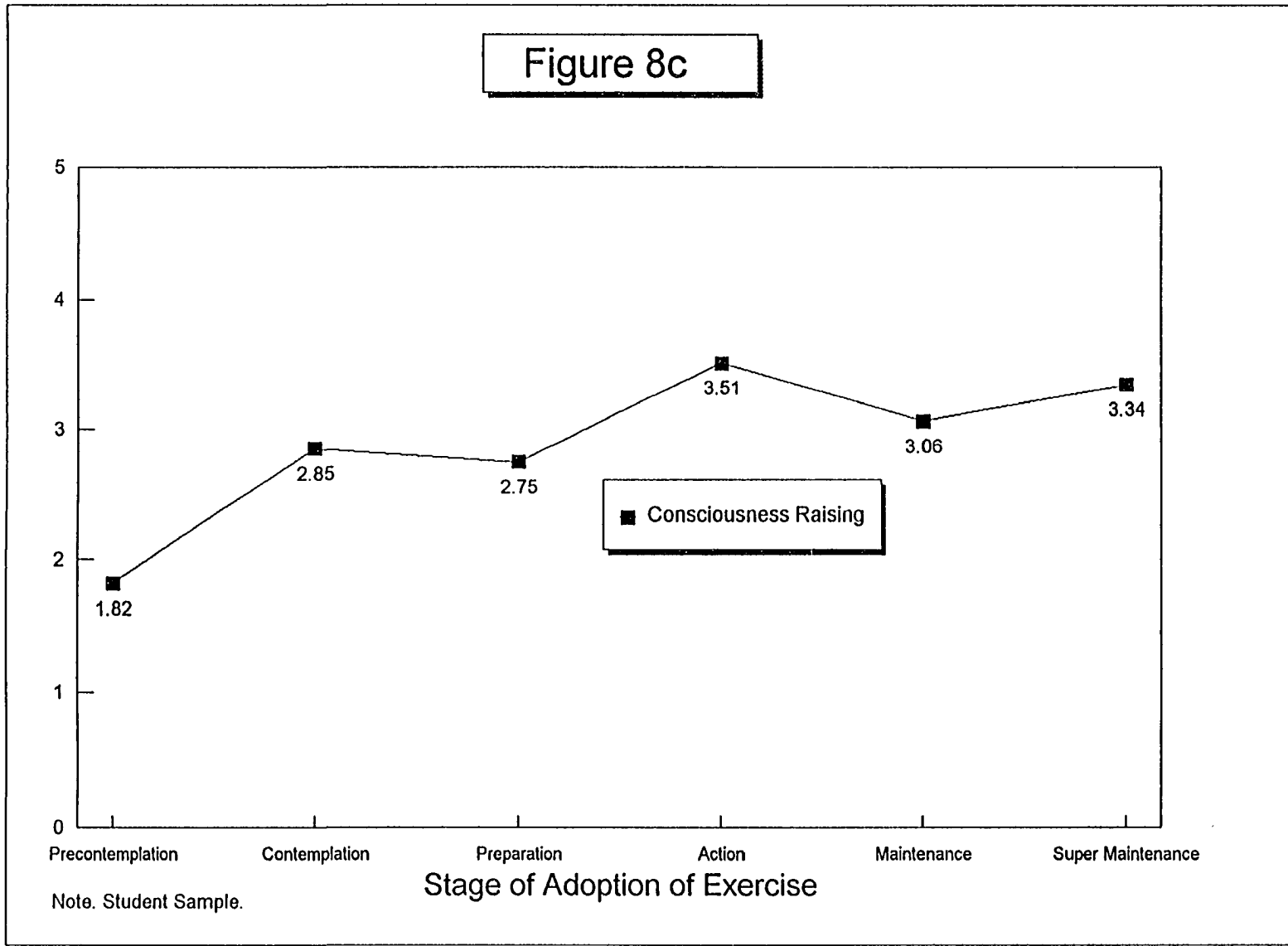
The third order trend, a cubic trend, was significant, Wilk's $\lambda = .9221$, approximate $F(9,294) = 2.76$, $p < .01$. Univariate trend analysis indicated that 3 of 9 possible processes of change showed significant cubic trends, including self-reevaluation ($F(1,302) = 17.11$, $p < .001$), self-liberation ($F(1,302) = 4.50$, $p < .05$), and stimulus control ($F(1,302) = 4.22$, $p < .05$).

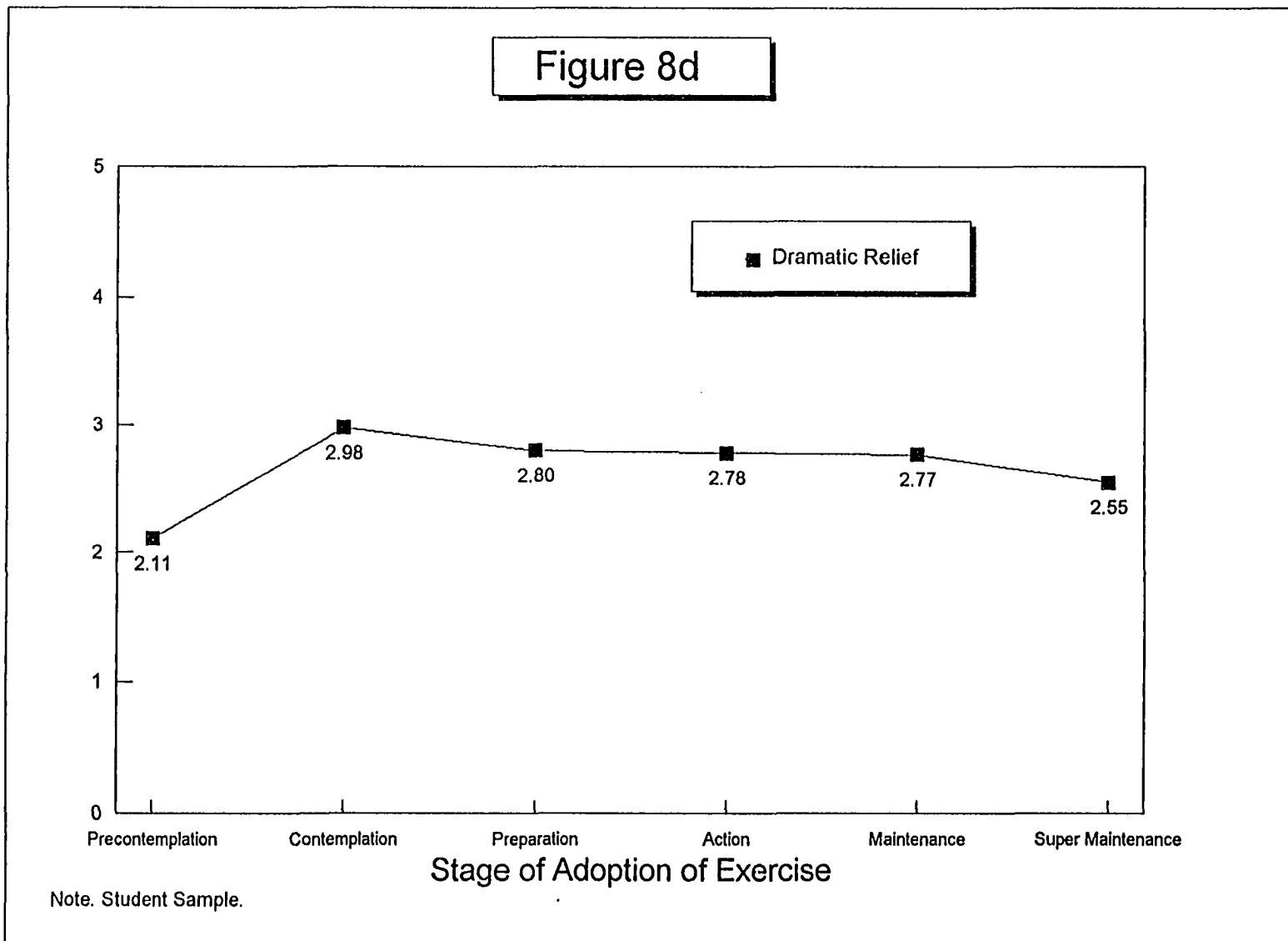
The second order or quadratic trend was also significant, Wilk's $\lambda = .9342$, approximate $F(9,294) = 2.30$, $p < .05$. 4 of the 9 possible processes of change were significant on univariate tests, including consciousness raising ($F(1,302) = 7.32$, $p < .01$), dramatic relief ($F(1,302) = 6.12$, $p < .01$), self-reevaluation ($F(1,302) = 17.28$, $p < .001$), and self-liberation ($F(1,302) = 8.98$, $p < .01$).

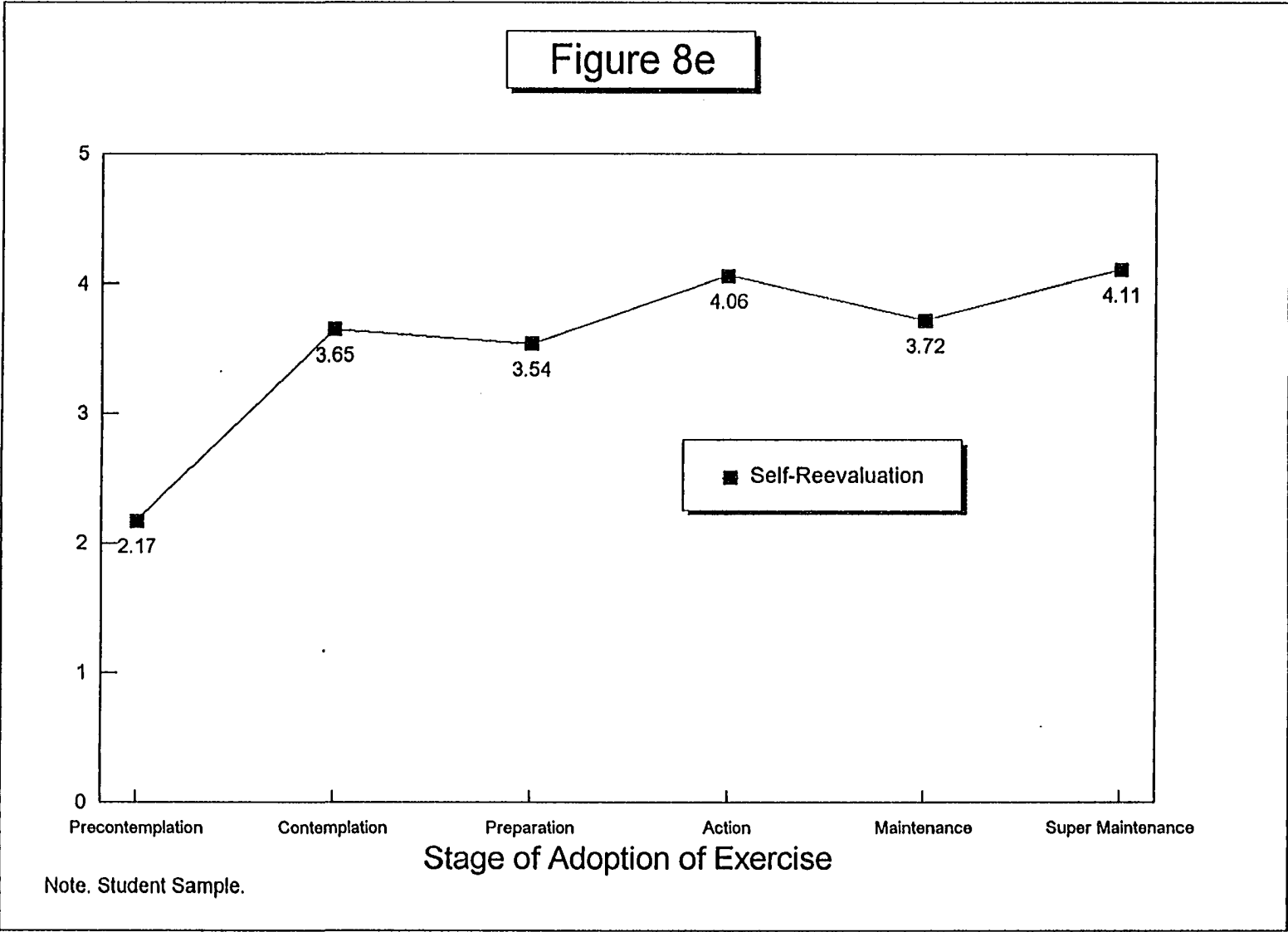
Finally, the first order or linear trend was significant, Wilk's $\lambda = .6717$, approximate $F(1,302) = 15.97$, $p < .001$. 7 of the possible 9 processes of change revealed significant linear trends following univariate testing, including consciousness raising ($F(1,302) = 29.02$, $p < .001$), self-reevaluation ($F(1,302) = 61.10$, $p < .001$), counterconditioning ($F(1,302) = 73.19$, $p < .001$), helping relationships ($F(1,302) = 5.68$, $p < .05$), reinforcement management ($F(1,302) = 26.22$, $p < .001$), self-liberation ($F(1,302) = 68.10$, $p < .001$), and stimulus control ($F(1,302) = 37.07$, $p < .001$).

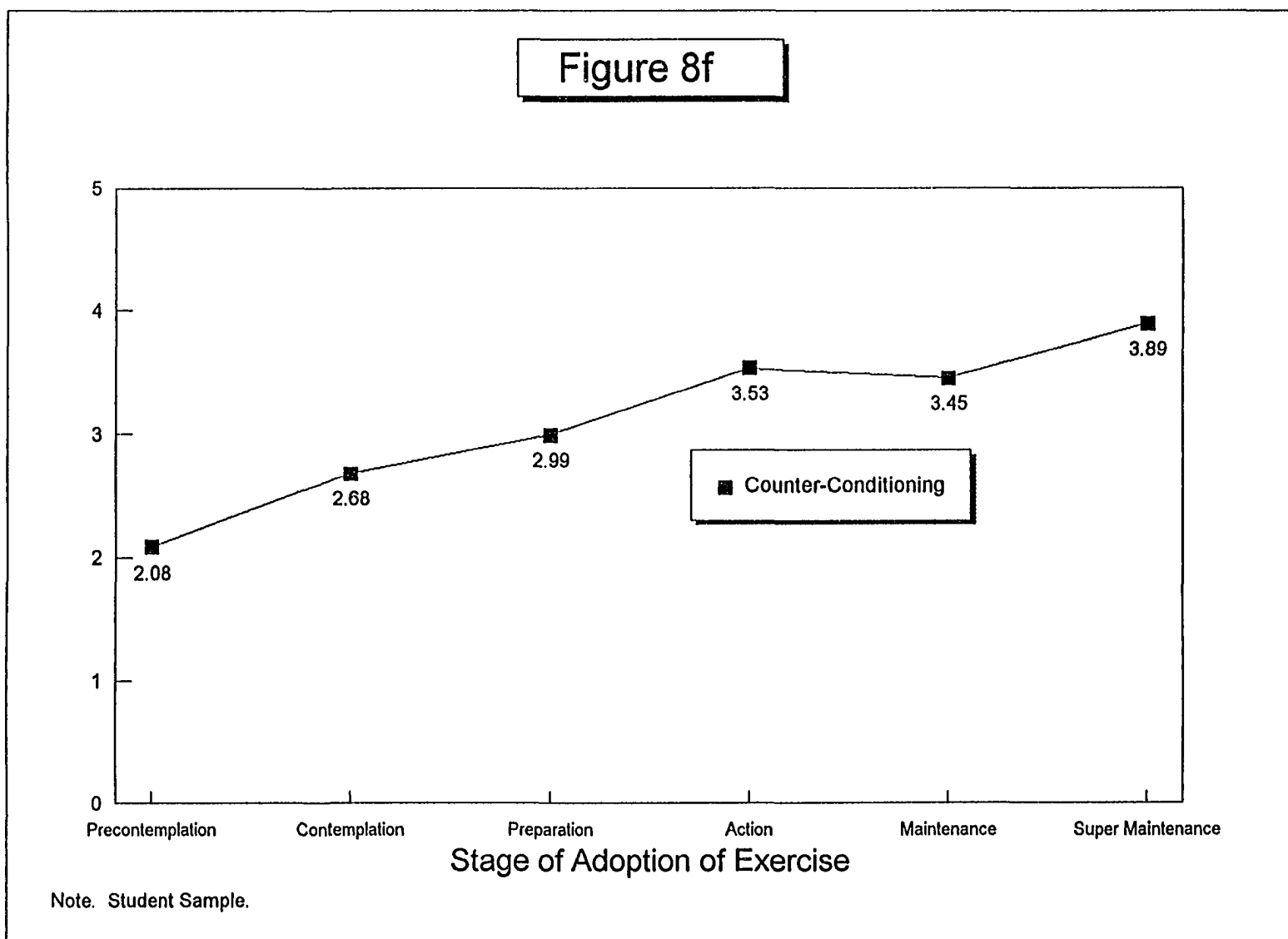
In contrast to the other 8 processes of change, environmental reevaluation was not significant on any trend.

Means for significant processes of change are graphed in Figures 8c through 8j.









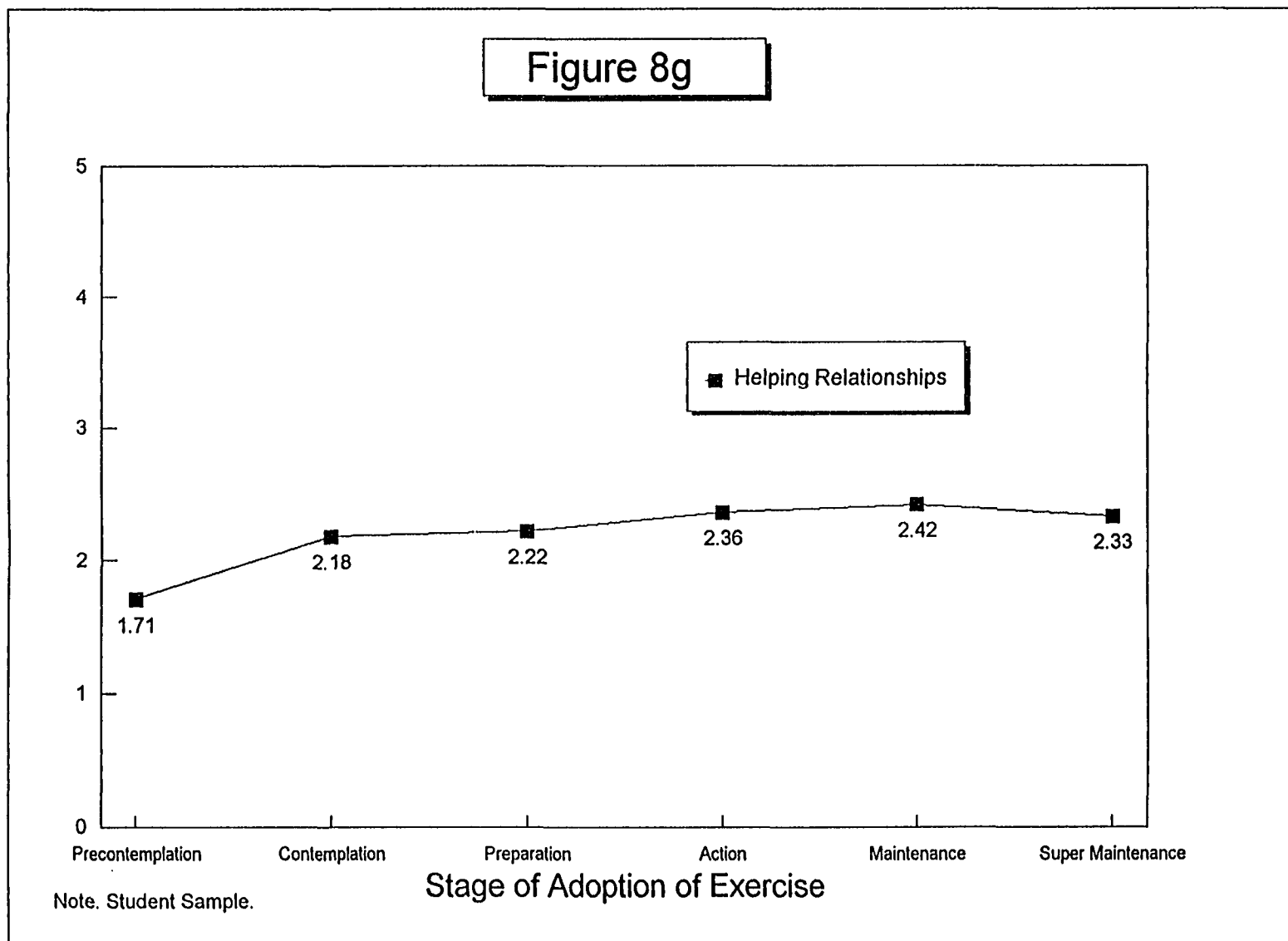
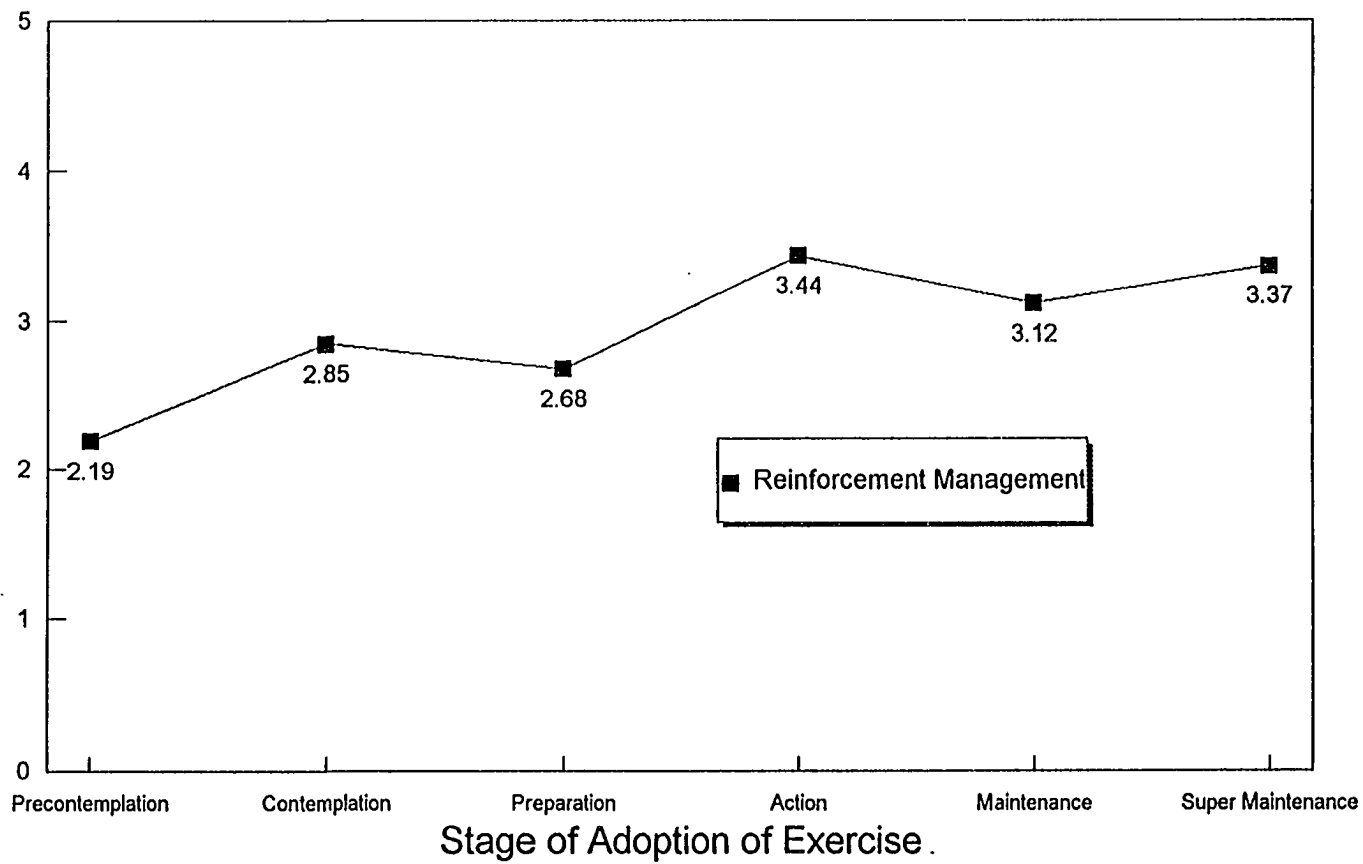


Figure 8h



Note. Student Sample.

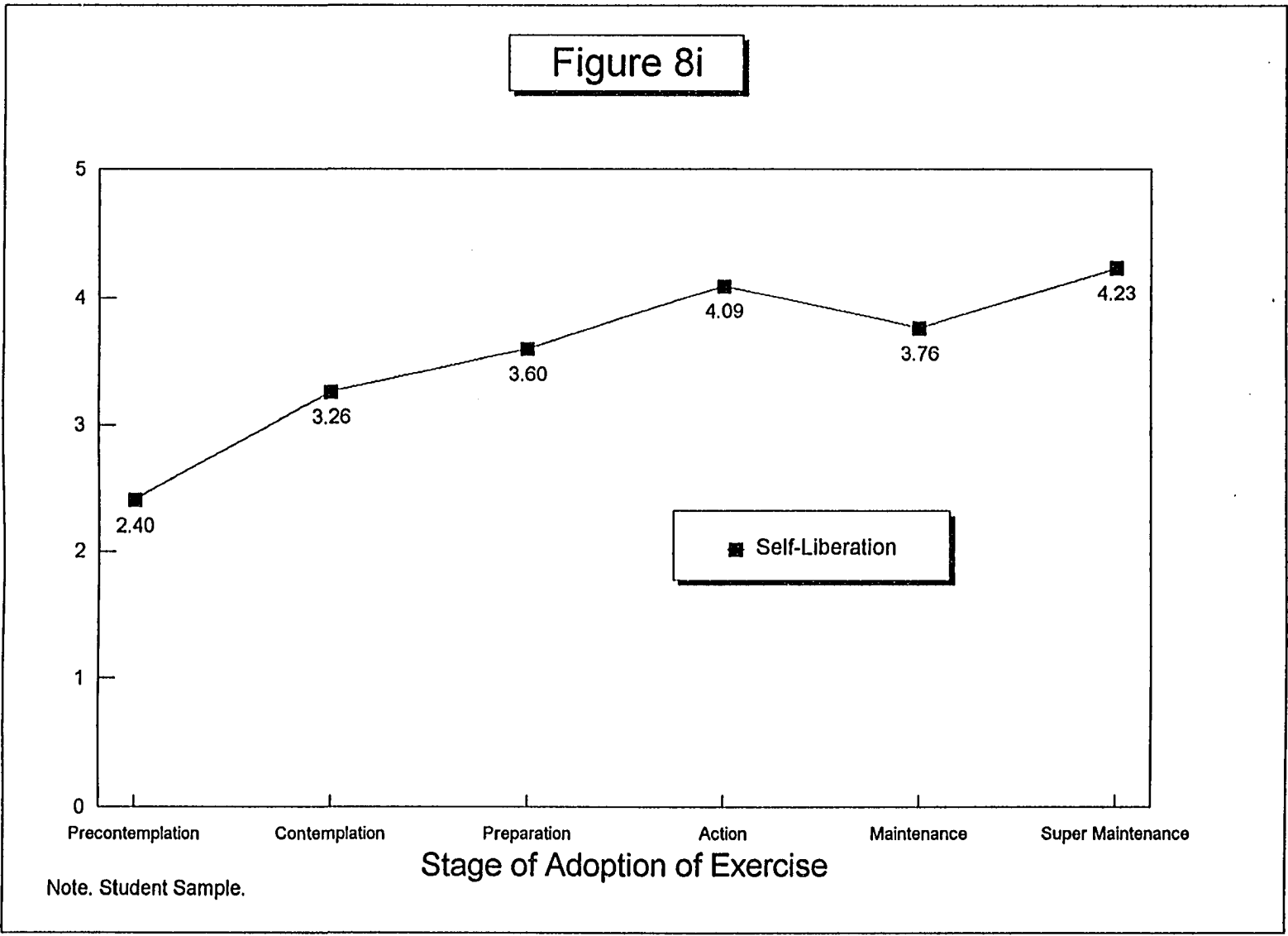
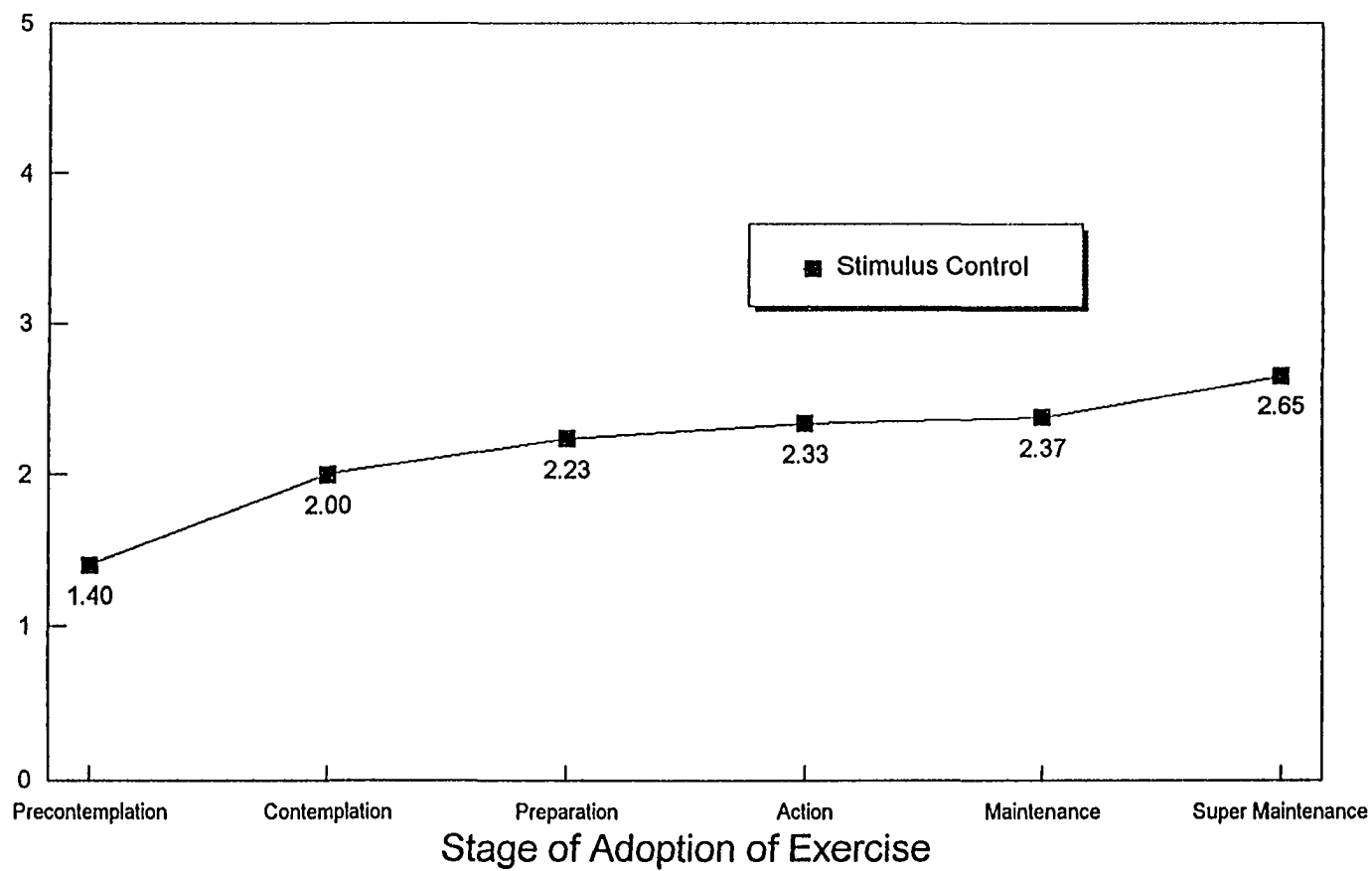


Figure 8j



Note. Student Sample.

Pros and Cons.

The MANOVA main effect with stage as the Factor and pros and cons of exercise as the dependent variables was also significant for several polynomial contrasts, ranging from 5th order to 1st order. For purposes of discussion, again, we will limit description of these results to trends ranging from cubic to linear.

The cubic trend for the pros and cons MANOVA was significant, Wilk's Lambda=.9442, approximate $F(2,291)=8.61$, $p<.001$. Univariate trend analysis indicated a significant cubic trend only for pros, $F(1,292)=15.87$, $p<.001$.

The quadratic trend for the pros and cons MANOVA was also significant, Wilk's lambda=.9695, approximate $F(2,291)=4.58$, $p<.01$. Again, only the univariate trend for pros reached significance, $F(1,292)=9.17$, $p<.01$.

Finally, the linear trend for the pros and cons MANOVA was significant as well, Wilk's Lambda=.8257, approximate $F(2,291)=30.72$, $p<.001$. Both pros and cons univariate tests for linear trend were significant, with $F(1,292)=45.25$, $p<.001$, and $F(1,292)=5.86$, $p<.05$, respectively.

Means for the pros and cons of exercise are graphed in Figure 8k and 8l.

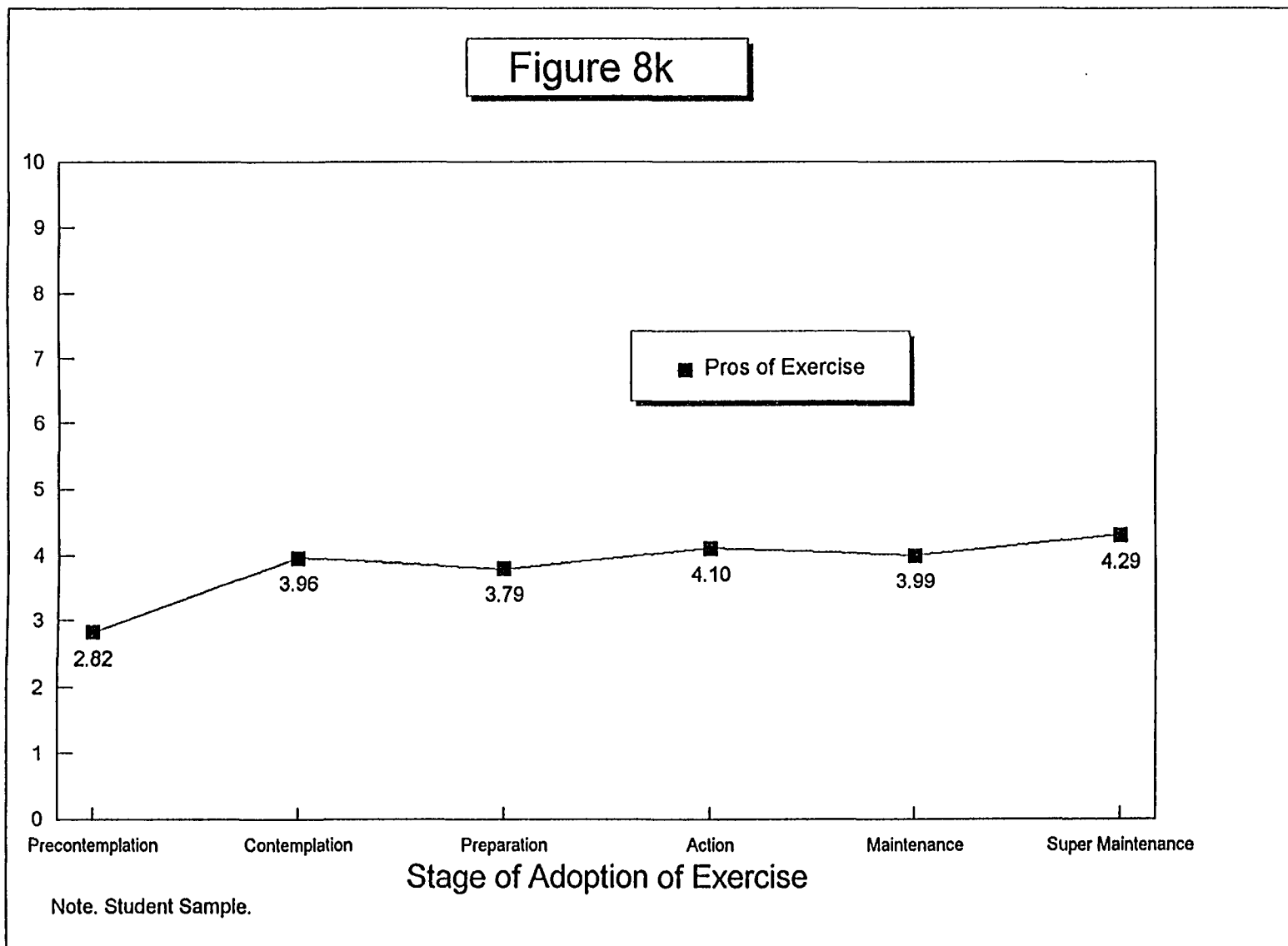
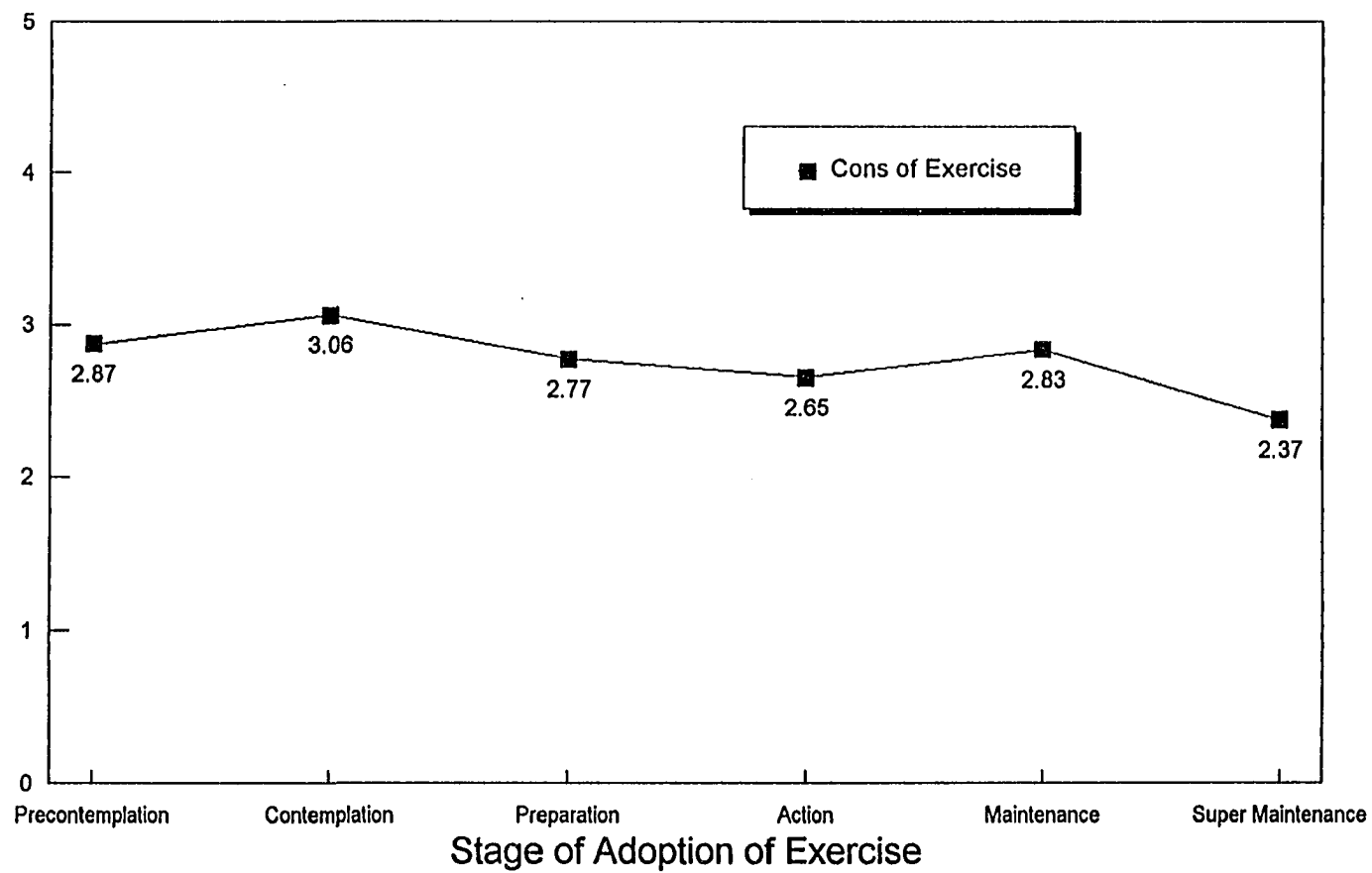


Figure 8I

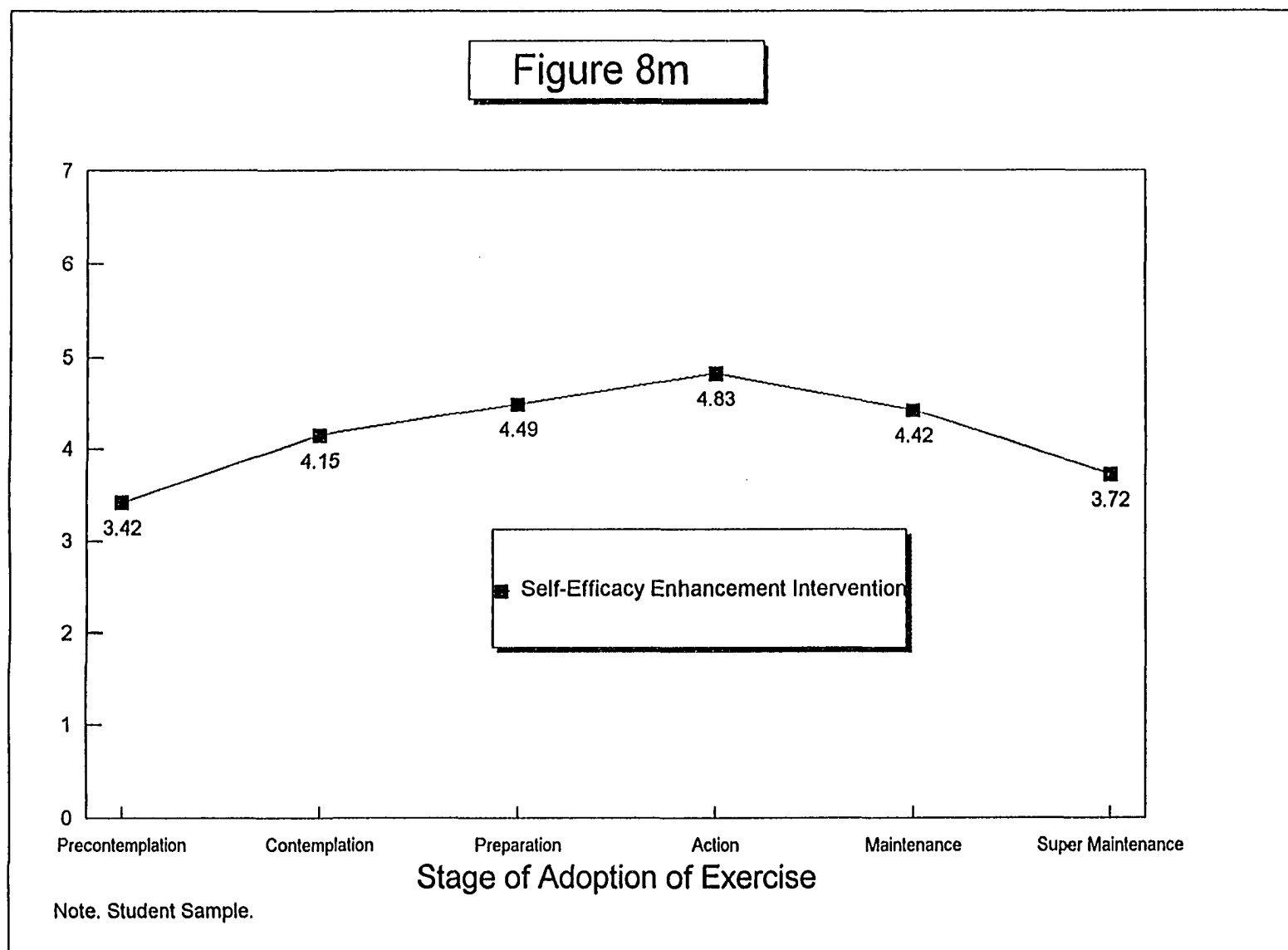


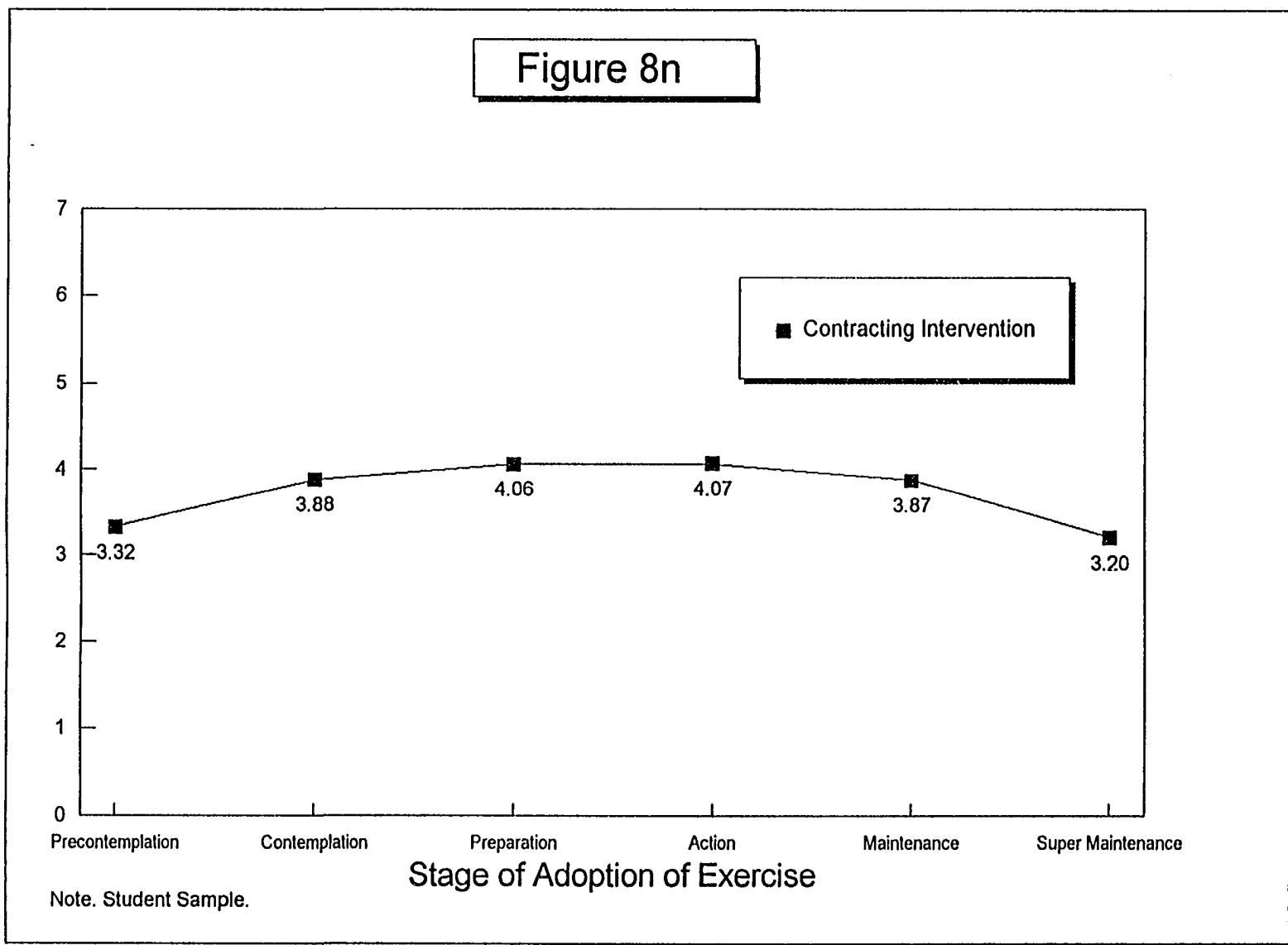
Note. Student Sample.

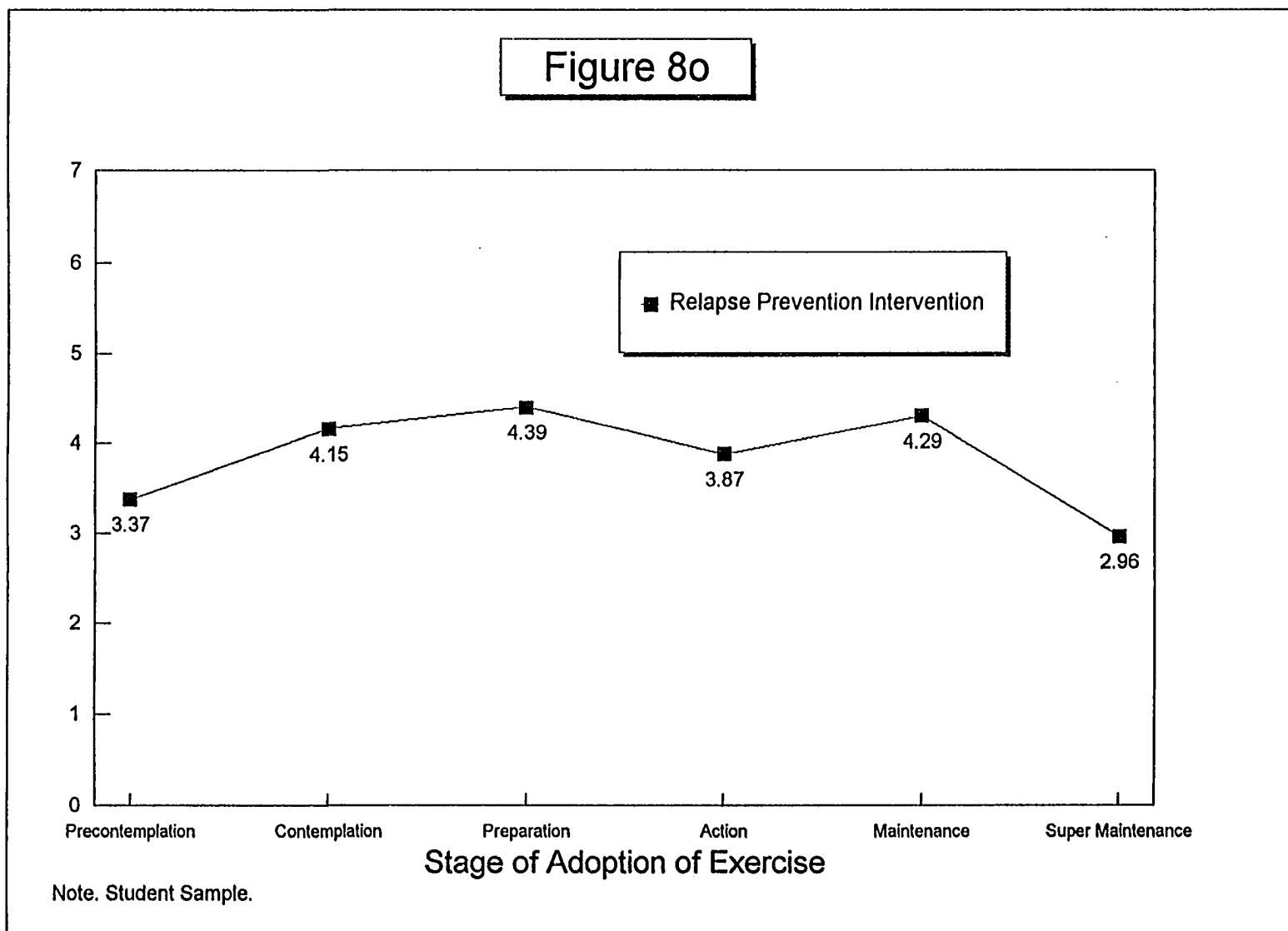
Interventions 1-7.

A significant quadratic trend was revealed by the MANOVA testing the dependent variables of interventions 1 through 7 with stage as the Factor, Wilk's Lambda= .9442, approximate $F(7,308)=2.60$, $p<.01$. Univariate tests revealed significant quadratic trends for intervention 1 (self-efficacy enhancement), 3 (contracting), and 7 (relapse management), $F(1,314)=10.80$, $p<.001$, $F(1,314)=4.14$, $p<.05$, and $F(1,314)=10.39$, $p<.001$, respectively.

Means for these three interventions are graphed in Figures 8m, 8n, and 8o.







Context Variables.

No specific hypotheses were proposed for the set of context variables. Results for this set of variables, therefore, are reported for exploratory purposes only. Table 4 reported the means and standard deviations for this set of variables. Each item was rated as True=1, and False=0. Therefore, scores for each item could range between zero and one, with higher scores indicating a context more supportive of exercise. Importance was rated on a scale from 1 to 5, with 5=very important. Subjects in the student sample appeared to believe that a) they could fit exercise into their daily routines (mean=.80, $\underline{n}$ =315), and this was quite important in their decision to exercise (mean=4.0, $\underline{n}$ =334); b) they could exercise in or close to home (mean=.90, $\underline{n}$ =311), again, quite important in their decision to exercise (mean=4.2, $\underline{n}$ =333); c) they would have enough time to exercise (mean=.80, $\underline{n}$ =311), importance=4.3 ($\underline{n}$ =330); d) they would need a regular exercise routine (mean=.80, $\underline{n}$ =312), somewhat important (mean=3.8, $\underline{n}$ =331). In contrast, being able to exercise during working hours seemed somewhat less likely (mean=.2, $\underline{n}$ =310), and subjects were split as to whether they would have adequate facilities in which to exercise (mean=0.5, $\underline{n}$ =311).

Organizational Sample

The analyses for the organizational sample were performed to determine the generalizability of the results of the student sample.

Again, due to smaller sample sizes in the earlier stages of exercise adoption, several of the analyses to follow collapse the six stage measure used above to a four or five-stage measure. This was necessary to avoid the production of singular variance-covariance matrices during the MANOVA analysis.

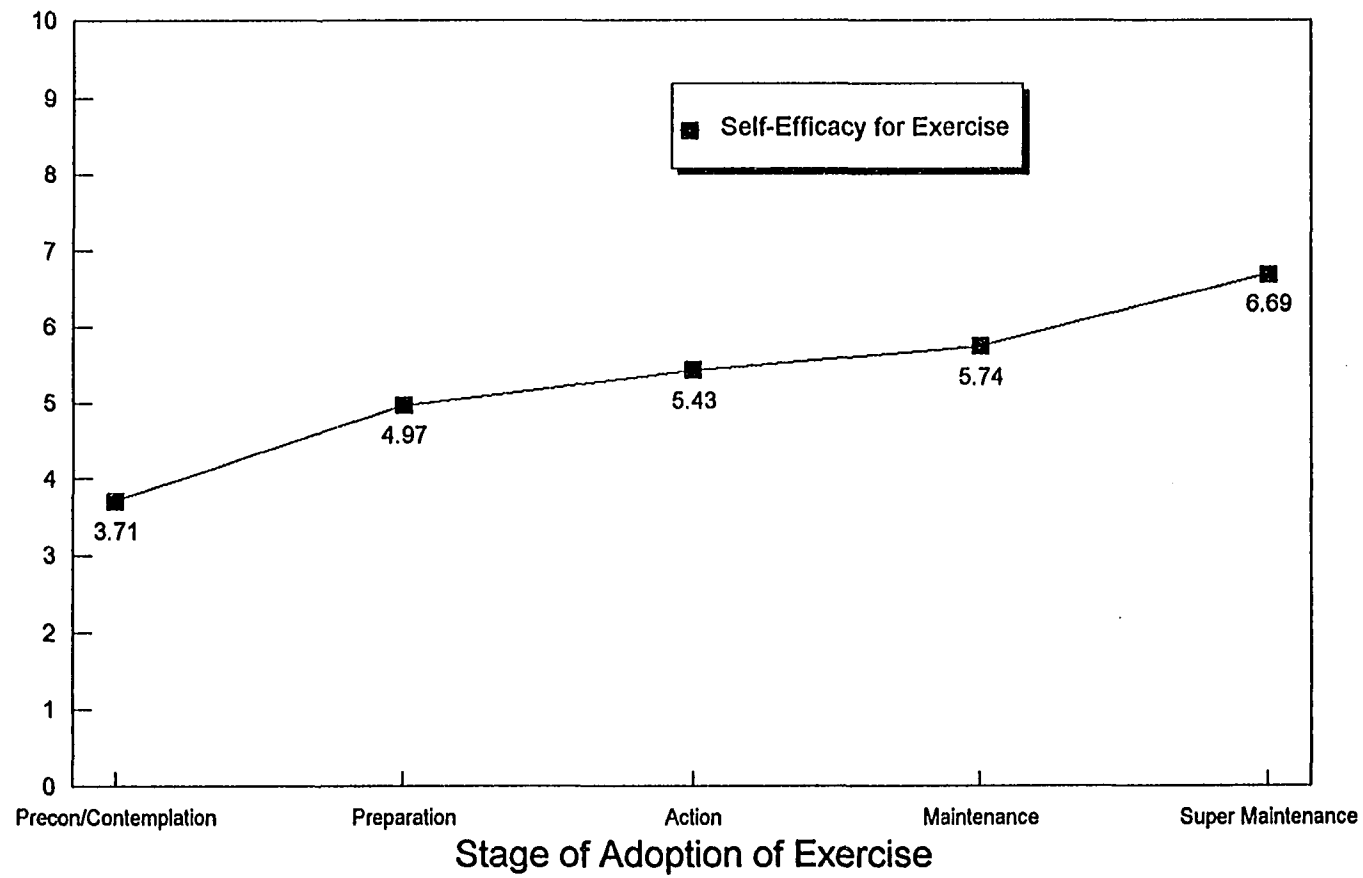
Organizational Culture, Social Support and SEE.

Due to small sample size in the precontemplation stage, the stage measure was collapsed in this analysis from six to five stages, such that precontemplation and contemplation stages were treated as one stage called precon/contemplation. The MANOVA main effect indicated that the linear trend for stage was significant, Wilk's $\lambda = .7906$, approximate $F(3,120) = 10.60$, $p < .001$. No other polynomial contrast was significant.

Individual univariate tests for significant trends indicated that, as consistent with results for the student sample above, both social support and SEE exhibited significant linear trends, $F(1,122) = 7.84$, $p < .01$, and $F(1,122) = 26.14$, $p < .001$, respectively. As in the student sample, organizational culture did not exhibit a significant linear trend.

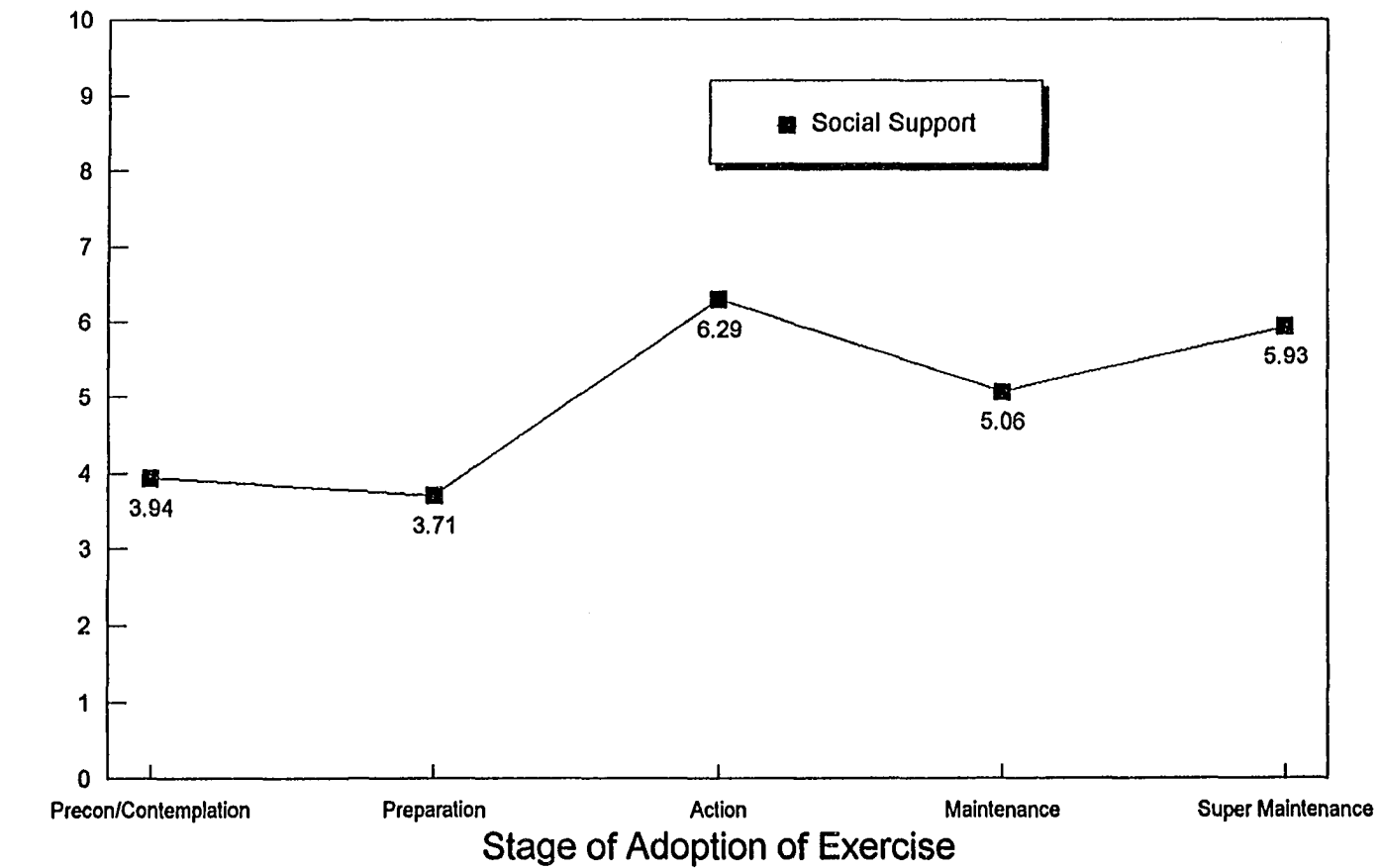
Means for SEE and social support are graphed in Figures 9a and 9b.

Figure 9a



Note. Organizational Sample.

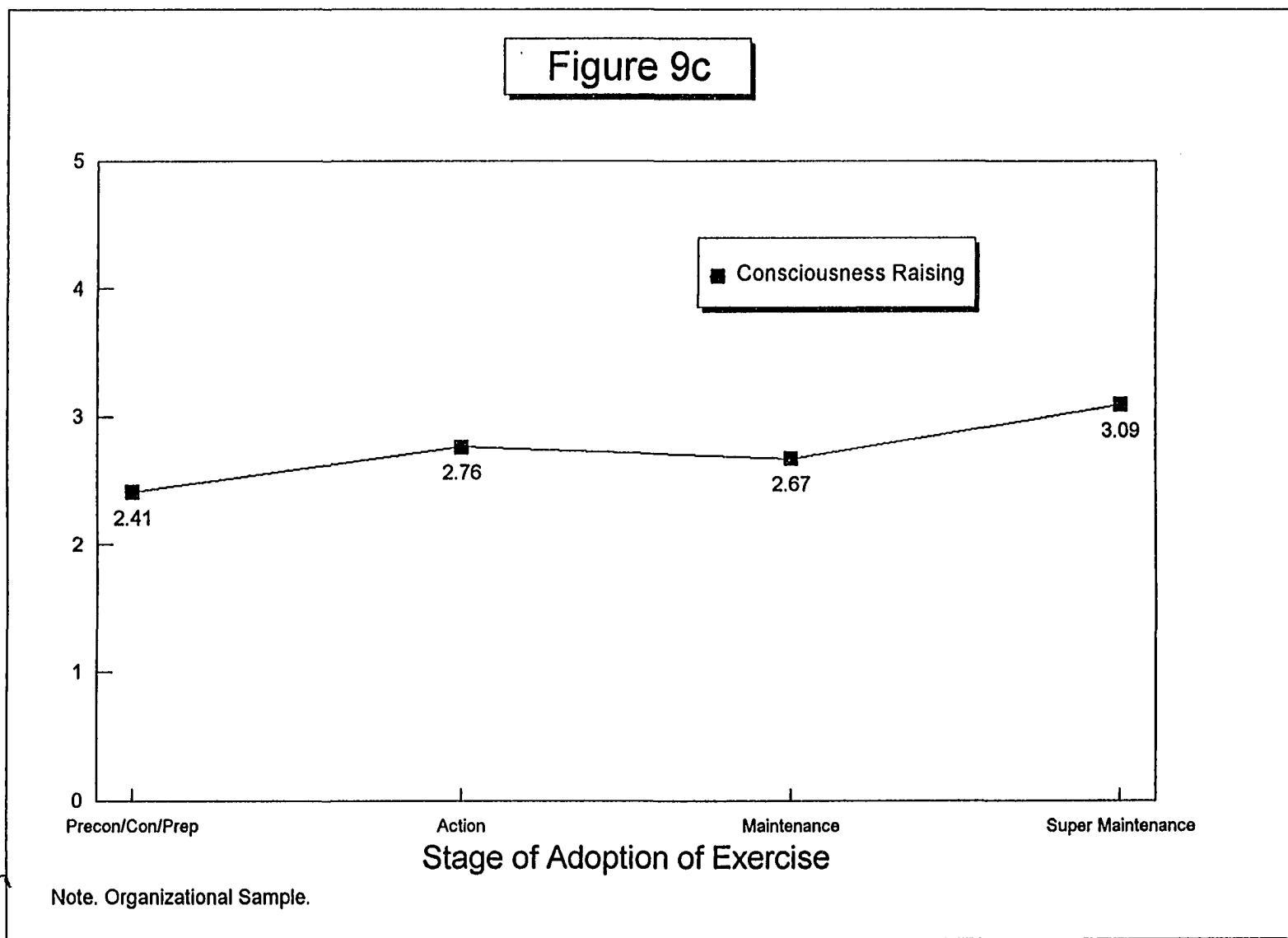
Figure 9b

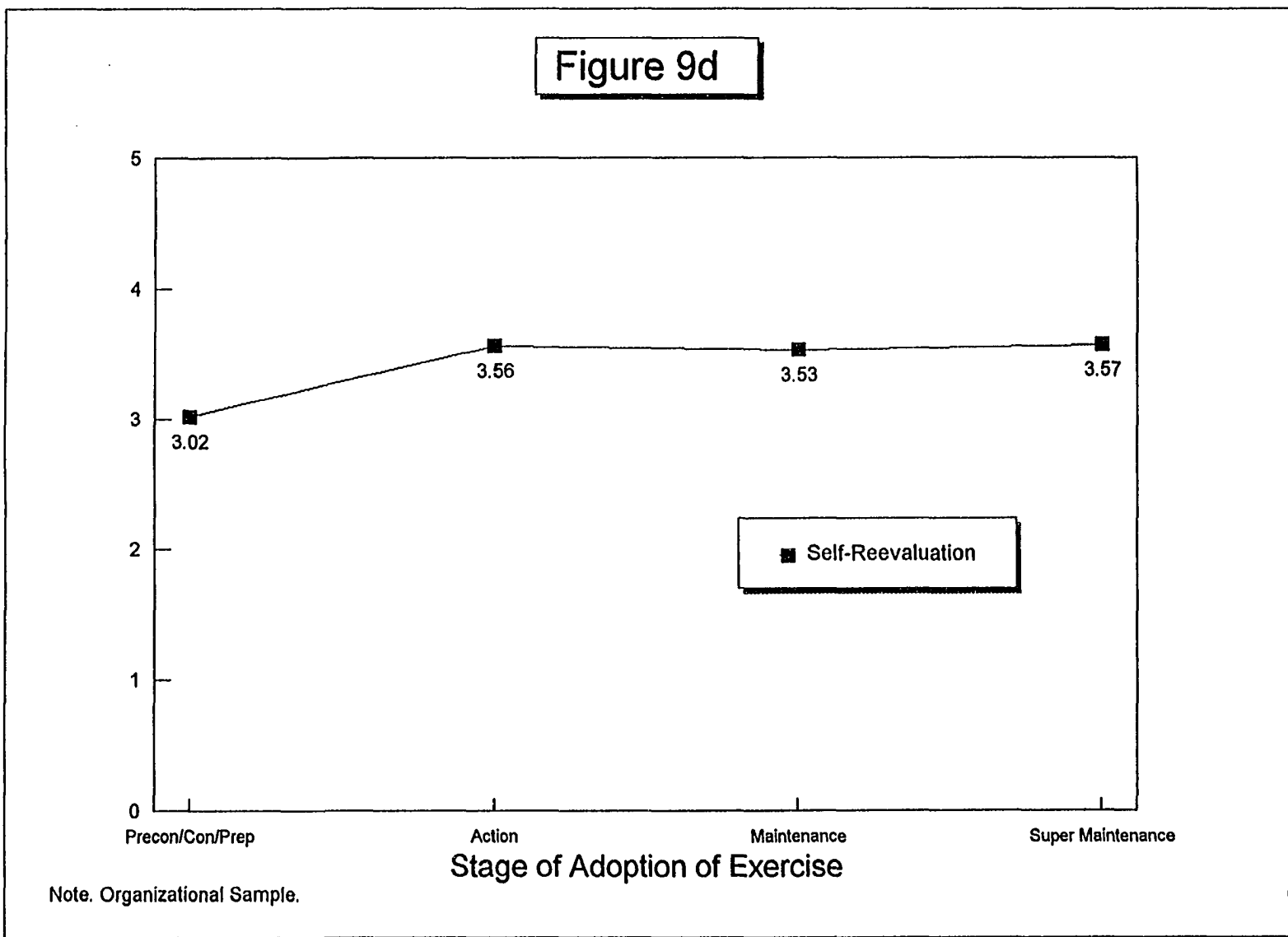


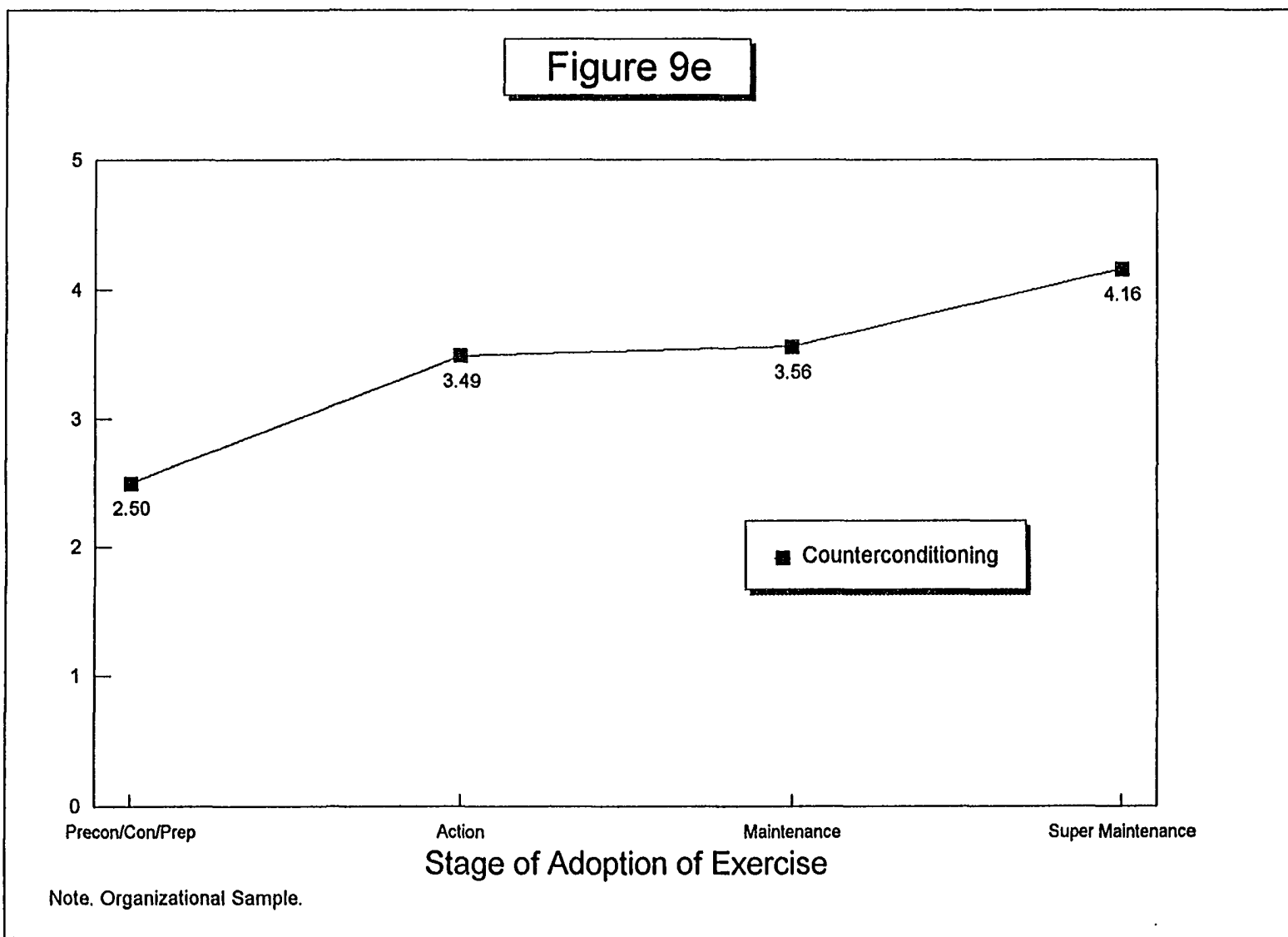
9 Processes of Change.

Again, due to small sample sizes in certain stages, it was necessary to further collapse the 6-stage measure. In this case precontemplation, contemplation, and preparation were collapsed into one stage termed preconprep, producing a 4-stage measure consisting of preconprep, action, maintenance, and super maintenance stages. The first order or linear trend was significant for this 4-stage measure, with stage as the Factor and the nine processes of change as the dependent variables, Wilk's $\lambda = .6209$, approximate $F(9,127) = 8.61$, $p < .001$. Six of the possible nine processes of change revealed significant linear trends following univariate testing, including consciousness raising ($F(1,135) = 5.65$, $p < .05$), self-reevaluation ($F(1,135) = 4.79$, $p < .05$), counterconditioning ($F(1,135) = 72.42$, $p < .001$), reinforcement management ($F(1,135) = 11.27$, $p < .001$) self-liberation ($F(1,135) = 14.51$, $p < .001$), and stimulus control ($F(1,135) = 9.49$, $p < .01$), revealing consistent results for linear trends with the student sample, with the exception of helping relationships.

Mean scores on the significant processes of change are graphed in Figures 9c through 9h.







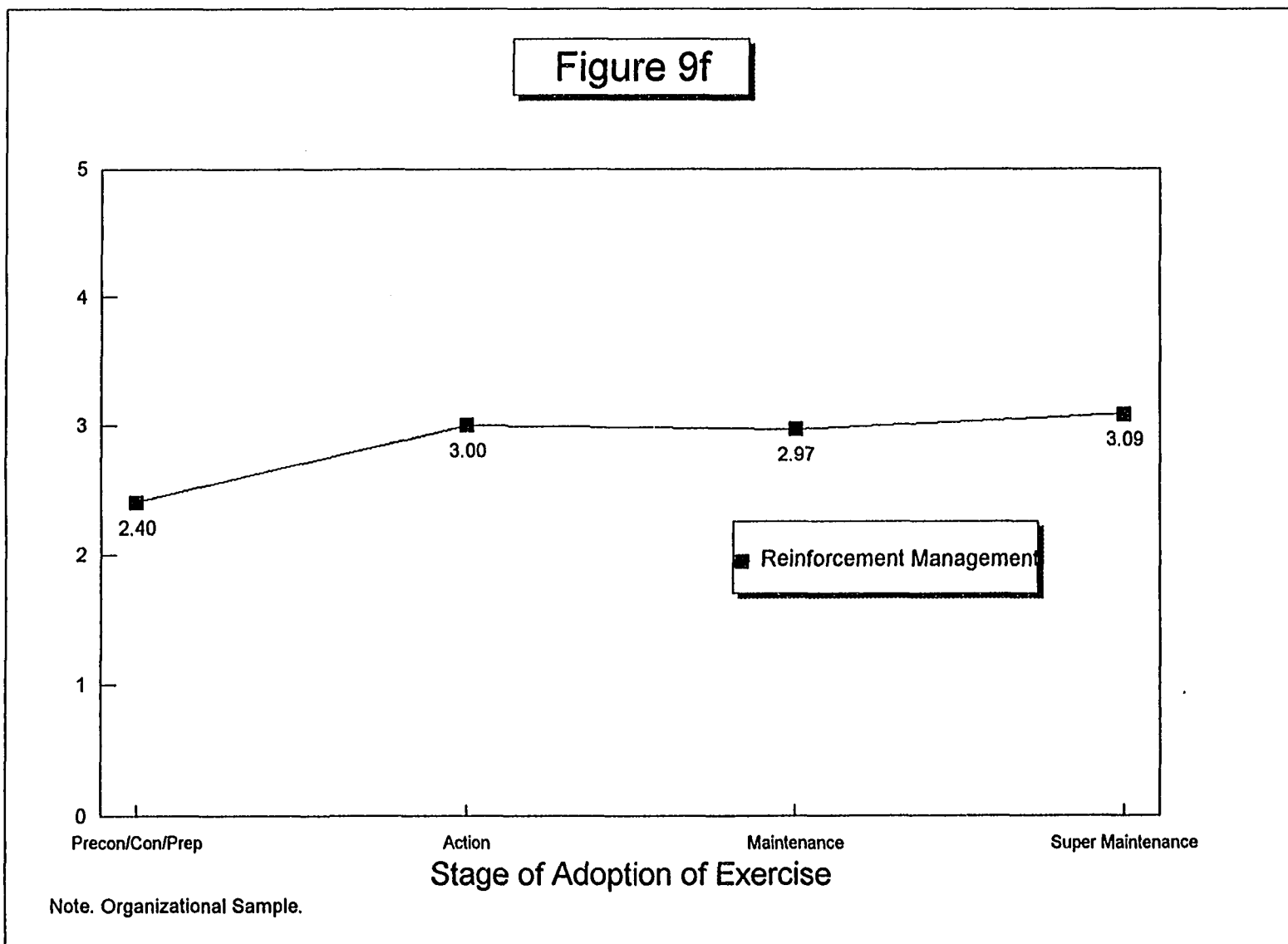
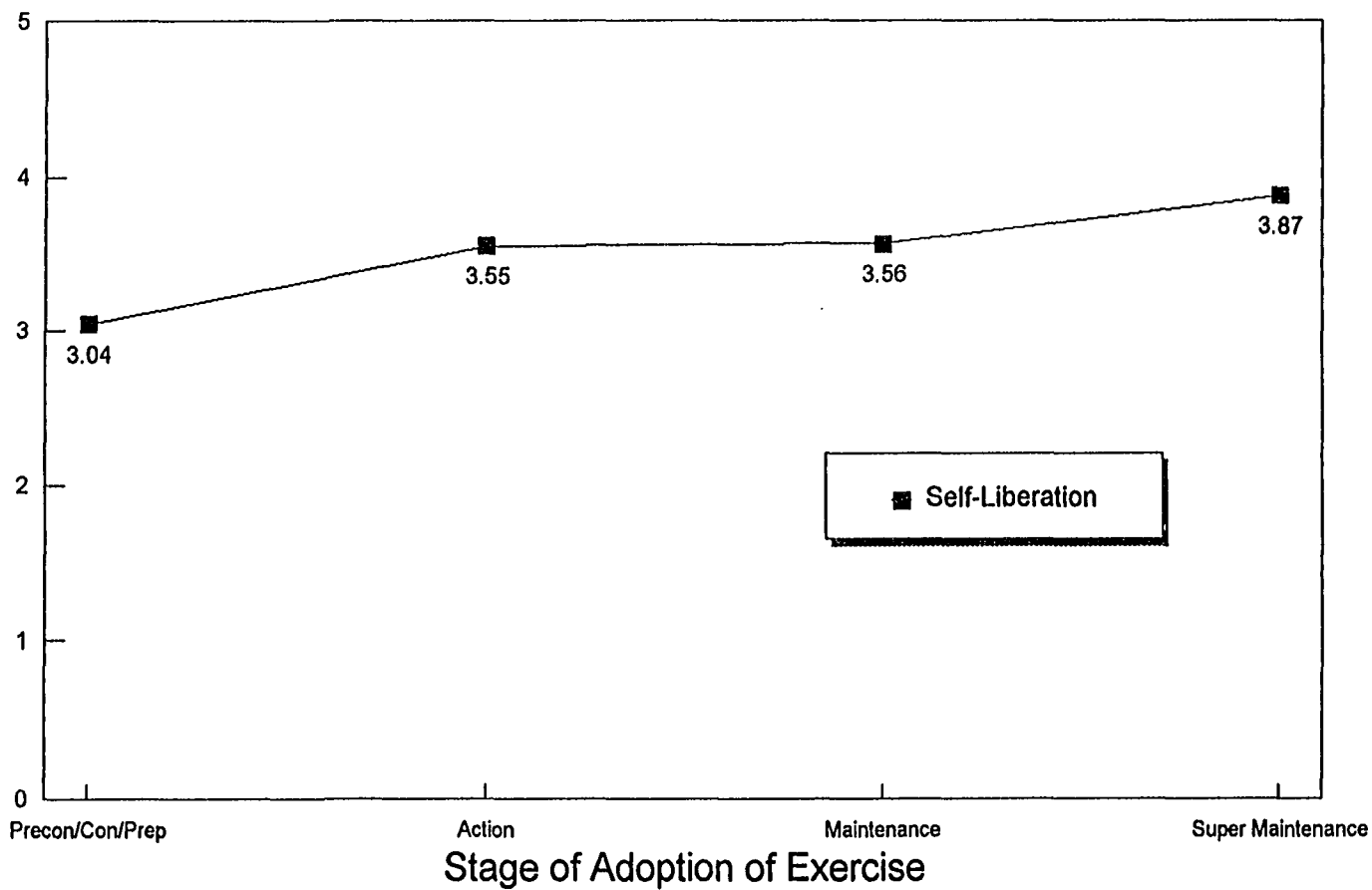
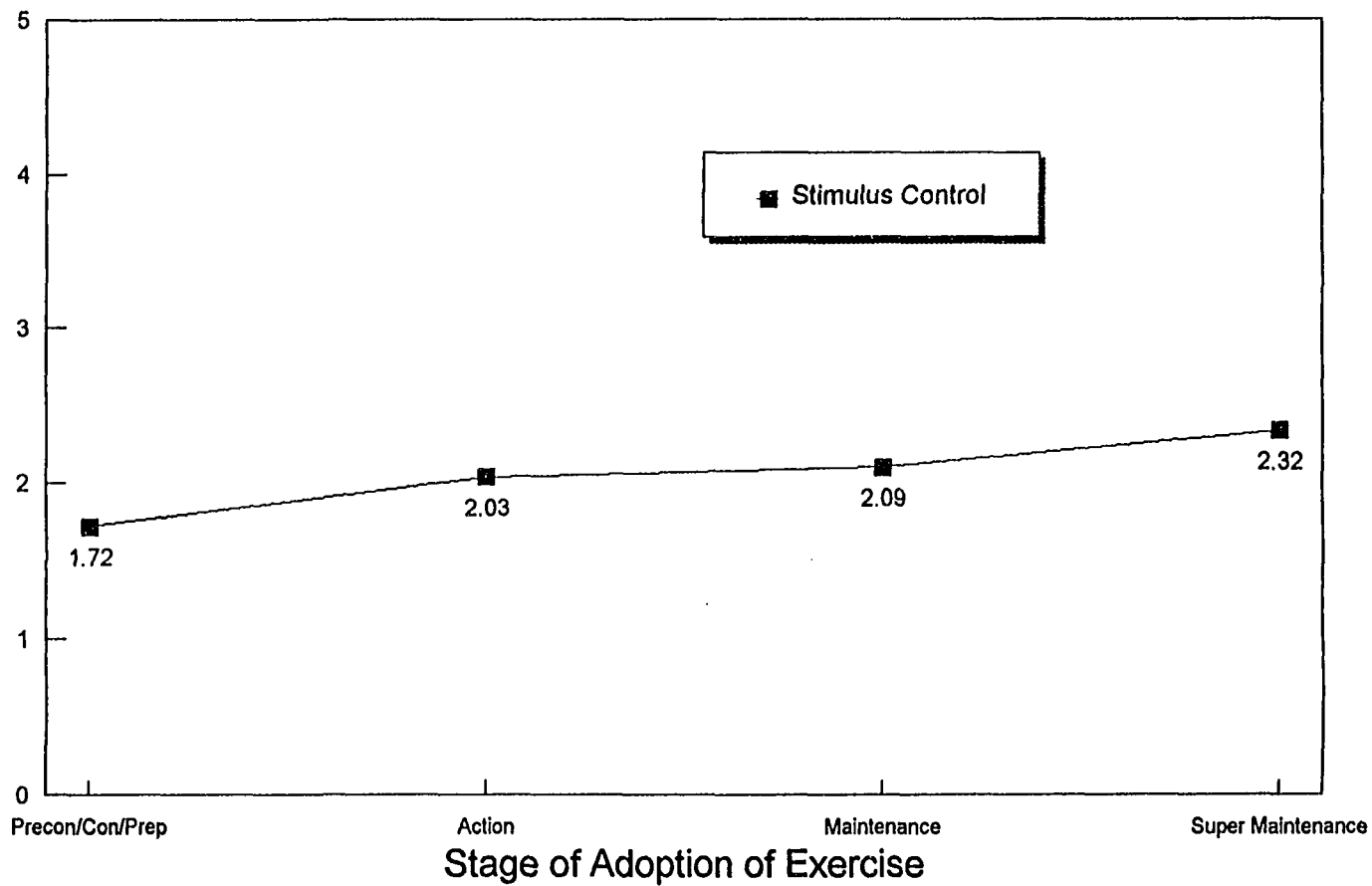


Figure 9g



Note. Organizational Sample.

Figure 9h



Note. Organizational Sample.

Pros and Cons.

It was possible to perform the MANOVA for pros and cons with a 6-stage model of exercise (i.e., no variance-covariance matrix was singular when the analysis was performed in this way).

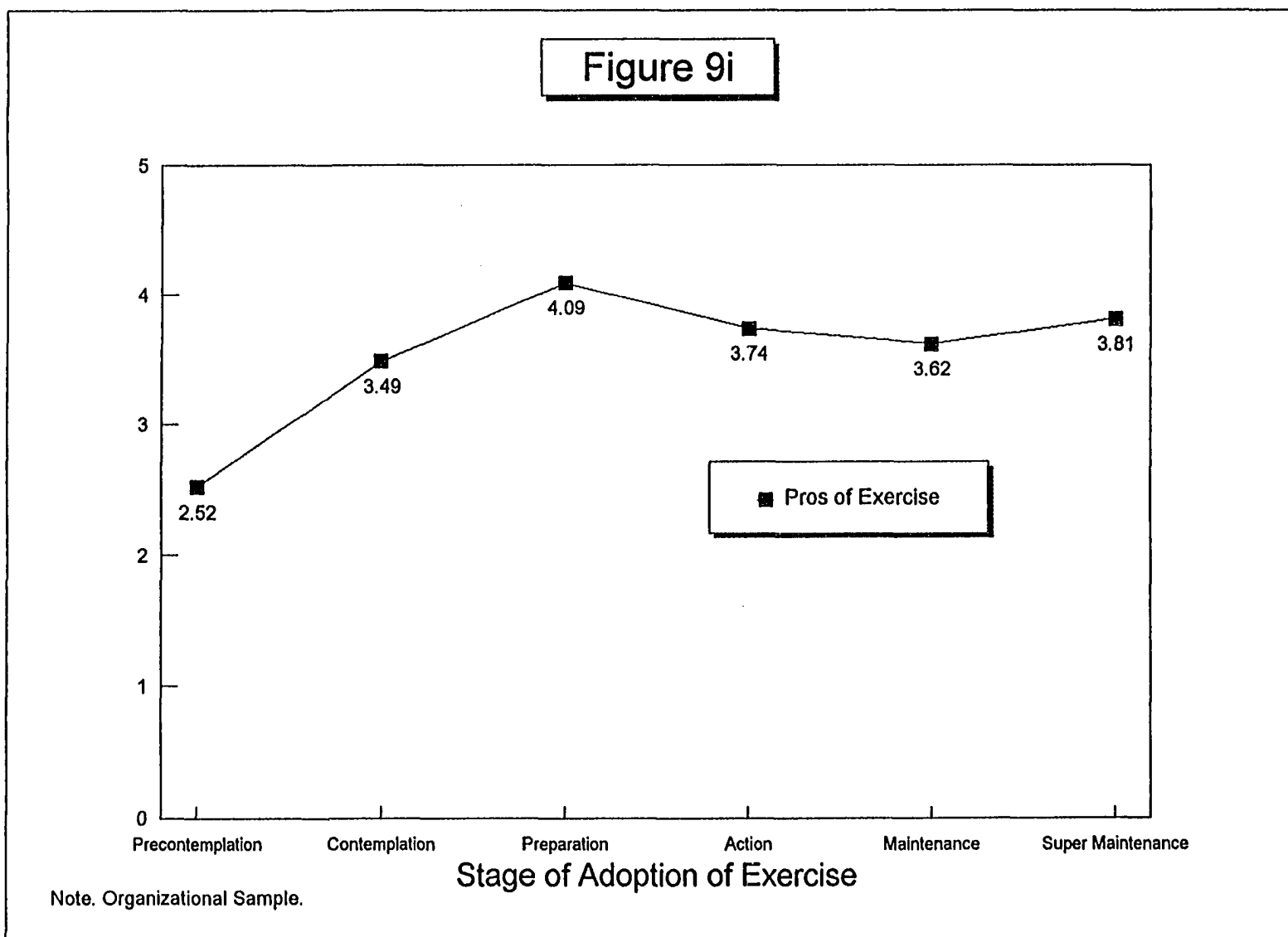
The main effect for stage in terms of pros and cons of exercise was significant for several polynomial contrasts, ranging from cubic to linear.

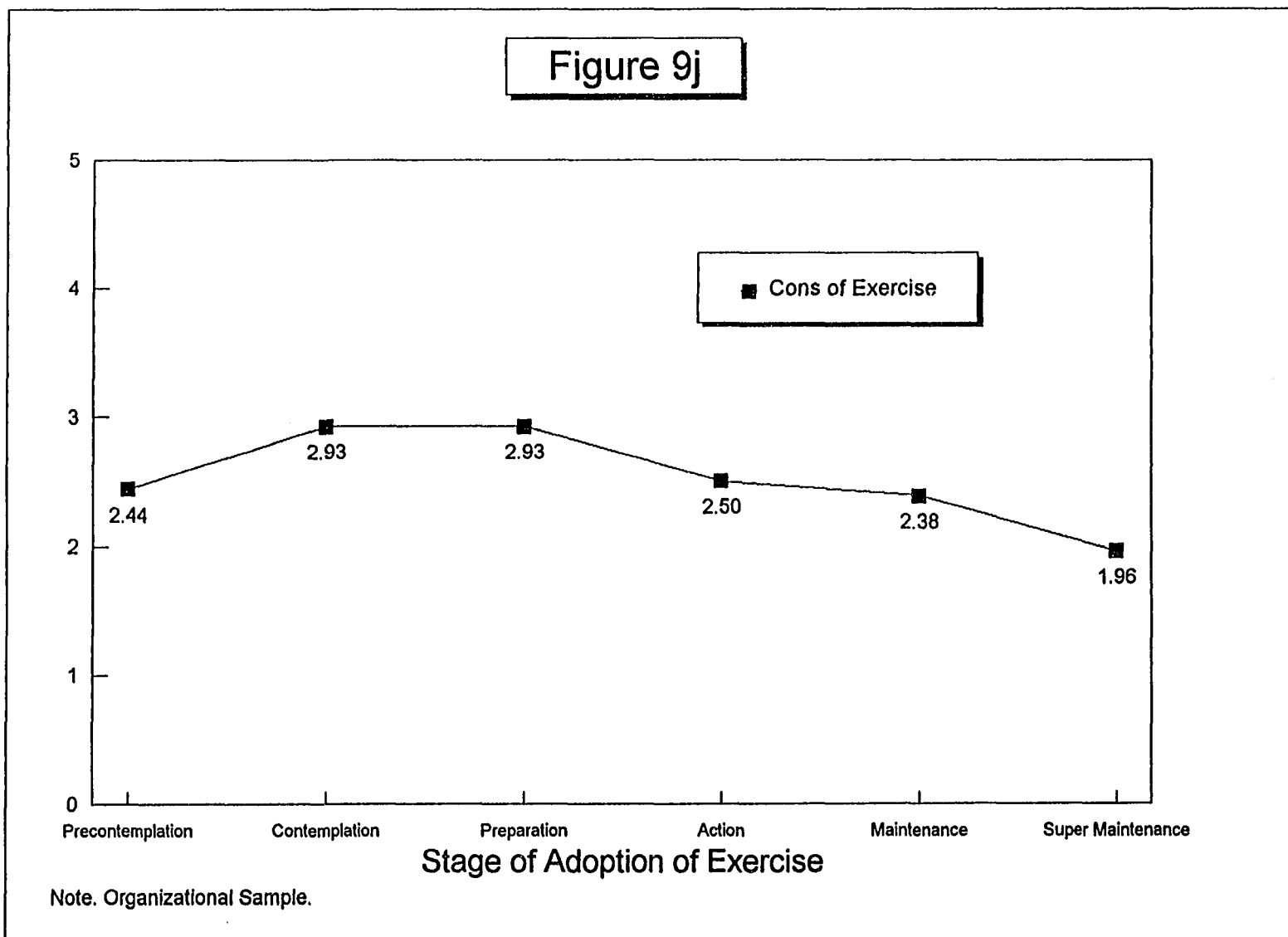
The cubic trend for the pros and cons MANOVA was significant, Wilk's Lambda=.9560, approximate $F(2,140)=3.22$, $p<.05$. Consistent with the student sample, univariate trend analysis indicated a significant cubic trend only for pros, $F(1,141)=5.71$, $p<.05$.

The quadratic trend for the pros and cons MANOVA was also significant, Wilk's lambda=.9248, approximate $F(2,140)=5.69$, $p<.01$. Both univariate trends for pros and cons reached significance here, $F(1,141)=7.90$, $p<.01$, and $F(1,141)=4.99$, $p<.05$, respectively.

Finally, the linear trend for the pros and cons MANOVA was highly significant, Wilk's Lambda=.8875, approximate $F(2,140)=8.87$, $p<.001$. Both pros and cons univariate tests for linear trend were again significant, with $F(1,141)=10.07$, $p<.01$, and $F(1,141)=5.58$, $p<.05$, respectively.

Means for the pros and cons of exercise are graphed in Figures 9i and 9j.





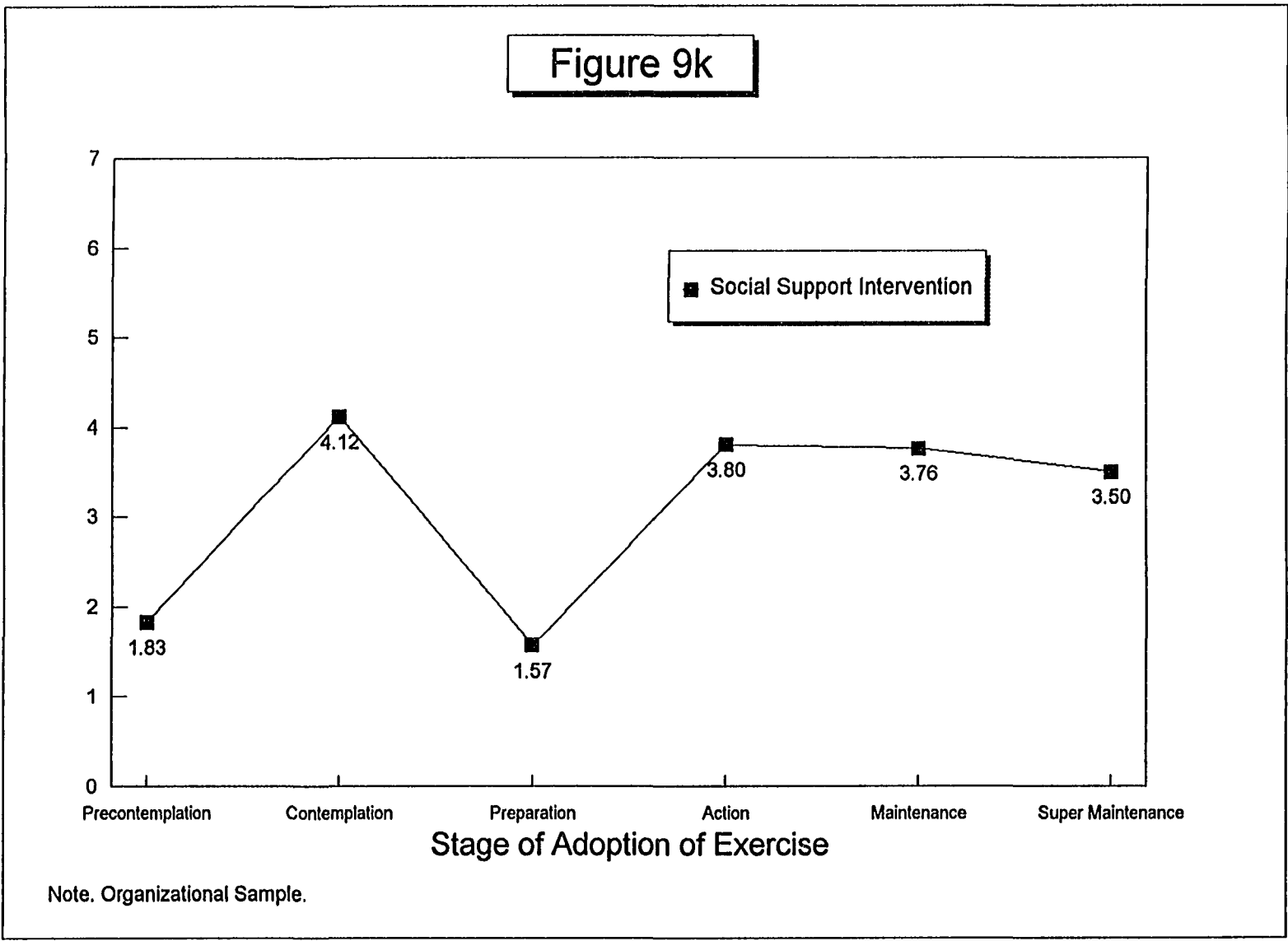
Interventions 1-7.

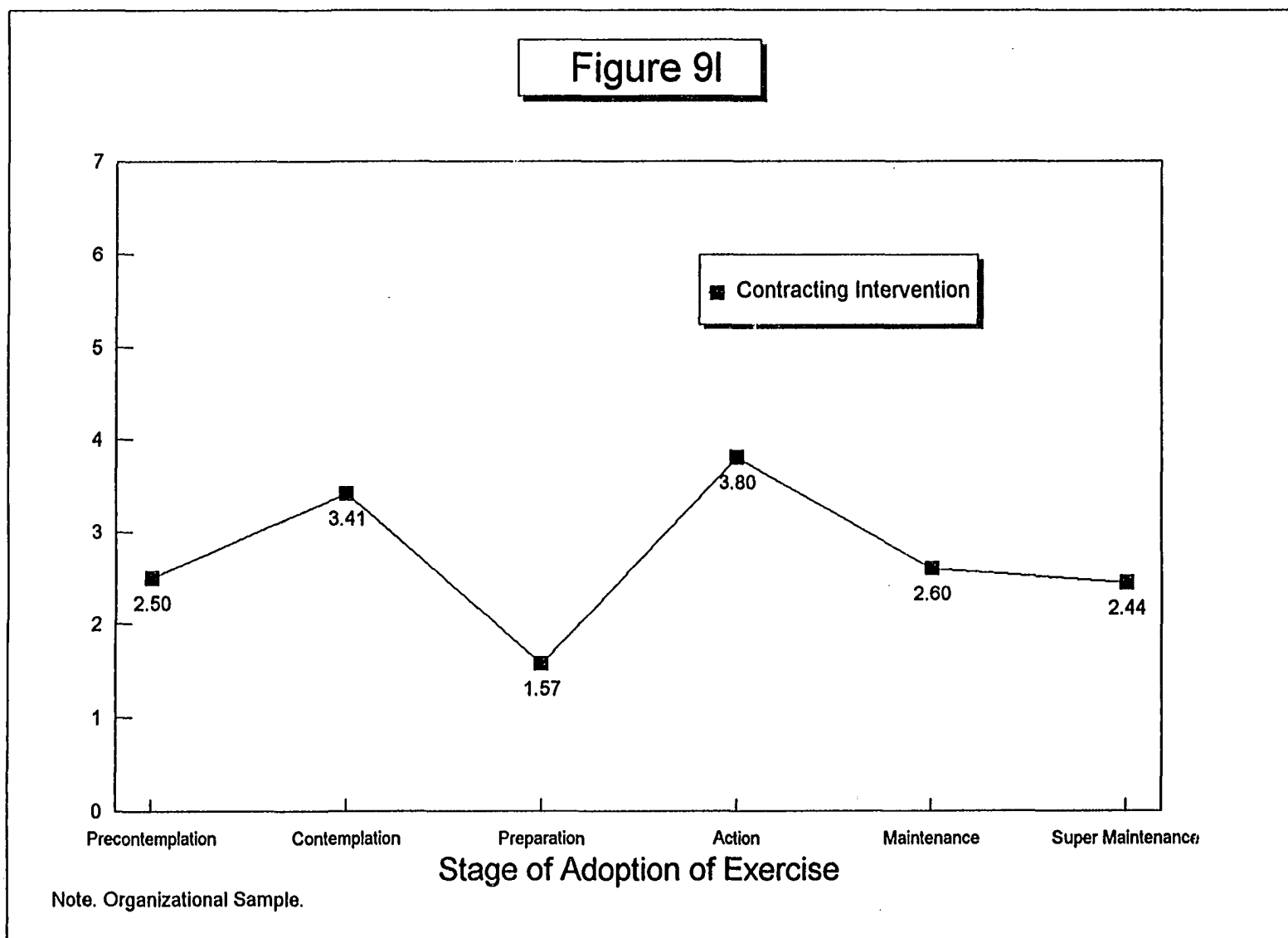
Testing all 7 interventions together led to 2 singular variance-covariance matrices due to small sample sizes in both the precontemplation and the preparation stages. In order to be able to test results for a 6-Stage model here, interventions 1-4, and interventions 5-7 were tested in two separate models. Results are reported for interventions 1-4 first.

Only the 5th order polynomial trend was significant for interventions 1-4, Wilk's $\lambda = .9029$, approximate $F(4,138) = 3.71$, $p < .01$. Both Intervention 2 (social support) and Intervention 3 (contracting) exhibited significant univariate 5th order trends, $F(1,141) = 6.54$, $p < .01$, and $F(1,141) = 7.91$, $p < .01$, respectively. No other polynomial trends were significant here, indicating a rather complex relationship between stage and Interventions 2 and 3.

In terms of interventions 5-7, no polynomial trend was significant.

Means for the two significant interventions are presented in Figures 9k and 9l.





These results do not mirror the results for the student sample above, in which Interventions 1, 3 and 7 had significant quadratic trends.

Context Variables.

As in the student sample, results for the set of context variables are reported for exploratory purposes only. The organizational sample reported similar results to the student sample, with the exception that they judged themselves high on all context variables, including being able to exercise during working hours, and having adequate exercise facilities (See Table 4 for the actual means and standard deviations for each individual item).

Relationships between Demographics and Stage

No specific hypotheses were proposed for the demographic variables. However, exploratory chi-square analyses were performed to determine whether any relationship existed between stage and three of the six demographic variables. These three variables were selected from the group of demographics because they exhibited significant correlations with stage. The variables included gender (1=male, 2=female), age (1=age 20 to 29, 2=age 30 to 39, 3=age 40 to 49, 4=age 50 to 59, 5=age 60 to 69, and 7=age 70 and above), and educational level (1=High School, 2=Some college, 3=two year college, 4=four year college, 5=graduate school); correlations between these variables and Stage were $r=-.21$ ($N=471$), $r=.20$ ($N=470$), and $r=.25$ ($N=472$),

respectively. For these analyses, student and organizational data were combined to provide a larger sample size in certain cells, and thus a more robust test.

A significant relationship was found between gender and stage, Pearson chi-square=(5, $N = 474$) = 25.55, $p < .001$. Standardized residuals were examined in each cell. According to Hays (1988, p. 778), the magnitude of these residuals indicate the cells in a chi-square analysis which "...bear the heaviest share in the association reflected in the overall chi-square value, and the sign of the standardized residual shows whether the association is positive (more than expectation) or negative (fewer than expected)...". In terms of gender, the largest standardized residuals were found at the contemplation, maintenance, and super maintenance stages for both males and females. For males, these values were -2.7, 1.7 and 1.9, respectively; for females, these values were 2.3, -1.4 and -1.6, respectively. These values indicate that fewer males reported being at the contemplation stage than expected, and more females reported being at the contemplation stage than expected. For both maintenance and super maintenance, more males reported being at these stages than expected, and fewer females reported being at these stages than expected. Thus, males tend to be at later stages relative to females.

In terms of age, a significant relationship was also found, Pearson chi-square (20, $N=475$)=42.00, $p < .01$.

Examination of standardized residuals following the above procedure revealed the largest residuals at preparation for subjects aged 30-39 and 40-49 (standardized residuals=-2.1 and 2.0, respectively). Thus, fewer 30 to 39-year olds were at preparation than expected, and more 40 to 49-year olds were at preparation than expected. In addition, more 50 to 59-year olds were at maintenance than expected (standardized residual=2.0), and more 60 to 69-year olds were at super maintenance than expected (standardized residual=1.7). These results suggest that, within this sample, older subjects were at later stages more than expected, and younger subjects at earlier stages more than expected.

A significant relationship was also found between educational level and stage, Pearson's chi-square (20, $N=473$)=42.00, $p<.01$. Examination of standardized residuals suggests that this result is mainly due to subjects at the extremes of education, particularly High School versus Graduate School. Subjects who reported having completed only High School occupied the contemplation cell more than would be expected were education and stage independent (standardized residual=2.2), and fewer High School graduates occupied the maintenance and super maintenance stage than expected (standardized residuals=-1.5 and -1.6, respectively). In contrast, fewer subjects who completed Graduate School occupied precontemplation and contemplation cells than expected (standardized residuals=-1.6 and -2.6,

respectively), while more occupied maintenance and super maintenance than expected (standardized residuals=2.4 and 2.5, respectively). These results indicate that subjects with more education occupied later stages more than expected, while subjects with less education were present at earlier stages more than expected.

DISCUSSION AND LIMITATIONS

This paper began by describing the benefits of exercise programs for both individuals and organizations, and described prior research on exercise adherence. Based on this review, a study was performed to confirm hypotheses concerning potential differences between subjects at different stages of exercise.

Results in general revealed support for the majority of the hypothesized relationships. In particular, linear relationships were found between stage and: SEE, social support, seven of the nine processes of change, and the pros and cons of exercise. In contrast, linear relationships were not found between stage and the seven interventions, nor between stage and organizational culture. Several more complicated trends were found between stage and three of the seven interventions, several processes of change, and the pros and cons of exercise.

With regard to the quality of the measurement instruments, results revealed that subjects were indeed able to characterize their exercise behavior in terms of stage. An eleven-stage measure was used to measure exercise behavior; these stages were then collapsed into a six-stage theoretically-based model of exercise adoption. The measure upon which these classifications were based, termed the "Self-Report Measure of stage" above, was validated by examining its relationship with two alternate

operationalizations of stage, including a Diary measure and a computer recorded measure of stage. High correlations between these measures revealed evidence of convergent validity, lending further support to the validity of the Self-Report Measure.

There was, however, some evidence that suggested that these three measures were not completely convergent. In particular, in most cases, mean Diary stage was significantly higher than mean Self-Report stage. It could be that people underestimate the amount of exercise that they perform when asked to describe the amount of exercise they have typically performed over the last 6 months. Future research should evaluate the relationship between Diary measures and the variables studied herein; it could be that a day-by-day record of exercise behavior is a more valid indicator of stage.

In addition, mean Self-Report stage was significantly higher than computerized records of exercise. This result is not surprising, as subjects may have performed exercise outside of the fitness center which would not have been recorded in the computerized measure, but would have affected their own judgements of stage in the Self-Report Measure. Thus, while there is some evidence for convergent validity among the Self-Report measure and the two alternate operationalizations of stage, there is also evidence for divergence between these measures.

Factor analyses were performed on two scales revised specifically for this study, including SEE and social support for exercise. Both exploratory and confirmatory factor analysis results revealed that, contrary to expectations, both SEE and social support measures were based on two, rather than one underlying factor. These results serve to clarify the meaning of these measures, and provide an opportunity for future research to test whether there are any differential relationships between individual factors and stage. It was decided to use both these measures here as single scales due to sufficient internal consistency and item-total correlations.

The context or environment in which exercise occurs has been reported to be a significant determinant of exercise behavior. In fact, people often report that contextual factors like lack of time or lack of adequate facilities are the central factor in their decision of whether to exercise. This study asked subjects to rate whether six context factors were adequate in their environments, and to rate how important each factor was in their decision to exercise. Both student and organizational samples reported that the context of their exercise programs was, in general, adequate. Students reported, in general, being able to fit exercise into their daily routines, being able to exercise in or close to home, having enough time to exercise, and needing a regular exercise routine. However, students

reported not being able to exercise during working hours, and 41% of students reported not having adequate facilities in which to exercise.

In contrast, the organizational sample reported high scores for all context variables, including being able to exercise during working hours. In addition, only 6% of subjects in this sample reported not having adequate facilities in which to exercise. Given these results, it appears that subjects in the organizational sample had a context somewhat more facilitative to exercise.

In addition to context, both person and environmental-level variables were hypothesized to impact stage of exercise; as discussed earlier, several of the hypotheses posed in this study received empirical support. For example, among both student and organizational samples, SEE exhibited a significant linear trend. Examination of Figures 8a and 9a, which plot mean SEE scores for each stage, reveals that SEE increased linearly from the precontemplation to the super maintenance stages. The same result was also found for social support; subjects at later stages of exercise reported greater social support for exercise than subjects at earlier stages (see Figures 8b and 9b). These results support Hypothesis 1, and Hypothesis 2a.

In contrast, Hypothesis 2b, that subjects in later stages of adoption of exercise would report greater perceptions of support of exercise through organizational

culture was not supported, either in the student or the organizational sample. Several reasons may exist for this finding. First, within the organizational sample, 75% of subjects reported that their organizational culture was doing well or very well in supporting exercise. As discussed earlier, this may have produced too much range restriction to provide a reasonable test of this hypothesis. It may be that multiple organizational cultures need to be compared to determine the effect of this variable on stage of adoption of exercise. However, an alternate explanation might be that this measure did not adequately measure subjects' perceptions of organizational culture. Scholars who study organizational culture usually suggest that questionnaire methodology is insufficient to measure organizational culture; they recommend instead the use of interviews, observations, and the long-term study of the myths, stories, and norms of behavior within organizations to decipher culture. Future research should continue to examine the potential role of organizational culture in influencing exercise behavior, possibly using an interview or observational methodology.

In terms of the processes of change, Hypothesis 3 was largely supported. Among both student and organizational samples, a linear trend was found among seven and six of the nine processes of change, respectively. In all cases, the use of the processes of change was higher in subjects in the

later stages than subjects in the earlier stages of adoption of exercise, thus providing support for Hypothesis 3. The exceptions were the processes of dramatic relief (e.g., "Warnings about health hazards of inactivity move me emotionally"), and environmental reevaluation (e.g., "I wonder how my inactivity affects those people who are close to me"). Within the organizational sample only, helping relationships also did not exhibit a significant linear relationship (e.g., "I have someone on whom I can depend when I am having problems with exercising"). Examination of Table 1 reveals the definition of helping relationships as "Trusting, accepting, and utilizing the support of caring others during attempts to change the problem behavior". This one difference in the importance of the use of processes of change to change behavior could be due to differences between working students and full-time workers. It may be that students, particularly students who attend college and work at the same time, typical of the students in this sample, require more help from others in trying to change their exercise behavior.

Perhaps more interesting than the support for a linear trend in the use of processes of change, however, is the finding that, among the student sample, several more complicated relationships exist. Self-reevaluation, self-liberation, and stimulus control all exhibited cubic trends, indicating two changes of grade in the trend between

precontemplation and super maintenance. Examination of Figures 8e reveals that the first change in grade occurs at the preparation stage. Subjects here report using self-reevaluation less than subjects at the contemplation stage. The same is true for the maintenance stage; subjects here report using less of this process than subjects at the action stage. These results were unanticipated. One possible explanation for these results is that the revision of the stage measure to an 11-point scale, and the later collapsing of these stages to six led to the inclusion of subjects who might have belonged at an earlier stage in the original model. An examination of the means in Table 9 for self-reevaluation in the original 11-stage measure provides some support for this idea.

Table 9 Examination of means for Self-Reevaluation (SR) and Consciousness Raising (CR) for the Eleven Stage Model		
Stage	Mean SR	Mean CR
Precontemplation	2.17	1.82
Contemplation	3.51	2.77
Intention	3.88	2.97
Low Preparation	3.53	2.64
High Preparation	3.55	2.88
Action	4.05	3.66
Super Action	4.06	3.25
Low Maintenance	3.53	2.91
Medium Maintenance	3.50	2.67
High Maintenance	3.96	3.39
Super Maintenance	4.11	3.34

Note: $n=305$. Original five stage means are shown in bold.

In particular the use of self-reevaluation appears to decline for subjects at low and medium maintenance. The original definition of the maintenance stage included subjects who exercised 3 times a week for at least 20 minutes at a time, and had exercised at that level for greater than 6 months. Low and medium maintenance subjects reported exercising 1 and 2 times a week, respectively, for greater than 6 months. While they thus are maintaining some level of exercise, it may not be enough to require the use of this process of change to a great degree. The significance of the cubic trend for self-liberation and

stimulus control was less than that of the linear trend; results here do not appear to deviate as much from the hypothesized relationships.

In addition to linear and cubic trends, four of the nine processes revealed quadratic trends, or trends with one significant change in direction from linearity, including consciousness raising, dramatic relief, self-reevaluation, and self-liberation. For consciousness raising, self-reevaluation, and self-liberation, an examination of Figure 8c and Table 9 suggests this may be due again to the addition of new stages of exercise. In particular, an examination of the means for the original 11-stage measure reveals that consciousness raising in Table 9, for example, increases among 4 of the original 5 stages, but shows an irregular pattern when the 6 new stages are added in (see Table 9 above).

The above findings of more complicated polynomial trends for the processes of change may thus be due to the inclusion, and possible misplacement of 6 new stages of adoption of exercise. Nevertheless, results still support a linear trend in between six and seven of the processes of change, lending support to Hypothesis 3. In addition, the complex polynomial trends did not appear in the organizational sample. When stages were collapsed to a four rather than a six-stage or five-stage model, they revealed only a linear relationship.

Hypothesis 4 stated that subjects at earlier stages endorse the cons of exercise more strongly than subjects at later stages, and that subjects at later stages endorse the pros of exercise more strongly than subjects at earlier stages. This Hypothesis was supported in both the student and the organizational sample by the significant linear trend revealed for both pros and cons. An examination of the means for the six stages as presented in Figure 8k/8l and Figure 9i/9j reveals a general trend such that the importance of pros increases, while the importance of cons decreases. However, this relationship is again complicated by the significance of both cubic and quadratic trends as well. Again, these results may be due to addition and placement of the 6 new stages of exercise adoption. Removal or re-placement of these stages might remove these more complex relationships.

Hypothesis 5, in general, was not supported by the results of this study. Nonetheless, several interesting results were found. In terms of the perceived motivational ability of this group of interventions, social support was deemed the most motivating of all interventions by the student sample (mean=5.3, $n=335$), and contracting the least (mean=3.8, $n=335$). In contrast, within the organizational sample, goal setting was deemed most motivating (mean=4.1, $n=149$), and contracting the least (mean=2.8, $n=149$). Within the student sample, a significant quadratic trend was found

for SEEE, contracting, and rewards, such that the motivational potential of this intervention was reported to increase until the action stage, and decrease thereafter. This supports Hypothesis 5 to a certain extent. In particular, it was hypothesized that these 3 interventions would be perceived as less motivating by subjects in the later stages of exercise. It was not expected that, however, they would be perceived as gradually more motivating from precontemplation to action. This result makes sense to a certain extent, however, in that precontemplators have no intention of exercising, and thus may see nothing as motivational in changing that intention. People at maintenance may not see themselves as requiring any external motivation. No significant trends were found for the other interventions. Among the organizational sample, two significant 5th order trends were revealed, for both the social support and the contracting intervention. An examination of Figures 9k and 9l reveal a sharp decline in the motivational potential of these interventions of the preparation stage, followed by a equally sharp increase at the action stage. As in the student sample, later stages (i.e., maintenance and super maintenance) report gradually decreasing motivational potential of these interventions.

One explanation for the lack of linear trends with respect to the interventions may be that, while people at different stages may have different characteristics (e.g.,

SEE, social support, use of different processes of change), they may not perceive that different types of interventions would be differentially motivating. It may be that if the interventions were actually tested on people of different stages, that Hypothesis 5 would receive support. Perhaps reading about possible interventions is not as salient as actually experiencing them.

In general then, as described earlier, Hypothesis 1, 2a, 3, and 4 received meaningful support here. In contrast, Hypothesis 5 received only modest support, and Hypothesis 2b was not supported.

The revelation of more complex relationships between stage and many of the variables here has been explained by the addition of six new stages of exercise. Future research may benefit from this revelation by placing these new stages more appropriately.

Even with the addition of these stages, however, significant linear trends were found for many of the hypothesized relationships. This lends support to the idea that future interventions designed to increase exercise should be targeted to specific stages, with the needs of people at these stages in mind. The patterns of response concerning the motivational potential of the set of interventions should be considered in the design of future interventions as well; although no intervention was found to be linearly related to stage, there were definite patterns

of preference between stages.

With respect to the exploratory analysis of the relationship between demographics and stage, significant relationships were revealed between stage and gender, age, and educational level. Chi-square tests revealed that the number of males was lower than expected at the contemplation stage, and higher than expected at the maintenance and super maintenance stages. The opposite was true for females, such that the number of females was higher than expected at the contemplation stage, and lower than expected at the maintenance and super maintenance stages. This indicates that stage and gender are not independent, but rather that males are more likely to be at later stages than females.

Chi-square tests also revealed a significant relationship between age and stage, such that older subjects occupied later stages more than expected, and younger subjects occupied earlier stages more than expected. As for gender, this indicates that stage and age are not independent. However, this result is contrary to findings in earlier research, which suggested that younger subjects were more likely to exercise. Due to this unexpected finding, separate analyses were run for student and organizational samples. Only the organizational sample revealed a significant relationship between stage and age, Pearson chi-square (20, $N=149$)=32.00, $p<.05$. Examination of standardized residuals here did not lead to any clear

relationship between age and stage. Therefore, it appears that the relationship described earlier may be due to combining the student and organizational samples. In particular, subjects in the student sample were younger and at earlier stages of exercise than those in the organizational sample. Further research is necessary before making any firm conclusions regarding the relationship between age and stage.

The relationship between educational level and stage is more clear. More subjects than expected who had only completed High School occupied earlier stages, and fewer subjects who had completed Graduate School occupied earlier stages. The opposite was true for later stages, such that more subjects who had completed Graduate School occupied these stages than expected, and fewer subjects who had completed only High School occupied these stages than expected. Thus, like gender, educational level and stage were significantly related.

The results of this research fill a theoretical and empirical gap by providing preliminary information as to which interventions may be appropriate for each particular stage of adoption of exercise. Results indicate, for example, that a subject at earlier stages of exercise (e.g., precontemplation or contemplation) may require an intervention which targets SEE enhancement, increasing social support for exercise by placing the subject with

other people who support exercise through their norms of behavior, emphasizing increased use of the processes of consciousness raising, reinforcement management, self-reevaluation, etc., and helping subjects to note the pros rather than the cons of exercise. In contrast, a subject at the maintenance stage of exercise may be found to require a much different form of intervention. Subject's gender and educational level should be considered as well, as results here suggest that males, and people with more education are more likely to occupy later stages of exercise. This suggests that females, and people with less education may need significantly more help in progressing to the later stages of exercise.

While this study fills an important gap in the literature, it does have several limitations. First, the study is based entirely on self-report data. While previous research in this area has also been based upon self-report data, this may create artificial relationships between variables due to the likelihood of common method variance. This problem, however, is likely to occur at all stages-of-exercise adoption; since this study assessed differences between these stages, this problem seems less significant.

A second limitation of this study is that there was no measure of actual physical fitness. It would be useful to have such a measure to validate the stages of adoption of exercise instrument. However, this measure has been

significantly associated with other self-report measures of exercise behavior. In the present research, the Self-Report Measure of stage was found to be significantly related to both a two-week Diary of exercise behavior and a computer-recorded measure of exercise behavior. This lends some support to the validity of this measure in assessing stage of exercise. Future research should continue to examine the relationship between stage and more concrete measures of physical fitness to provide additional information regarding the meaning of this measure.

The third limitation of this study is that there is no actual application of the various interventions; rather, subjects are asked to report the degree to which they expect these interventions to be motivational. Again, this may be the reason that hypotheses regarding these interventions were not supported. Due to the preliminary nature of the present investigation this was a necessary limitation. Future research should utilize the results of this study to measure potential stage-specific effects of actual interventions.

The fourth limitation of this study concerns self-selection of subjects to participate, and the lower response rates within the organizational sample. The problem of self-selection was more severe in the organizational sample than in the student sample; in the organizational sample there was an underrepresentation of subjects at earlier

stages of exercise. Two reasons may exist for this. First, the Questionnaire may have appeared more salient and interesting to subjects who did exercise; several members of Organization A suggested this to the author. In addition, non-exercisers may have felt uncomfortable about responding to questions which made their exercise status even more salient to them. Again, comments from subjects at Organization A suggest this is a definite possibility. In addition, organizational subjects all worked in an environment which contained a fitness center on site. It could be that, overall, subjects from the organizational populations were at later stages than those from the student population.

The issue of the low response rate is a problem, again, mainly for the organizational samples. The response rate in Organization A (36%) was low, and it was even lower in Organization B (5%). The relatively higher response rate in Organization A may be due to several things. First, the method of data collection was different between Organizations. In Organization B, the author was allowed no personal contact with subjects, and was unable to offer any incentive for completing the survey. In contrast, Organization A allowed free face-to-face contact with all potential subjects, and allowed the incentive of a \$50 lottery for participants. Differences in type of company and organizational norms may have also influenced response

rates. Observations of the culture of Organization B by the author revealed a very time-constrained, closed culture. In contrast, Organization A seemed more relaxed and open. Given the low response rates, conclusions may not be drawn regarding the organizations as a whole, but should be limited to those subjects who responded to the measures.

Perhaps the most important limitation of the present study was the use of cross-sectional data. While hypotheses were largely supported across stages of exercise, it could be that some other characteristic associated with stage but not measured caused these effects. Three characteristics that were measured here allow some insight into this issue. In particular, significant relationships were found between stage and the demographic variables of gender and educational level. Future research may benefit from these results by including these variables in any further modeling of variables which may predict stage.

Although this study relies on cross-sectional data, previous research provides support for the idea that subjects scores on these variables increase as they progress or regress through the stages of exercise. In particular, longitudinal work by Marcus, Simkin, and Rossi (1992) reported that, as subjects progress from stage to stage, they also progress in the expected directions in terms of the use of processes of change. In the present research, conclusions must be limited to stating that a relationship

exists between stage and the aforementioned variables. Future research should expand the present study by following a group of subjects as they progress through the stages of exercise to examine whether there is the proposed change in the variables discussed here. The present study provides the necessary base from which that research may proceed.

The issue of causation is the final limitation of this study. While stage-specific differences were found with respect to several variables, it is unclear what caused these differences. It may be that subjects higher in SEE or social support are more likely to exercise. Conversely, it is possible that exercise itself causes increases in SEE and perceptions of social support. The most likely answer to this question of causality is that a circular path exists such that these variables may increase exercise, and exercise may in turn further increase these variables. The present study's design does not allow for precise causative analysis; future research should examine this issue in more depth.

In conclusion, this research found some evidence for cross-sectional stage-specific differences in SEE, social support for exercise, use of several processes of change, perceptions of the pros and cons of exercise, perceptions of the motivational potential of three interventions, and several demographic variables. In addition, this study largely confirmed the generalizability of these findings

across two different types of subjects. The knowledge gained in this preliminary research in exercise adherence will be valuable for future efforts in this area.

APPENDIX A

Exhibit 1a. Revision 1 of the Self-Report Stage of Adoption of Exercise measure.

THE ORIENTATION TO EXERCISE QUESTIONNAIRE

The following questionnaire consists of nine different parts; please follow the instructions described to answer the questions for each part.

Your participation is greatly appreciated.

Please place a check in the box next to one of the following statements which best describes your current exercise behavior.

I currently do not exercise and...	
☐	I do not intend to start exercising in the next 6 months.
☐	I am thinking about starting to exercise in the next 6 months.
☐	I definitely intend to start exercising in the next 6 months.

I currently exercise about <u>1</u> time per week for at least 20 minutes at a time and...	
☐	have been doing so for less than 6 months.
☐	have been doing so for longer than 6 months.

I currently exercise about <u>2</u> times per week for at least 20 minutes at a time and...	
☐	have been doing so for less than 6 months.
☐	have been doing so for longer than 6 months.

I currently exercise about <u>3</u> times per week for at least 20 minutes at a time and...	
☐	have been doing so for less than 6 months.
☐	have been doing so for longer than 6 months.

I currently exercise between <u>4</u> and <u>7</u> times per week for at least 20 minutes at a time and...	
☐	have been doing so for less than 6 months.
☐	have been doing so for longer than 6 months.

Exhibit 1b. Revision 2 of the Self-Report Stage of Adoption of Exercise measure.

THE ORIENTATION TO EXERCISE QUESTIONNAIRE

The following questionnaire consists of nine different parts; please follow the instructions described to answer the questions for each part.

Your participation is greatly appreciated.

If you are a member of the Lifestyle/Fitness Center, please write your four digit Member ID in the space below (the number you use to access the computer in the Lifestyle/Fitness Center); note that this data will be used to match your survey with your computer-recorded exercise in the Lifestyle/Fitness Center and will be kept confidential:

Member ID: — — — —

(Even if you are not a member of the Lifestyle/Fitness Center, your response to the rest of this survey is very important)

If you currently DO NOT EXERCISE, please respond to Part A only.

If you currently DO exercise, please respond to Parts B and C.

Part A

Please place a check in the box next to ONE of the following statements which best describes your current exercise behavior.

I currently do not exercise and...	
☐	I do not intend to start exercising in the next 6 months.
☐	I am thinking about starting to exercise in the next 6 months.
☐	I definitely intend to start exercising in the next 6 months.

Part B

Please place a check in the box next to ONE of the following statements which best describes your current exercise behavior.

☐	I currently exercise about <u>1</u> time per week for at least 20 minutes at a time.
☐	I currently exercise about <u>2</u> times per week for at least 20 minutes at a time.
☐	I currently exercise about <u>3</u> times per week for at least 20 minutes at a time.
☐	I currently exercise between <u>4 and 7</u> times per week for at least 20 minutes at a time.

Part C

Please place a check to indicate how long you have been exercising at the above level.

I HAVE BEEN EXERCISING AT THE ABOVE LEVEL FOR	
☐	less than 6 months.
☐	longer than 6 months.

Exhibit 1c. Revision 3 of the Self-Report Stage of Adoption of Exercise measure.

THE ORIENTATION TO EXERCISE QUESTIONNAIRE

The following questionnaire consists of nine different parts; please follow the instructions described to answer the questions for each part.

Your participation is greatly appreciated.

Members of the Fitness Center: please write your ID number in the space below; note that this data will be used to match your survey with exercise recorded in the Fitness Center and will be kept confidential:

ID Number: _____

(Even if you are not a member of the Fitness Center, your response to the rest of this survey is very important.)

PLEASE NOTE: Exercise is defined here as any type of activity that elevates the heart rate, including but not limited to brisk walking, running, cycling, tennis, swimming, etc. Please do not include non-aerobic exercise such as slow walking, gardening, etc.

Please include exercise both in and outside of the Fitness Center.

NON-EXERCISERS ONLY:

Please place a check in the box next to ONE of the following statements which best describes your current exercise behavior.

I currently do not exercise and...	
☐	I do not intend to start exercising in the next 6 months.
☐	I am thinking about starting to exercise in the next 6 months.
☐	I definitely intend to start exercising in the next 6 months.

EXERCISERS ONLY:

Please place a check in the box next to ONE of the following statements which best describes your current exercise behavior.

☐	I currently exercise about <u>1</u> time per week for at least 20 minutes at a time.
☐	I currently exercise about <u>2</u> times per week for at least 20 minutes at a time.
☐	I currently exercise about <u>3</u> times per week for at least 20 minutes at a time.
☐	I currently exercise between <u>4 and 7</u> times per week for at least 20 minutes at a time.

Please place a check to indicate how long you have been exercising at the above level.

I HAVE BEEN EXERCISING AT THE ABOVE LEVEL FOR	
☐	less than 6 months.
☐	longer than 6 months.

Exhibit 2. Diary Measure of Stage of Adoption of Exercise.

Please return by Tuesday, October 4th.

DIARY OF EXERCISE BEHAVIOR

Please complete (in addition to the attached questionnaire) the following two-week exercise diary; even if you currently do not exercise, it is important for you to return this part of the survey, noting that fact for each day.

Please begin the diary on Sunday, September 18th, and continue recording your exercise on this diary until Saturday, October 1st.

Thank you in advance for your participation in this research.

Upon completion of this diary, please respond to the following question, and return this diary and cover sheet to the Fitness Center via interoffice mail to the attention of Patricia Peters. Please note there is no right or wrong answer to this question.

The amount of exercise I have reported here for each week:

___ is more than I have exercised per week for the last six months.

___ is about equal to the amount I have exercised per week for the last six months.

___ is less than I have exercised per week for the last six months.

Members of the Fitness Center: please write your ID number in the space below; note that this data will be used to match your survey with exercise recorded in the Fitness Center, and will be kept confidential:

ID Number: _____

For each day, please indicate:

- Whether you exercised by writing "YES" or "NO".
- If you did exercise, please write in the amount of time you exercised in minutes.
- The intensity of that exercise:

Light intensity: you would have been able to sing a song while you exercised.

Medium intensity: you would have been aware of exertion, but would have been able to hold a conversation.

High intensity: you would have been aware of hard work, breathing would have been difficult, and conversation would have been limited.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	Sept 18	19	20	21	22	23	24
Did you exercise?							
How long did you exercise (in minutes)?							
At what intensity did you exercise (Light, Medium, or High)?							

Note. Only one week of the two-week diary is shown here. The second week mirrored this presentation exactly.

Exhibit 3. Example of computerized record of exercise behavior.

EXERCISE LOG

MEMBER

DATE:

MEMBER ID:

CURRENT WEIGHT:

MESSAGE:

DATE	TYPE OF EXERCISE	DURATION	QUANTITY	KCAL	METS
04/27/93	StairMaster	0:30:00		311	10.9
04/28/93	StairMaster	0:30:00		318	11.1
04/30/93	StairMaster	0:30:00		317	11.1
05/03/93	StairMaster	0:30:00		318	11.1
05/05/93	StairMaster	0:30:00		318	11.1
05/06/93	StairMaster	0:30:00		310	10.8
05/07/93	StairMaster	0:30:00		315	11.0
05/10/93	StairMaster	0:30:00		318	11.1
05/11/93	StairMaster	0:30:00		319	11.1
05/12/93	StairMaster	0:30:00		318	11.1
05/14/93	StairMaster	0:30:00		314	11.0
05/17/93	StairMaster	0:30:00		319	11.1
05/18/93	StairMaster	0:30:00		314	11.0
05/24/93	StairMaster	0:30:00		321	11.2

TOTALS

TYPE OF EXERCISE	THIS MONTH			LAST MONTH			LIFETIME
	QUANTITY	KCAL	AVG. METS	QUANTITY	KCAL	AVG. METS	QUANTITY
Aerobic Dance							
Weights (Circuit Trng.)							
Skiing (Cross Country)							
Treadmill							13 Hr
Stationary Cycle							11 Hr
All Other Sports	20.5 Hr	12353	10.5	3.5 Hr	1945	9.7	113 Hr

TOTAL CALORIES EXPENDED 12353 1945

METS = Intensity of Exercise. 1 Met = sitting oxygen uptake (3.5 ml./min./kg)

KCAL = Energy expenditure in calories.

Exhibit 4. Context Variables Measure.

**Please respond to the following items on the scales below:
IF I CHOSE TO EXERCISE....**

	YES	NO	How important is this fact in your decision to exercise or not to exercise?				
			1 Very important	2	3	4	5 Not important
I would be able to incorporate exercise into my daily routine.			1	2	3	4	5
I would be able to exercise during working hours.			1	2	3	4	5
I would be able to exercise in or close to my home.			1	2	3	4	5
I would have enough time available to exercise.			1	2	3	4	5
I would need a regular exercise routine.			1	2	3	4	5
I would have adequate facilities in which to exercise (including personnel, equipment, etc.)			1	2	3	4	5

Exhibit 5. Self-Efficacy for Exercise Measure.

Using the rating scale below, please circle a number for each item to indicate how confident you are that you could exercise in each of the following situations: For example, the first item reads: "I would exercise if I was bored by the program or the activity".

This item asks how confident you are that you would exercise if you were bored by the program or the activity. If you had no confidence at all that you could exercise if you were bored by the activity, you would circle 0. However, if you had complete confidence that you could exercise even if you were bored by the activity, you would circle 10. Please use the rating scale below to respond to each of the following items; answer honestly and accurately. There are no right or wrong answers.

I WOULD EXERCISE IF...															
0	1	2	3	4	5	6	7	8	9	10					
Not at all confident				somewhat confident				completely confident							
I was bored by the program or activity.					0	1	2	3	4	5	6	7	8	9	10
I felt I didn't have time.					0	1	2	3	4	5	6	7	8	9	10
I felt discomfort when exercising.					0	1	2	3	4	5	6	7	8	9	10
I had to exercise alone.					0	1	2	3	4	5	6	7	8	9	10
It was not fun or enjoyable.					0	1	2	3	4	5	6	7	8	9	10
I didn't like the particular activity or program.					0	1	2	3	4	5	6	7	8	9	10
I felt self-conscious about my appearance when I exercised.					0	1	2	3	4	5	6	7	8	9	10
I was in a bad mood.					0	1	2	3	4	5	6	7	8	9	10
I was tired.					0	1	2	3	4	5	6	7	8	9	10
I was under personal stress of some kind.					0	1	2	3	4	5	6	7	8	9	10

Exhibit 6. Social Support through Group Exercise Norms Measure.

Please place a check mark to indicate whether each of the following statements is true or false for you.		
Typically, people in one or more of the groups that I belong to (e.g., family, friends, work groups):	Check if true	Check if false
...exercise three times a week.		
...are a few pounds overweight.		
...look on exercise as a grind.		
...skip exercise due to other pressures.		
...drive short distances rather than walk.		
...don't exercise much.		
...make exercise a priority in their daily schedules.		
...use the elevator instead of the stairs.		
...think of being "slightly" overweight as natural.		
...don't balance their food intake with their physical exercise.		

Exhibit 7. Support of Exercise through Organizational Culture Measure.

Frequently the amount of support and encouragement that people feel in their environments has an important impact on their lifestyle and health. Listed below are some health practices that could be supported within Organization _____. Please use the scale next to each item to respond to the following question:

How well is Organization _____ doing in actively, constructively, and consistently supporting people in their efforts to:					
	Very well	Well	some but not enough	Poor	Very Poor
...exercise regularly?	1	2	3	4	5
...attain and maintain a good state of fitness?	1	2	3	4	5

Note. This measure was modified appropriately for the Student and Organizational Samples such that for each subject, it referred to their particular work organization. Subjects in the Student Sample were instructed to skip this section if they had never worked.

Exhibit 8. Processes of Change Measure.

The following experiences can affect the exercise habits of some people. Think of any similar experiences you may be having now, or have had during the past month, and please...

...rate how frequently each of the following occurs for you by circling the number for each item that best describes your experience.					
1 Never	2	3 Occasionally	4	5 Repeatedly	
Instead of remaining inactive, I engage in some physical activity.	1	2	3	4	5
I tell myself I am able to keep exercising if I want to.	1	2	3	4	5
I put things around my home to remind me of exercise.	1	2	3	4	5
I tell myself that if I try hard enough I can keep exercising.	1	2	3	4	5
I recall information people have personally given me on the benefits of exercise.	1	2	3	4	5
I make commitments to exercise.	1	2	3	4	5
After I exercise, I reward myself by treating myself to something.	1	2	3	4	5
I think about information from articles and advertisements on how to make exercise a regular part of my life.	1	2	3	4	5
I keep things around my place of work that remind me of exercise.	1	2	3	4	5
Warnings about health hazards of inactivity affect me emotionally.	1	2	3	4	5
I am considering the idea that regular exercise would make me a healthier, happier person to be around.	1	2	3	4	5
Dramatic portrayals of the hazards of inactivity affect me emotionally.	1	2	3	4	5

...rate how frequently each of the following occurs for you by circling the number for each item that best describes your experience.					
1 Never	2	3 Occasionally	4	5 Repeatedly	
I get frustrated with myself when I don't exercise.	1	2	3	4	5
I think of exercise as a time to relax and recover from the day's worries, not a task to get out of the way.	1	2	3	4	5
I look for information related to exercise.	1	2	3	4	5
When I exercise, I tell myself that I am being good to myself by taking care of my body.	1	2	3	4	5
I have someone who points out my rationalizations for not exercising.	1	2	3	4	5
I think about the fact that some of my close friends might exercise more if I would.	1	2	3	4	5
I consider the fact that I would feel more confident in myself if I exercised regularly.	1	2	3	4	5
When I feel tired, I make myself exercise because I know I will feel better afterward.	1	2	3	4	5
I avoid spending long periods of time in environments that promote inactivity.	1	2	3	4	5
I have someone on whom I can depend when I am having problems with exercising.	1	2	3	4	5
I try to set realistic exercise goals for myself rather than setting myself up for failure by expecting too much.	1	2	3	4	5

...rate how frequently each of the following occurs for you by circling the number for each item that best describes your experience.					
1 Never	2	3 Occasionally	4	5 Repeatedly	
When I'm feeling tense, I find exercise a great way to relieve my worries.	1	2	3	4	5
I have a healthy friend who encourages me to exercise when I don't feel up to it.	1	2	3	4	5
I wonder how my inactivity affects those people who are close to me.	1	2	3	4	5
I do something nice for myself for making efforts to exercise more.	1	2	3	4	5
I read articles about exercise in an attempt to learn more about it.	1	2	3	4	5
I react emotionally to warnings about an inactive life style.	1	2	3	4	5
I realize that I might be able to influence others to be healthier if I would exercise more.	1	2	3	4	5
I remind myself that I am the only one who is responsible for my health and well-being, and that only I can decide whether or not I will exercise.	1	2	3	4	5
I think about the type of person I will be if I keep exercising.	1	2	3	4	5
I remove things that contribute to my inactivity.	1	2	3	4	5
I have someone who provides feedback about my exercising.	1	2	3	4	5
I worry that inactivity can be harmful to my body.	1	2	3	4	5

Exhibit 9. Pros and Cons of Exercise Measure.

How important is each of the following in your decision to exercise or not to exercise?					
1 Not at all important	2	3	4	5 Extremely important	
Having more energy for family and friends.	1	2	3	4	5
Helping to relieve tension.	1	2	3	4	5
Being too tired to do daily work after exercising.	1	2	3	4	5
Sleeping more soundly.	1	2	3	4	5
Being too exhausted at the end of the day to exercise.	1	2	3	4	5
Liking your body better.	1	2	3	4	5
Feeling uncomfortable when exercising because you get out of breath and your heart beats very fast.	1	2	3	4	5
Feeling less stressed.	1	2	3	4	5
Feeling more comfortable with your body.	1	2	3	4	5
Having less time for family and friends.	1	2	3	4	5
Feeling more confident.	1	2	3	4	5
Finding it difficult to find an exercise activity you enjoy that is not affected by bad weather.	1	2	3	4	5
Finding it easier to perform routine physical tasks.	1	2	3	4	5
Exercise taking too much time.	1	2	3	4	5
Helping you have a more positive outlook on life.	1	2	3	4	5
Feeling good about yourself if you kept your commitment to exercise regularly.	1	2	3	4	5

Exhibit 10. Perceptions of motivational power of interventions in encouraging exercise adherence measure.

Below are one paragraph descriptions of several ways that your work organization might help to motivate you to continue or to start to exercise.

Please read the description of each method, and using the scale below each method, rate how motivating you feel this method would be in encouraging you to continue or to start to exercise.

Method 1:

This method would try to raise your belief in your ability to exercise by presenting you with motivational readings that emphasize that "anyone can exercise regularly once they decide they want to". In addition, you might be asked to begin exercising a few times per week, in an attempt to enhance your belief that you can accomplish some amount of exercise.

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

Method 2:

This method would provide a group of other people for you to exercise with; you would select people to exercise with with whom you felt close, and team-building exercises would be used to help you to feel like a close-knit group. In addition, your group might be encouraged to compete with other groups.

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

Method 3:

This method would have you sign a contract describing the amount of exercise that you intended to accomplish per week. You might be asked to deposit a small sum of money, of which you would lose a certain amount for each exercise session you miss. Someone else would also sign the contract as a witness to your commitment.

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

Method 4:

This method would have you write down the things you anticipate that you would gain from exercising, and the things you'd anticipate losing on a "Decision-Balance" sheet; you would be able to see how the benefits of exercise may outweigh the costs of exercise.

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

Method 5:

This method would require you to set specific goals for the number of exercise sessions you would accomplish per week, the duration of each session, and the intensity of exercise during each session. You would record your exercise each week on a chart, and receive feedback as to how well you did each week in achieving your goals.

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

Method 6:

This method would ask you to generate a list of rewards that you would receive for exercise (e.g., exercise clothing, a trip to the movies, etc.), and the amount of exercise you decide you must accomplish before giving these rewards to yourself.

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

Method 7:

This method would consist of a lecture describing the "relapse effect", or the reasons why people quit exercising once they have begun. You would be asked to think of situations that might cause you to quit exercising once you've begun, and to rehearse some coping strategies to help you overcome these situations to keep exercising.

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

Exhibit 11. Demographics Measure.

The following items refer to things about yourself. Please respond on the scales below:

1. Gender: ☐ male
☐ female
2. Age: ☐ 20-29
☐ 30-39
☐ 40-49
☐ 50-59
☐ 60-69
☐ 70+
3. Marital Status:
☐ Single
☐ Married
☐ Divorced/separated
4. Highest Educational Level completed:
☐ High School
☐ Some college
☐ Two-year College
☐ Four-Year College
☐ Graduate School
5. Smoking history:
☐ Currently smoking
☐ Have quit smoking
☐ Have never smoked
6. Do you personally have any history of cardiac disease?
☐ Yes
☐ No

APPENDIX B

To: All Organization A Employees

From: Top Management

Date: May 12, 1994

Re: Research on the exercise habits of Organization A
employees

As you know, Organization A maintains a comprehensive Lifestyle and Fitness Center for use by all employees.

Last spring, Patricia Peters conducted research at Organization A concerning the exercise habits of our employees; she intends to continue her research here in order to complete her Ph.D. in Industrial and Organizational Psychology at Baruch College.

For this purpose, during the next two weeks Ms. Peters will administer a survey to all Organization A employees. The results of this survey will be quite helpful in understanding our current exercise habits. The data from this survey may also be used by the Fitness Director at the Lifestyle/Fitness Center to generate new contests, and to help him develop programs to continue to motivate employees to exercise.

Participation in this survey is completely voluntary. Nonetheless, I encourage you to take the time to fill it out. The results of this research will be of benefit to both Organization A and to advances in preventative health care research.

TO: All Organization A Employees

**FROM: Patricia Peters, Department of Psychology,
Baruch College of the City University of New York**

DATE: May 12, 1994

RE: Research Project on the Lifestyle/Fitness Center

WIN \$50!!! WIN \$50!!! WIN \$50!!!

WHAT'S THIS ALL ABOUT?

In conjunction with the Fitness Director and the Lifestyle/Fitness Center, I am continuing to conduct research on the exercise habits of employees in order to complete my Ph.D. in Industrial and Organizational Psychology at Baruch College.

WHAT AM I ASKING YOU TO DO?

To perform this research, I am asking that all employees:

- o complete the attached "Orientation to Exercise Questionnaire". Return: as soon as completed.
- o record your exercise behavior for the next two weeks on the attached "Diary of Exercise Behavior". Return: by May 18th.
- o include your name on all measures to allow a match-up between exercise recorded via computer in the Lifestyle/Fitness Center and the above questionnaires. Please note this information will be kept confidential.
- o return all materials upon completion via interoffice mail to the Lifestyle Center, attention of Patricia Peters.

WHO SHOULD PARTICIPATE IN THIS RESEARCH?

Participation in this research is completely voluntary; however, it is hoped that ALL employees will participate.

Even if you currently do not exercise, and/or do not currently use the Lifestyle/Fitness Center, your response to this questionnaire will be very valuable.

WHAT ARE THE POTENTIAL BENEFITS OF THIS RESEARCH?

- o The development of new ways to motivate people to exercise, and the advancement of preventative health care research.
- o The provision of information about current exercise practices among employees.
- o The linking of research in Health Psychology and Industrial and Organizational Psychology.

WHY SHOULD YOU PARTICIPATE?

- o Your participation in this research will benefit both the Lifestyle/Fitness Center and research devoted to enhancing exercise behavior.
- o In addition, by participating in this research, your name will be entered in a lottery drawing for a \$50.00 prize.

Please note that your participation in this study is completely voluntary, and you may withdraw at any time. All results will be confidential; the information gathered will be used for research purposes only, and it will be held in confidence. The results of this research will be made available to any participant upon their request at the completion of this study.

If you wish to participate in this research, please read and sign the consent form below. If you have any questions regarding this research, I can be reached at (212) 869-8207. Your participation in this research is sincerely appreciated.

 _____ **YES**, I wish to participate in this research project. I fully understand the risks and benefits involved in my participation, and I understand that the results of this research will be confidential. Please enter my name in the \$50.00 lottery to be awarded upon completion of this research.

Name (please print) _____ Date _____

Signature _____

_____ **NO**, I do not wish to participate in this research.

If you would like to receive a copy of the results upon completion of this research, please write your address below:

TO: All Organization A Employees

FROM: Patricia Peters, Department of Psychology,
Baruch College of the City University of New York

DATE: May 30, 1994

RE: Return of the "Exercise Diary" to the
Lifestyle/Fitness Center.

As you know, for the last two weeks I have been conducting research on the exercise behavior of employees. I have enjoyed having the opportunity to meet and talk with all of you during this time.

I thank those of you who have chosen to fill out the "Orientation to Exercise Questionnaire".

This is a reminder that your Exercise Diary should be fully completed by this time (the last date to record your exercise behavior was on Sunday, May 28th). **You can return the completed Exercise Diary via interoffice mail to the Lifestyle/Fitness Center, to the attention of Patricia A. Peters.** As I've noted before, participation in this research is completely voluntary.

I will announce the winner of the \$50.00 contest during the month of June, and the results of the study will be available in early August.

Thank you again for your participation, and for the time you took to speak with me over the last two weeks.

APPENDIX C
M E M O R A N D U M

August 26, 1994

TO: All Attorneys
FROM: Top Management

Re: Research Project on Exercise Habits Survey

Patricia A. Peters, a student at Baruch College, Department of Psychology, has requested our attorneys' participation in a research program she is conducting on exercise habits. As you will note, Ms. Peters is interested in having both users and non-users of the Fitness Center participate in the survey.

The program is purely voluntary and will assist Ms. Peters in completing her dissertation entitled "Stage-Specific Interventions to Encourage Participation in Corporate Fitness Centers".

Attached is more detailed information as well as consent and questionnaire forms.

Attachments

TO: All Attorneys

FROM: Patricia A. Peters, M.S.
Baruch College, Department of Psychology

DATE: September 12, 1994

RE: Exercise Habits Survey

WHAT'S THIS ALL ABOUT?

As you know, Organization B maintains a comprehensive Fitness Center for use by attorneys. The attached survey has been designed to conduct research on the exercise habits of Organization B's attorneys, and to develop new ways to motivate people to exercise. In addition, the results of this survey will be used by me for research purposes as a member of the Psychology Department at Baruch College.

WHAT AM I ASKING YOU TO DO?

To perform this research, I am asking that all attorneys (ESPECIALLY THOSE WHO CURRENTLY DO NOT EXERCISE):

- o Sign and return the Informed Consent form on the next page; this is necessary since the results of this survey may be published in scientific journals (NOTE: TO PROTECT YOUR ANONYMITY, PLEASE RETURN THIS FORM IN A DIFFERENT ENVELOPE THAN THE QUESTIONNAIRE ITSELF).
- o Complete the attached "Orientation to Exercise Questionnaire". Return: as soon as completed.
- o Record your exercise behavior for the next two weeks on the attached "Diary of Exercise Behavior". Return: by September 27th.
- o Return all materials upon completion via interoffice mail to the Fitness Center, attention of Patricia Peters.

WHO SHOULD PARTICIPATE IN THIS RESEARCH?

ALL attorneys. Those of you who currently do not exercise are specially encouraged to participate. Please note, however, that participation in this research is completely voluntary.

WHY SHOULD YOU PARTICIPATE?

Your participation in this research will benefit both the Fitness Center and research devoted to enhancing exercise behavior.

Please note that your participation in this study is completely voluntary, and you may withdraw at any time. All results will be confidential; the information gathered will be used for research purposes only, and it will be held in confidence. The results of this research will be made available to any participant upon their request at the completion of this study.

If you wish to participate in this research, please read and sign the consent form below. If you have any questions regarding this research, Patricia Peters, M.S. can be reached at (212) 869-1028. Your participation in this research is sincerely appreciated.

INFORMED CONSENT FORM

____ **YES**, I wish to participate in this research project. I fully understand the risks and benefits involved in my participation, and I understand that the results of this research will be confidential.

Name (please print) _____ Date _____

Signature _____

____ **NO**, I do not wish to participate in this research.

If you would like to receive a copy of the results upon completion of this research, please write your address below:

NOTE: TO PROTECT YOUR ANONYMITY, PLEASE RETURN THIS FORM IN A DIFFERENT ENVELOPE THAN THE QUESTIONNAIRE ITSELF.

APPENDIX D

TO: Students

FROM: Patricia A. Peters
Baruch College, Department of Psychology

RE: Exercise Habits Survey

WHAT'S THIS ALL ABOUT?

The attached survey has been designed for the purpose of completing my doctoral dissertation for the Industrial/Organizational Psychology subprogram at Baruch College. The survey investigates exercise habits, and will be used to develop new ways to motivate people to exercise. In addition, the results of this survey will be used by me for research purposes as a member of the Psychology Department at Baruch College.

WHAT AM I ASKING YOU TO DO?

To perform this research, I am asking that students
(ESPECIALLY THOSE WHO CURRENTLY DO NOT EXERCISE):

- o Sign and return the Informed Consent form on the next page; this is necessary since the results of this survey may be published in scientific journals (NOTE: TO PROTECT YOUR ANONYMITY, PLEASE SEPARATE THIS FORM FROM THE QUESTIONNAIRE ITSELF).
- o Complete the attached "Orientation to Exercise Questionnaire".
- o Record your exercise behavior for the next two weeks on the attached "Diary of Exercise Behavior".
- o Return all materials to me on or about October 4th when I return to your class.

WHO SHOULD PARTICIPATE IN THIS RESEARCH?

ALL students. Those of you who currently do not exercise are specially encouraged to participate. Please note, however, that participation in this research is completely voluntary.

WHY SHOULD YOU PARTICIPATE?

Your participation in this research will benefit research devoted to enhancing exercise behavior; results of this research may be used in actual organizations in the future.

Please note that your participation in this study is completely voluntary, and you may withdraw at any time. All results will be confidential; the information gathered will be used for research purposes only, and it will be held in confidence. The results of this research will be made available to any participant upon their request at the completion of this study.

If you wish to participate in this research, please read and sign the consent form below. If you have any questions regarding this research, Patricia Peters can be reached at (212) 869-1028. Your participation in this research is sincerely appreciated.

INFORMED CONSENT FORM

____ **YES**, I wish to participate in this research project. I fully understand the risks and benefits involved in my participation, and I understand that the results of this research will be confidential.

Name (please print) _____

Date _____

Signature _____

____ **NO**, I do not wish to participate in this research.

If you would like to receive a copy of the results upon completion of this research, please write your address below:

NOTE: TO PROTECT YOUR ANONYMITY, PLEASE SEPARATE THIS FORM FROM THE QUESTIONNAIRE ITSELF.

APPENDIX E

WRITTEN DEBRIEFING:

This debriefing form is designed to inform all research participants of the educational relevance of your participation in this research program, as well as to inform you of the purpose, hypotheses, design, measures, and alternative interpretations of results.

Relevance:

This research is relevant to your undergraduate education in psychology because it provides you with an opportunity to participate in a survey research project. As such, it may allow you to see several potential advantages, as well as disadvantages in choosing this research strategy. It may also help you to become more aware of reasons you do or do not choose to exercise, as well as provide you with some examples of ways you might motivate yourself to exercise.

Purpose of the research:

The purpose of the present research is to test several hypotheses concerning interventions that might be useful in encouraging individuals to start or to continue to exercise within corporate fitness programs, and to confirm hypothesized differences between people at different "stages" of exercise adoption. These differences may allow the creation of interventions that are targeted more appropriately to different stages of exercise. Such tailoring may enable people to adhere to exercise more easily.

Hypotheses:

It is hypothesized that individuals who are at different "stages of adoption of exercise behavior" will differ significantly on the several variables investigated in the survey. Specifically, it is hypothesized that people who do not yet exercise, or who have just begun to exercise (i.e., people at earlier stages of adoption of exercise) will differ from people who currently exercise and have done so for longer than six months (i.e., people at later stages of adoption of exercise) in terms of:

- a. self-efficacy for exercise: It is hypothesized that people in later stages of exercise will believe more strongly in their ability to continue to exercise in the face of challenges to exercise.
- b. social support for exercise/norms of exercise behavior: it is hypothesized that people in later stages of exercise adoption will report that the groups to which they belong have norms of behavior which are supportive of exercise.

- c. organizational culture's support for exercise: it is hypothesized that, among people who work, those in later stages of exercise adoption will report an organizational culture that supports their efforts to exercise.
- d. processes of change utilized by subject: it is hypothesized that people in later stages of exercise adoption will report using processes of change that are useful in initiating and maintaining changes in exercise behavior more often than people in earlier stages of exercise adoption.
- e. evaluation of pros and cons of exercise: it is hypothesized that people in later stages of exercise adoption will report that the benefits achieved through exercise are more important than the costs incurred through exercise; people in earlier stages are expected to report that the costs incurred through exercise are more important than the benefits achieved.
- f. assessment of motivational impact on interventions: it is hypothesized that subjects in earlier stages of exercise adoption will endorse self-efficacy enhancement, social support, contracting, cost-benefit analysis, and rewards as more useful interventions. Subjects in later stages are expected to endorse goal-setting and relapse management as the more useful interventions.
- g. context of exercise/importance of exercise context and demographic variables: no specific hypotheses will be tested regarding these variables; their inclusion is strictly exploratory (i.e., there is no research literature suggesting a relationship between these variables and the stages of exercise adoption).

Design: This research project consists of a two-part survey, including the Orientation to Exercise Questionnaire as well as the Diary of Exercise Behavior. The diary measure is used to validate a self-report "Stage of Adoption of Exercise" measure included in the Questionnaire.

Measures:

As described earlier, this study utilizes two surveys. The Orientation to Exercise Questionnaire measures the following characteristics:

- o stage of adoption of exercise
- o context of exercise/importance of exercise context
- o self-efficacy for exercise
- o social support for exercise/norms of exercise behavior
- o organizational culture's support for exercise
- o processes of change utilized by subject
- o evaluation of pros and cons of exercise
- o assessment of motivational impact on interventions
- o demographic variables.

The second survey measures actual exercise behavior for a two-week time period.

Alternative explanations of results:

The above hypotheses may be supported by the results of this project; however, there are several alternative explanations that may explain this support, other than the idea that people at different stages of exercise adoption may require different interventions:

- a. First, the measures employed are not perfectly valid or reliable. To the degree that these measures are faulty, the results may not support the above hypotheses.
- b. Second, the results of this study may not generalize to actual work organizations. The author of this research is currently collecting data within work settings to try to resolve this issue.
- c. The data from this study are correlational; therefore, it would be incorrect to make any causal interpretations of this data. For example, if the results revealed that a person at a later stage of exercise reported an organizational culture supportive of exercise, the author could not state that an organizational culture supportive of exercise causes exercise behavior.

If you have any further questions regarding this research, the researcher, Patricia A. Peters, can be contacted at 212-581-6019 or at 212-387-1544, or written to at the following address:

Baruch College
Department of Psychology
17 Lexington Avenue, Box 512
New York, New York 10010
Attn: Patricia A. Peters

Below you will find a list of several references which may be helpful if you are interested in pursuing research in this area.

Note: If you wish to receive a copy of the results of this research, please be sure to provide the researcher with your address.

References

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84(2), 191-215.

Dishman, R.K. (1982). Compliance/adherence in health-related exercise. Health Psychology, 1(3), 237-267.

Dishman, R.K. (Ed.). (1988). Exercise Adherence: It's Impact on Public Health. Illinois: Human Kinetics Books.

Marcus, B.H., & Owen N. (1992). Motivational readiness, self-efficacy and decision-making for exercise. Journal of Applied Social Psychology, 22, 3-16.

McAuley, E. (1991). Efficacy, attributional, and affective responses to exercise participation. Journal of Sport and Exercise Psychology, 13, 382-393.

Prochaska, J.O., & DiClemente, C.C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. Journal of Consulting and Clinical Psychology, 51(3), 390-395.

Schein, E.H. (1990). Organizational Culture. American Psychologist, 45(2), 109-119.

Strecher, V.J., DeVellis, B.M., Becker, M.H., & Rosenstock, I.M. (1986). The role of self-efficacy in achieving health behavior change. Health Education Quarterly, 13(1), 73-91.

Wallston, B.S., Alagna, A.S., DeVellis, B.M., & DeVellis, R.F. (1983). Social support and physical health. Health Psychology, 2(4), 367-391.

BIBLIOGRAPHY

Ajzen, I., & Fishbein, M. (1977). Attitude-Behavior relations: A theoretical analysis and review of empirical research. Psychological Bulletin, 84(5), 888-918.

Allen, R. (1982). The importance of cultural variables in program design. In M.P. O'Donnell & T.H. Ainsworth (Eds.), Health promotion in the workplace (pp. 69-95). New York: John Wiley & Sons.

American College of Sports Medicine. (1990). Position statement on the recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults. Medicine and Science in Sports and Exercise, 22, 265-274.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84(2), 191-215.

Bandura, A. (1986). From thought to action: Mechanisms of personal agency. New Zealand Journal of Psychology, 15(1), 1-17.

Baun, W.B., Bernacki, E.J., & Tsai, S.P. (1986) A preliminary investigation: Effect of a corporate fitness program on absenteeism and health care costs. Journal of Occupational Medicine, 28(1), 18-22.

Baun, W.B., & Bernacki, E.J. (1988). Who are corporate exercisers and what motivates them? In R.K. Dishman (Ed.), Exercise Adherence: It's Impact on Public Health (pp. 321-348). Illinois: Human Kinetics Books.

Becker, M.H., & Maiman, L.A. (1975). Sociobehavioral determinants of compliance with health and medical care recommendations. Medical Care, 3, 10-24.

Belisle, M., Roskies, E., & Levesque, J.M. (1987). Improving adherence to physical activity. Health Psychology, 6(2), 159-172.

Berman, L.F. (1985). The relationships of social networks and social support to morbidity and mortality. In S. Cohen & S.L. Syme (Eds.), Social Support and health (pp. 241-262). New York: Academic Press.

Bernacki, E.J., & Baun, W.B. (1984). The relationship of job performance to exercise adherence in a corporate fitness program. Journal of Occupational Medicine, 26(7), 529-531.

Blumenthal, J.A., Williams, R.S., Wallace, A.G., Williams, R.B., & Needles, T.L. (1982). Physiological and psychological variables predict compliance to prescribed exercise therapy in patients recovering from myocardial infarction. Psychosomatic Medicine, 44(6), 519-527.

Bowne, D.W., Russell, M.L., Morgan, J.L., Optenberg, S.A., & Clarke, A.E. (1984) Reduced disability and health care costs in an industrial fitness program. Journal of Occupational Medicine, 26(11), 809-816

Boyce, R.W., Jones, G.R., & Hiatt, A.R. (1991). Physical fitness capacity and absenteeism of police officers. Journal of Occupational Medicine, 33(11), 1137-1143.

Cady, L.D., Thomas, P.C., & Karwasky, R.J. (1985). Program for increasing health and physical fitness of fire fighters. Journal of Occupational Medicine, 27(2), 110-114).

Chen, M.S. (1984). Proving the effects of health promotion in industry: An academician's perspective. Health Education Quarterly, 10(3/4), 235-245.

Clingman, J.M., & Hilliard, D.V. (1987). Some personality characteristics of the super-adherer: Following those who go beyond fitness. Journal of Sport Behavior, 10(3), 123-136.

Cohen, W.S. (1985). Health promotion in the workplace: A prescription for good health. American Psychologist, 40(2), 213-216.

Czajkowski, S.M., Hindelang, R.D., Dembroski, T.M., Mayerson, S.E., Parks, E.B., & Holland, J.C. (1990). Aerobic fitness, psychological characteristics, and cardiovascular reactivity to stress. Health Psychology, 9(6), 676-692.

Davis, K.E., Jackson, K.L., Kronenfeld, J.J., & Blair, S.N. (1984). Intent to participate in worksite health promotion activities: A model of risk factors and psychosocial variables. Health Education Quarterly, 11(4), 361-377.

Deal, T.E., & Kennedy, A.A. (1982). Corporate cultures: The rites and rituals of corporate life. Reading, MA: Addison-Wesley Publishing Company, Inc.

DiClemente, C.C., Prochaska, J.O., Fairhurst, S.K., Velicer, W.F., Velasquez, M.M., & Rossi, J.S. (1991). The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change. Journal of Consulting and Clinical Psychology, 59(2), 295-304.

Dishman, R.K. (1981). Biologic influences on exercise adherence. Research Quarterly for Exercise and Sport, 52(2), 143-159.

Dishman, R.K. (1981). Prediction of adherence to habitual physical activity. In Nagle, F.J., & Montoye, H.J. (eds.), Exercise in Health and Disease. Illinois: Charles C. Thomas.

Dishman, R.K. (1982). Compliance/adherence in health-related exercise. Health Psychology, 1(3), 237-267.

Dishman, R.K. (1983). Predicting exercise compliance using psychometric and behavioral measures of commitment. Medicine and Science in Sports and Exercise, 15, 1.

Dishman, R.K. (Ed.). (1988). Exercise Adherence: It's Impact on Public Health. Illinois: Human Kinetics Books.

Dishman, R.K., Ickes, W., & Morgan, W.P. (1980). Self-motivation and adherence to physical activity and exercise. Public Health Reports, 10(2), 115-132.

Dishman, R.K., & Ickes, W. (1981). Self-motivation and adherence to therapeutic exercise. Journal of Behavioral Medicine, 4(4), 421-438.

Dishman, R.K., Sallis, J.F., & Orenstein, D.R. (1985). The determinants of physical activity and exercise. Public Health Reports, 100(2), 158-171.

Eakin, J.M., Gotay, C.C., Rademaker, A.W., & Cowell, J.W.F. (1988). Factors associated with enrollment in an employee fitness center. Journal of Occupational Medicine, 30(8), 633-637.

Epstein, L.H., Wing, R.R., Thompson, J.K., & Griffin, W. (1980). Attendance and fitness in aerobics exercise. Behavior Modification, 4(4), 465-479.

Falkenberg, L.E. (1987). Employee fitness programs: Their impact on the employee and the organization. Academy of Management Review, 12(3), 511-522.

Fielding, J.E. (1982). Effectiveness of employee health improvement programs. Journal of Occupational Medicine, 24(11), 907-916.

Fielding, J.E. (1984). Health promotion and disease prevention at the worksite. Annual Review of Public Health, 5, 237-265.

Franklin, B.A. (1978). Motivating and educating adults to exercise. Journal of Physical Education and Recreation, 49(6), 13-17.

Fruin, D.J., Pratt, C., & Owen, N. (1991). Protection motivation theory and adolescents' perceptions of exercise. Journal of Applied Social Psychology, 22(1), 55-69.

Gale, J.B., Eckhoff, W.T., Mogel, S.F., & Rodnick, J.E. (1984). Factors related to adherence to an exercise program for healthy adults. Medicine and Science in Sports and Exercise, 16(6), 544-549.

Garcia, A.W., King, A.C. (1991). Predicting long-term adherence to aerobic exercise: A comparison of two models. Journal of Sport and Exercise Psychology, 13, 394-410.

Gebhardt, D.L., & Crump, C.E. (1990). Employee fitness and wellness programs in the workplace. American Psychologist, 45(2), 262-272.

Gibbs, J.O., Mulvaney, D., Henes, C., & Reed, R.W. (1985) Work-site health promotion. Journal of Occupational Medicine, 27(11), 826-830.

Glasgow, R.E., & Terborg, J.R. (1988). Occupational health promotion programs to reduce cardiovascular risks. Journal of Consulting and Clinical Psychology, 56(3), 365-373.

Golaszewski, T., Snow, D., Lynch, W., Yen, L., & Solomita, D. (1992). A benefit-to-cost analysis of a work-site health promotion program. Journal of Occupational Medicine, 34(12), 1164-1172.

Hays, W.L. (1988). Statistics. Fort Worth: Holt, Rinehart and Winston, Inc.

Holloway, J.B., Beuter, A., & Duda, J.L. (1988). Self-efficacy and training for strength in adolescent girls. Journal of Applied Social Psychology, 18(8), 699-719.

Horn, D. (1976). A model for the study of personal choice health behaviour. International Journal of Health Education, 76(19), 89-98.

Ilgen, D.R. (1990). Health issues at work: Opportunities for industrial/organizational psychology. American Psychologist, 45(2), 273-283.

Imm, P.S. (1990). Perceived benefits of participants in an employees' aerobic fitness program. Perceptual and Motor Skills, 71, 753-754.

Iverson, D.C., Fielding, J.E., Crow, R.S., & Christenson, G.M. (1985). The promotion of physical activity in the United States population: The status of programs in medical, worksite, community, and school settings. Public Health Reports, 100(2), 212-223.

Janis, I.L., & Mann, L. (1977). Decision making: A psychological analysis of conflict, choice, and commitment. New York: The Free Press.

Kaplan, R.M., Atkins, C.J., & Reinsch, S. (1984). Specific efficacy expectations mediate exercise compliance in patients with COPD. Health Psychology, 3(3), 223-242.

Karoly, P. (1993). Mechanisms of self-regulation: A systems view. Annual Review of Psychology, 44, 23-52.

Kau, M.L., & Fischer, J. (1974). Self-modification of exercise behavior. Journal of Behavioral Therapy and Experimental Psychiatry, 5, 213-214.

Keefe, F.J., & Blumenthal, J.A. (1980). The life fitness program: A behavioral approach to making exercise a habit. Journal of Behavior Therapy and Experimental Psychiatry, 11, 31-34.

Keppel, G., Saufley, W.H., & Tokunaga, H. (1992). Introduction to Design & Analysis: A Student's Handbook. New York: W.H. Freeman and Company.

King, A.C., & Frederiksen, L.W. (1984). Low-cost strategies for increasing exercise behavior. Behavior Modification, 8(1), 3-21.

King, A.C., Taylor, C.B., Haskell, W.L., & DeBusk, R.F. (1989). Influence of regular aerobic exercise on psychological health: A randomized, controlled trial of healthy middle-aged adults. Health Psychology, 8(3), 305-324.

King, A.C., Taylor, C.B., Haskell, W.L., & DeBusk, R.F. (1990). Identifying strategies for increasing employee physical activity levels: Findings from the Stanford/Lockheed exercise survey. Health Education Quarterly, 17(3), 269-285.

Knapp, D.N. (1988). Behavioral management techniques and exercise promotion. In R.K. Dishman (Ed.), Exercise Adherence: It's Impact on Public Health (pp. 203-236). Illinois: Human Kinetics Books.

Kotter, J.P., & Heskett, J.L. (1992). Corporate culture and performance. New York: The Free Press.

Kravitz, L., & Furst, D. (1991). Influence of reward and social support on exercise adherence in aerobic dance classes. Psychological Reports, 69, 423-426.

Latham, G.P., & Locke, E.A. (1991). Self-regulation through goal setting. Organizational Behavior and Human Decision Processes, 50, 212-247.

Lee, C. (1993). Attitudes, knowledge, and stages of change: A survey of exercise patterns in older Australian women. Health Psychology, 12(6), 476-480.

Louis, M.R. (1985). An investigator's guide to workplace culture. In P.J. Frost, L.F. Moore, M.R. Louis, C.C. Lundberg, & J. Martin (Eds.), Organizational culture (pp.73-94). Beverly Hills: Sage.

Marcus, B.H., & Owen N. (1992). Motivational readiness, self-efficacy and decision-making for exercise. Journal of Applied Social Psychology, 22, 3-16.

Marcus, B.H., Rakowski, W., & Rossi, J.S. (1992). Assessing motivational readiness and decision making for exercise. Health Psychology, 11(4), 257-261.

Marcus, B.H., Rossi, J.S., Selby, V.C., Niaura, R.S., & Abrams, D.B. (1992). The stages and processes of exercise adoption and maintenance in a worksite sample. Health Psychology, 11(6), 386-395.

Marcus, B.H., Selby, V.C., Niaura, R.S., & Rossi, J.S. (1992). Self-efficacy and the stages of exercise behavior change. Research Quarterly for Exercise and Sport, 63, 60-66.

Marcus, B.H., & Simkin, L.R. (in press). The stages of exercise behavior. Journal of Sports Medicine and Physical Fitness.

Marcus, B.H., Simkin, L.R., & Rossi, J.S. (1992, March). Longitudinal shifts in employees stages and processes of exercise behavior change. Paper presented at the meeting of the Society of Behavioral Medicine, New York, NY.

McAuley, E. (1991). Efficacy, attributional, and affective responses to exercise participation. Journal of Sport and Exercise Psychology, 13, 382-393.

McAuley, E. (1992). The role of efficacy cognitions in the prediction of exercise behavior in middle-aged adults. Journal of Behavioral Medicine, 15(1), 65-88.

McAuley, E., & Courneya, K.S. (1992). Self-efficacy relationships with exertion and responses to exercise. Journal of Applied Social Psychology, 22(4), 312-326.

McAuley, E., Wraith, S., & Duncan, T.E. (1991). Self-efficacy, perceptions of success, and intrinsic motivation for exercise. Journal of Applied Social Psychology, 21(2), 139-155.

Morgan, W.P. (1977) Involvement in vigorous physical activity with special reference to adherence. Proceedings, College Physical Education Conference, Orlando, Fl.

Morgan, W.P., Roberts, J.A., Brand, F.R., & Feinerman, A.D. (1970) Psychological effect of chronic physical activity. Medicine and Science in Sports, 2(4), 213-217.

McGrath, J.E. (1984). Groups: Interaction and Performance. New Jersey: Prentice-Hall, Inc.

Oldridge, N.B. (1979) Compliance in exercise rehabilitation. Physician and Sportsmedicine, 7(94), 103.

Ostwald, S.K. (1989). Changing employees' dietary and exercise practices: An experimental study in a small company. Journal of Occupational Medicine, 31(2), 90-97.

Pauly, J.T., Palmer, J.A., Wright, C.C., & Pfeiffer, G.J. (1982). The effect of a 14-week employee fitness program on selected physiological and psychological parameters. Journal of Occupational Medicine, 24(6), 457-463.

Peters, P.A. (1993a). Personal and environmental determinants of adherence to exercise programs. Unpublished manuscript, Baruch College, New York.

Peters, P.A. (1993b). Personal and environmental determinants of exercise: A quasi-experiment in a corporate fitness center. Unpublished master's thesis, Baruch College, New York.

Pinder, C.C. (1984). Work motivation: Theory, issues, and applications. New York: Harper Collins.

Pollock, M.L. (1988). Prescribing exercise for fitness and adherence. In R.K. Dishman (Ed.), Exercise Adherence: It's Impact on Public Health (pp. 259-278). Illinois: Human Kinetics Books.

Prochaska, J.O., & DiClemente, C.C. (1982). Transtheoretical therapy: Toward a more integrative model of change. Psychotherapy: Theory, Research, and Practice, 10, 161-173.

Prochaska, J.O., & DiClemente, C.C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. Journal of Consulting and Clinical Psychology, 51(3), 390-395.

Prochaska, J.O., Velicer, W.F., DiClemente, C.C., & Fava, J. (1988). Measuring processes of change: Applications to the cessation of smoking. Journal of Consulting and Clinical Psychology, 56(4), 520-528.

Rippetoe, P.A., & Rogers, R.W. (1987). Effects of components of protection-motivation theory on adaptive and maladaptive coping with a health threat. Journal of Personality and Social Psychology, 52(3), 596-604.

Rosenfeld, O., Tenebaum, G., Ruskin, H., & Siman-Tov, H. (1989). The effect of physical training on objective and subjective measures of productivity and efficiency in industry. Ergonomics, 32(8), 1019-1028.

Schein, E.H. (1985). Organizational culture and leadership. San Francisco: Jossey-Bass.

Schein, L. (1989). A manager's guide to corporate culture. New York: The Conference Board.

Schein, E.H. (1990). Organizational Culture. American Psychologist, 45(2), 109-119.

Sciacca, J.P. (1987). The worksite is the best place for health promotion. Personnel Journal, Nov., 42-49.

Shephard, R.J. (1988). Exercise adherence in corporate settings: Personal traits and program barriers. In R.K. Dishman (Ed.), Exercise Adherence: It's Impact on Public Health (pp. 305-320). Illinois: Human Kinetics Books.

Shephard, R.J., Corey, P., Renzland, P., & Cox, M. (1982) The influence of an employee fitness and lifestyle modification program upon medical care costs. Canadian Journal of Public Health, 73, July-Aug., 259-263.

Sloan, R.P., & Gruman, J.C. (1988). Participation in workplace health promotion programs: The contribution of health and organizational factors. Health Education Quarterly, 15(3), 269-288.

Song, T.K., Shephard, R.J., & Cox, M. (1982). Absenteeism, employee turnover and sustained exercise participation. Journal of Sports Medicine, 22, 392-399.

Sonstroem, R.J. (1988). Psychological Models. In R.K. Dishman (Ed.), Exercise Adherence: It's Impact on Public Health (pp. 125-154). Illinois: Human Kinetics Books.

Stoffelmayr, B.E., Mavis, B.E., Stachnik, T., Robison, J., Rogers, M., VanHuss, W., & Carlson, J. (1992). A program model to enhance adherence in work-site-based fitness programs. Journal of Occupational Medicine, Feb., 156-161.

Strecher, V.J., DeVellis, B.M., Becker, M.H., & Rosenstock, I.M. (1986). The role of self-efficacy in achieving health behavior change. Health Education Quarterly, 13(1), 73-91.

Taylor, C.B., Sallis, J.F., & Needle, R. (1985). The relation of physical activity and exercise to mental health. Public Health Reports, 100(2), 195-201.

Thoits, P.A. (1986). Social support as coping assistance. Journal of Consulting and Clinical Psychology, 54(4), 416-423.

Thompson, C.E., & Wankel, L.M. (1980). The effects of perceived activity choice upon frequency of exercise behavior. Journal of Applied Social Psychology, 10(5), 436-443.

Thompson, J., Wyatt, B., & Craighead, L.K. (1984). Three theoretically based interventions to increase exercise adherence in a health-promotion regimen. Psychosomatic Medicine, 46(1), 80.

Trice, H.M. (1993). Occupational subcultures in the workplace. New York: ILR Press.

Van Maanen, J., & Barley, S.R. (1985). Cultural organization: Fragments of a theory. In P.J. Frost, L.F. Moore, M.R. Louis, C.C. Lundberg, & J. Martin (Eds.), Organizational culture (pp.31-54). Beverly Hills: Sage.

Wallston, B.S., Alagna, A.S., DeVellis, B.M., & DeVellis, R.F. (1983). Social support and physical health. Health Psychology, 2(4), 367-391.

Walter, G.A. (1985). Culture collisions in mergers and acquisitions. In P.J. Frost, L.F. Moore, M.R. Louis, C.C. Lundberg, & J. Martin (Eds.), Organizational culture (pp.301-314). Beverly Hills: Sage.

Wankel, L.M. (1985). Personal and situational factors affecting exercise involvement: The importance of enjoyment. Research Quarterly for Exercise and Sport, 56(3), 275-282.

Wankel, L.M. (1988). Exercise adherence and leisure activity: Patterns of involvement and interventions to facilitate regular activity. In R.K. Dishman (Ed.), Exercise Adherence: It's Impact on Public Health (pp. 369-396). Illinois: Human Kinetics Books.

Wankel, L.M., & Thompson, C. (1977). Motivating people to be physically active: Self-persuasion vs. balanced decision making. Journal of Applied Social Psychology, 7(4), 332-340.

Warner, K.E., Wickizer, T.M., Wolfe, R.A., Schildroth, J.E., & Samuelson, M.H. (1988). Economic implications of workplace health promotion programs: Review of the literature. Journal of Occupational Medicine, 30(2), 106-112.

Wortman, C.B., & Conway, T.L. (1985). The role of social support in adaptation and recovery from physical illness. In S. Cohen & S.L. Syme (Eds.), Social support and health. New York: Academic Press.