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The influence of exercise self-efficacy and social support on exercise for Air Force personnel

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THE INFLUENCE OF EXERCISE SELF-EFFICACY AND
SOCIAL SUPPORT ON EXERCISE FOR
AIR FORCE PERSONNEL

A Thesis

Presented to the

School of Health, Physical Education, and Recreation

and the

Faculty of the Graduate College

University of Nebraska

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

University of Nebraska at Omaha

by

Jerry Wilson

December 1998

UMI Number: EP72755

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THESIS ACCEPTANCE

Acceptance for the faculty of the Graduate College,
University of Nebraska, in partial fulfillment of the
requirements for the Master of Science,
University of Nebraska at Omaha.

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ABSTRACT

The purpose of the study was to determine how social support and self-efficacy function in each stage of change in exercise behavior and also to study to what extent social support and self-efficacy can predict what stage of change a person is in. To determine this, 179 Air Force men and women ranging in age from 19 to 54 years old at U.S. Strategic Command, Offutt Air Force Base, Nebraska, were administered a questionnaire to determine their exercise stage of change, self-efficacy, and social support from family and friends. The stages of change for exercise were as follows: 0.0% precontemplation, 5.0% contemplation, 40.8% preparation, 13.4% action, and 40.8% maintenance. For family and friend social support, the mean scores increased from the precontemplation through the maintenance stage. However, no significant difference among the stages were found using Kruskal-Wallis one-way ANOVAs. For self-efficacy, significant differences were found between the contemplation and maintenance stages, as well as the preparation and maintenance stages ($p < .05$). Chi-square analysis revealed no significant relationship between the stages of change and categorical demographic variables. Logistic regression analysis also found that the log odds of being in the action and maintenance stages versus the contemplation and preparation stage were significantly higher for those with higher friend social support and self-efficacy scores with odds ratios of 1.04 and 1.25 ($p < .05$), respectively. The significant variables of friend social support and self-efficacy were further analyzed in logistic regression analysis. A significant association was found between self-efficacy and being in the action and maintenance stages versus the contemplation and preparation stages ($p < .05$). Self-efficacy was found to account for 10.92% of the variance.

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CHAPTER 1

INTRODUCTION

Currently, U.S. Strategic Command Air Force members at Offutt Air Force Base, Nebraska, are allowed to work-out three times a week for approximately one and a half hours during normal duty hours. This fitness program is important because it strives to increase the health and well-being of each member so that they can be more productive and more importantly, so that they are ready to meet the increased physical challenges should they be called upon during a crisis or war. Regular exercise improves the health of a person in many ways. A report by the U.S. Department of Health and Human Services (1996) found regular exercise can reduce the chances of developing heart disease, diabetes, high blood pressure, colon cancer, and also promotes psychological well-being by reducing depression and anxiety. Despite these findings, more than 60 percent of American adults do not exercise regularly and 25 percent of adults do not exercise at all.

There are many factors that influence exercise participation such as self-efficacy, social support, enjoyment of physical activity, positive beliefs about physical activity benefits, and a lack of perceived barriers to exercising (U.S. Department of Health and Human Services, 1996). For many behaviors, self-efficacy and social support have been identified as factors in initial behavior change as well as a factor in the maintenance of a behavior. This study will investigate the role self-efficacy and social support has on people at U.S. Strategic Command who are at varying levels of exercise participation. It is needed to help understand one way to improve participation in the fitness program, as well as overall physical activity.

Self-efficacy is defined as a person's confidence in his or her ability to take action (Glanz, Lewis, and Riner, 1997). While many factors contribute to a person exercising,

self-efficacy is thought to be one of the largest contributors (Clark, 1996; Garcia et al., 1995). It has been examined in many studies across a wide variety of behaviors. A study by McAuley (1993) found self-efficacy to be the only variable to significantly explain exercise participation. Another study by Jeng and Braun (1997) found that self-efficacy scores actually went up the more a person exercised. Although the link between exercise behavior and self-efficacy has been examined before, there is still much to be learned with how it interacts with people who are in varying stages of change when it comes to exercise behavior.

While much has been done with self-efficacy (Jeng and Braun, 1997; Garcia et al., 1995; McAuley, 1993), little has been done in looking at the relationship between social support and exercise behavior. Social support can be defined as any activity which helps another person reach his or her goals (Treiber et al., 1991). It can come from peers, family, friends, and bosses. Weight loss (Parham, 1993) and smoking cessation (Murray, Johnston, Dolce, Lee, and O'Hara, 1995 and Pirie, Rooney, Pechacek, Lando, and Schmid, 1997) studies have both demonstrated the ties social support has on target behaviors. Recent research has shown that social support positively correlates to physical activity (Treiber et al., 1991) and in a study by Lechner and De Vries (1995b), it was found that people who are active in corporate fitness programs perceived more social support for participation in a fitness program from their coworkers and bosses than did those who were not active in the fitness program. Additionally, the factor of convenience will be eliminated in this study because the exercise facilities for the fitness program are located across the street from the work place and personnel are given time off from work to exercise. Although Sallis et al. (1990) found that the frequency of exercise increased the closer the exercise facility was located to the subjects, more research is needed to

define the types of social support that best encourages people to exercise when convenience is not an issue.

The transtheoretical model has been utilized to show that people may be in different stages of change when it comes to behavioral change, including exercise (Cardinal, 1995; Lechner and De Vries, 1995; Marcus and Simkin, 1994). According to Prochaska (1994), the stages go from precontemplation (not thinking about changing), contemplation (thinking about changing, but not doing it yet), preparation (deciding and preparing for change, but not actually or consistently performing the behavior), action (the first six months of consistent behavior change), and maintenance (long term behavior change). People can move up from one stage to another, as well as relapse to previous stages of behavior. The transtheoretical model can be applied to the exercise behavior of participating in the Air Force fitness program by classifying people as to what stage of change they are in. In a study by Marcus et al. (1992), a stage-matched intervention program showed a significant increase in the amount of physical activity over six weeks. Understanding how self-efficacy and social support function in each stage of change, as well as relapse, could shed valuable light on targeting exercise behavior interventions.

This leads into health promotion for the Air Force fitness program, which is key to its success and effectiveness. Misguided promotion, or lack thereof, can lead to misperceptions as to what the program entails, what the benefits of the program are, and the amount of support available from colleagues and supervisors for the program. One of the main objectives of a promotion program for the Air Force fitness program would be to make sure that everyone at the worksite is more educated and supportive of the program. Fitness programs need to be tailored to show the advantages and feasibility of participating in the programs. In a study of worksite health promotion, Anderson and

Anderson (1991) found that even a short duration of health promotion achieved a significant improvement in worker's exercise habits. Looking at how self-efficacy and social support interact with exercise participation could be very important in promoting the program correctly and increasing the awareness of individuals within the military worksite.

The following were the objectives of the study:

- 1). Examine the relationship between exercise behavior and the exercise determinants of social support and self-efficacy.
- 2). Determine to what extent social support and self-efficacy predict/explain a person being in a stage of change for exercise behavior.

CHAPTER 2

PROBLEM

PURPOSE OF STUDY

The purpose of the study was to determine how social support and self-efficacy functions in each stage of change in exercise behavior and also to what extent social support and self-efficacy can predict what stage of change a person is in. Because of the higher fitness levels that military personnel are required to maintain, as opposed to the civilian population where such strict regulations are not in place across the board, this study had an opportunity to focus on people that were more physically fit and more likely to be in the action and maintenance stages of exercise participation. Currently, there seems to be a problem of too many Air Force members not taking advantage of time allotted at work for exercising. This could stem from the member being too busy in his or her job, their boss not being lenient when it comes to allowing them to take time off to work out, or the member just not being self-motivated enough to use the time for exercise that is available.

DELIMITATIONS

The social support and self-efficacy received by 179 Air Force men and women ranging in age from 19 to 54 years old at U.S. Strategic Command at Offutt Air Force Base, Nebraska, were measured. Those chosen were randomly selected as they entered and left the U.S. Strategic Command Headquarters buildings. The measurements were recorded by a questionnaire (See Appendix A) which included questions about health behavior (to determine the stage of change), self-efficacy, social support, and demographics. The duration of the survey was approximately 10 minutes. Questionnaires were passed out on August 31, 1998, and September 1, 1998, and had a suspense date of September 10, 1998. The survey provided a snapshot in time that

classified the person as to which stage of change of exercise behavior he or she was in and how much self-efficacy and social support each person was receiving. The scope of the study involved examining the relationship between the determinants of social support and self-efficacy and the various stages of change for exercise behavior among Air Force members at U.S. Strategic Command.

LIMITATIONS

One of the biggest sources of limitations came from the fact that the data was collected on a U.S. military base. The collection of data for a non-governmental survey had to be in accordance with Department of Defense Instruction 1100.12, Surveys of Department of Defense Personnel. This meant the data had to be collected voluntarily and it also had to be collected outside of the two main side entrances of the U.S. STRATCOM building. This means of collecting data is rare on a military base and presented a significant problem. Many military personnel were not accustomed to seeing anybody in civilian clothes soliciting them to fill out a questionnaire as they entered their place of work. Although the return rate was not especially low (64.8%), it left no way to track who did not fill out the questionnaire. Thus, a follow-up letter to remind the person to complete the questionnaire was not able to be sent out to those who chose not to participate.

Other types of limitations that may have altered the results of the study were as follows. The self-reporting that was required for the questionnaire could be a source of error for the stage of exercise scale, the self-efficacy, and the social support portions of the questionnaire. Questionnaire errors could also have occurred due to the biased response of those who responded to the questionnaire. It is feasible that a person who exercises more, is also more likely to fill out a questionnaire concerning exercise behavior. The questionnaire also only examined the effect of self-efficacy and social

support on exercise behavior. Determinants such as enjoyment of physical activity, positive beliefs about physical activity benefits, and a lack of perceived barriers to exercising were not examined. While it is possible that exercise behavior could also have an effect on social support (Heitzmann and Kaplan, 1988), this aspect was also not addressed. The results of the questionnaire only provided a snapshot in time of exercise behavior and the corresponding amounts of the person's self-efficacy and social support. The advantages of a longitudinal study, such as seeing if an increase or decrease in social support affected the stage of exercise of change for a person, were not examined (Duncan and Stoolmiller, 1993).

DEFINITION OF TERMS

Air force fitness program: This program aims to achieve and maintain satisfactory fitness levels among service members, assessing the fitness levels of members, and improving fitness levels. In this study, it referred specifically to the U.S. Strategic Command program of allowing members to participate in physical activity of the person's choice three times per week during the normal duty hours for approximately one and a half hours.

Regular exercise: This was defined as a moderate amount of activity that is performed at least three times a week. Physical activity is a function of intensity and duration. Some activities, such as brisk walking done at longer intervals, can give the same benefit as activities such as running done at shorter intervals. Some examples of what an exercise session can include are as follows: washing and waxing a car (45-60 minutes), washing windows or floors (45-60 minutes), playing volleyball (45 minutes), playing touch football (30-45 minutes), walking 1 3/4 miles in 35 minutes (20 minutes/mile), basketball (30 minutes), dancing fast (30 minutes), pushing a stroller 1 1/2 miles (30 minutes), raking leaves (30 minutes), water aerobics (30 minutes), swimming laps (20 minutes),

bicycling 4 miles (15 minutes), jumping rope (15 minutes), running 1 1/2 miles (15 minutes), and stairwalking for 15 minutes (U.S. Department of Health and Human Services, 1996).

Self-efficacy: A person's confidence in his or her ability to take action (Glanz, Lewis, and Riner, 1997). For this study, it will relate to the person's confidence to exercise.

Social support: Any activity which helps another person reach his or her goals (Treibner et al., 1991). For this study, this type of support was measured from friends and family. It can include emotional support such as providing love, trust, and caring; instrumental support such as providing direct assistance to a person; informational support such as providing advice, suggestions, and information; and/or appraisal support such as feedback and affirmation (Glanz, Lewis, and Riner, 1997).

Transtheoretical Model: A stage of change framework that describes the cessation of high-risk behaviors and the acquisition of healthy alternatives through five stages: precontemplation, contemplation, preparation, action, and maintenance (Prochaska, 1994).

Precontemplation: The stage where the individual is not engaged in the behavior of interest and has no intention of becoming involved in the next six months (Marcus et al., 1992).

Contemplation: The stage where the individual is not engaged in the behavior of interest, but is thinking about becoming involved in the next six months (Marcus et al., 1992).

Preparation: The stage where the individual is engaged in the behavior of interest, but not regularly (Marcus et al., 1992).

Action: The stage where the individual has been engaged in the behavior of interest regularly within the last six months (Marcus et al., 1992).

Maintenance: The stage where the individual has been engaged in the behavior of interest regularly for longer than six months (Marcus et al., 1992).

Relapse: This happens when the individual has been engaging in the behavior of interest in the past, but is no longer doing so (Marcus et al., 1992).

SIGNIFICANCE OF STUDY

The significance of this study is that it demonstrates the relationship between exercise behavior and the exercise determinants of self-efficacy and social support. It also shows the predictive value of self-efficacy and social support for stage of exercise change. By looking at the amount of social support and self-efficacy in each stage of change, it is possible to target specific categories of people. This may encourage an intervention strategy that includes facilitating more social support and self-efficacy to those people in lower stages of exercise activity within the work place with the goal of increasing fitness levels. Higher fitness levels are better for the Air Force in that it may lead to more productivity, less sick time off, increased morale, and better preparation for war or crisis situations in which the member may need to possess higher fitness levels for their jobs. By showing the benefits of self-efficacy and social support, more encouragement may be given to take part in the program. In our current peace time environment, the amount of emphasis placed on high fitness levels is lacking in the military. The information found in this study highlights the effect social support and self-efficacy can have in different stages of change of exercise behavior.

CHAPTER 3

REVIEW OF LITERATURE

This chapter is divided into the following subheadings: transtheoretical model, self-efficacy, social support, and participation in employee fitness programs. Review of the transtheoretical model is important to gain a better understanding of this concept, while the social support and self-efficacy review is essential to demonstrate the broad reaching effects of these exercise determinants. The review of participation in employee fitness programs is also essential as increasing participation in the Air Force fitness program is the end goal of the study.

TRANSTHEORETICAL MODEL

The transtheoretical model has been applied to a number of different behavioral problems. Prochaska (1994) applied this model across 12 problem behaviors: smoking cessation, quitting cocaine, weight control, high-fat diets, delinquent behavior, safer sex, condom use, sunscreen use, radon gas exposure, exercise acquisition, mammography screening, and physician's preventative practice with smokers. The study demonstrated commonalities across all 12 areas such as the pattern of change throughout the stages of change. For those subjects in the precontemplation stages, it was found the cons of changing their problem behavior was higher than the pros for all 12 areas ($p=.0002$), while those in the action stages found the pros to be higher than the cons in 11 of the 12 areas ($p=.003$). This compilation of studies provided strong support for the generalizability of the transtheoretical model across a variety of different problem areas.

DiClemente et al. (1991) used the model to test the stages of change with a population of smokers volunteering for a smoking cessation intervention program. The results showed that stage differences were successful in predicting attempts to quit smoking and cessation success at one and six month follow-ups ($p<.01$). Fava, Velicer, and Prochaska

(1995) did a similar study to determine the relationships between precontemplation, contemplation, and preparation stages of smokers. Significant differences among the stages were found on the number of cigarettes smoked per day, minutes to first cigarette of day, quit attempts in past year, quit attempts in lifetime, and the age of smoking initiation ($p < .0001$).

The transtheoretical model has also been applied in a number of ways with exercise behavior. Marcus et al. (1992) examined the application of constructs concerning stage of readiness to change and self-efficacy to exercise. Self-efficacy scores significantly differentiated subjects at most stages of change ($p < .001$). It was found that those subjects already exercising had higher confidence in their ability to exercise than did those subjects who had not yet begun to exercise ($p < .05$). Another study by Marcus and Simkin (1993) examined the application of the transtheoretical model to exercise behavior. This study compared the stage a person was in with the level of activity they were doing. It demonstrated that one's stage of exercise behavior can be differentiated by self-reported physical activity ($p < .001$). Cardinal (1995) performed a similar study to see if subjects classified by the stage of exercise differed in terms of exercise level, physical activity level, and VO₂ max. The study was able to do that and found it was able to differentiate among subjects classified in varying stages of change by exercise energy expenditure, physical activity expenditure, and VO₂ max ($p < .0001$). All of these studies showed that the transtheoretical model can be used to classify people into different stages of change by various methods.

SELF-EFFICACY

Self-efficacy has been found to be an important factor for exercise behavior in many studies. Clark (1996) concluded that it held more potential than any other exercise determinant. Considering that many adults do not exercise regularly, this is a variable

that warrants more understanding on how it functions in stages of change for exercise. McAuley (1993) conducted a study to determine the role played by self-efficacy in the maintenance of exercise participation of previously sedentary adults four months after the termination of a formal exercise program. The formal exercise program consisted of 44 subjects who were previous participants in a five month long exercise program. A significant correlation was found between self-efficacy and exercise behavior after the end of the formal exercise program ($p < .05$), with increased self-efficacy being associated with increased exercise. Multiple regression analysis also found that in predicting overall exercise behavior, only self-efficacy explained a significant portion of the variance ($R^2 = 0.125$, $p < .01$).

A study by Jeng examined the impact of exercise self-efficacy on exercise behaviors and outcomes. The sample studied consisted of 33 coronary artery disease patients going through cardiac rehabilitation exercise program. This treatment program lasted 12 weeks and self-efficacy was measured prior to the program beginning and at the fourth, eighth, and twelfth weeks of training. While significant differences in walking confidence scores ($F = 5.427$, $p = .0017$), biking confidence scores ($F = 12.717$, $p = .0001$), and total confidence scores ($F = 12.578$, $p = .0001$) were observed, no relationship between self-efficacy and compliance rate, nor between self-efficacy and exercise intensity was observed. It was the change in exercise self-efficacy after exercise training that was significantly related to exercise outcomes ($p < .05$). A similar finding was reported by Prochaska, Norcross, Fowler, Follick, and Abrams (1992). In this study the transtheoretical model was used to assess subject changes as they proceeded through a weight control program. Multiple regression analysis showed self-efficacy at pretreatment and mid-treatment did not significantly predict attendance for the program.

In fact, self-efficacy assessed at pre-treatment accounted for approximately 1% of the outcome variance.

SOCIAL SUPPORT

Social support has been found to be a factor in wide variety of behaviors. Sorenson, Stoddard, and Macario (1998) used the transtheoretical model to examine the relationship between social support and readiness to increase fruit and vegetable consumption. People who consumed five or more servings each of fruit and vegetables were classified in the action stage. If they the people were doing this for greater than six months, they were classified in the maintenance stage. It was found that both coworker and household support were significantly associated with readiness for dietary change. Pirie et al. (1997) investigated how social support affected participants in a community-based smoking cessation contest. The social support was in the form of a support person who assisted the smoker in quitting smoking. Those who had a support person had significantly higher smoking cessation rates than those who did not have a support person ($p < .05$). Murray et al. (1995) conducted a similar study on smoking cessation and social support. At the end of the 12 week smoking cessation program and after one year, men who were supported in quitting were more likely to be successful. The same was found not to be true for women. Although all of these studies indicated that social support played a role in ceasing behavioral problems, it was clear that social support has differing effects for different types of people in different situations.

While the role social support plays in exercise behavior still remains unclear to date, there has been some work in the area. Seeman et al. (1995) conducted a study with high-functioning men and women ranging in age from 70 to 79. The purpose of the study was to determine what factors predict higher levels of physical activity and ability. Through linear regression models, significant associations were found between

maintenance of better physical performance and social network emotional support ($p < .09$). Hovell et al. (1991) conducted a similar study to identify determinants of exercise in a Latino population. A positive correlation was found between walking and friend support (0.30, $p < .001$) and vigorous activity and friend support (0.42, $p < .001$). Both studies indicate that social support is a key factor to target for exercise intervention strategies.

Treiber et al. (1991) examined the relationships between self-reported physical activity and social support for exercise in two studies. One study involved a biracial sample of male and female teachers (mean age = 38.5 years) and one study involved male and female parent (mean age = 35.8 years). Both studies found social support for exercise positively correlated with physical activity ($p < .05$), but the relationships were mediated by race, gender, type of social support, and type of physical activity. Duncan and Stoolmiller (1993) conducted a survey to determine whether self-efficacy served a mediational role in the influence of social support on exercise behaviors. Latent growth modeling techniques were used on sedentary male and females ranging in age from 45 to 64 in a federally funded exercise program. It was found that the indirect effect of social support on exercise behaviors via self-efficacy was significant, while the direct effect of social support on exercise behavior was insignificant ($p < .01$). Noland (1989) compared the effects of self-monitoring and reinforcement administered by a significant other person on subject's adherence to an exercise program. The population studied consisted of 35 fit persons and 42 sedentary individuals. The reinforcement group was provided awards for exercise participation by a person close to them, which represented a form of social support. The reinforcement group ($M = 2.29$) reported a significantly higher frequency of exercise per week than did a control group ($M = 1.36$). It was also found that

behavioral interventions had little effect on participation by those subjects who were already regular exercisers.

PARTICIPATION IN EMPLOYEE FITNESS PROGRAMS

Two studies by Lechner and De Vries (1995) dealt with participation in employee fitness programs. The first study by Lechner and De Vries (1995a) looked at identifying the determinants of adherence level in an employee fitness program. This study examined 236 employees using a pre- and post-test questionnaire. The following Pearson correlations were found between determinants and exercise frequency: self-efficacy indirectly = .50, self-efficacy directly = .43, attitude = .31, and social support = .18 ($p < .05$). A similar study (1995b) looked at identifying the determinants of starting participation in an employee fitness program utilizing the transtheoretical model. A questionnaire was given to 488 employees at two work sites. The determinants that were looked at included attitude, social influence, and self-efficacy expectations. Multiple regression analysis revealed that self-efficacy accounted for 27% of the variance, while attitude and social influence accounted for 5% and 1% of the variance ($p < .001$), respectively. Subjects in the action stage reported the most social support to participate in the exercise program and the amount of support received from supervisors and co-workers was significantly different from those in the precontemplation, contemplation, and preparation stages. The amount of social support received by those in the precontemplation, contemplation, and preparation stages was not significantly different. These studies both indicated that social support is a factor in both starting and maintaining participation in an exercise program and thus, should be a key focus for the Air Force fitness program. Of note, no data was available for the air force fitness program at a specific work place.

In summary, the review of literature demonstrated several important trends. The transtheoretical model has been applied across a wide variety of behavior problems, including exercise behavior. The literature supported the concepts of the model and show it has been successful in classifying people according to the stage of change they are in. Although the self-efficacy exercise determinant seems to be strongly linked to exercise behavior in many studies, the way that self-efficacy is affected by other factors still seems to be unclear. The studies on social support indicated that it does play a role in exercise participation. However, the amount and way that social support does this remains unclear. The review of employee fitness programs pointed out that a number of determinants are responsible for getting people to stay active in an exercise program. The determinants also have different roles according to which stage of change a person is in. This information should be kept in mind when targeting people for an exercise program. Overall, it is well documented that self-efficacy and social support are factors in exercise participation. What is still uncertain is how these determinants impact people in different stages of change.

TABLE 3-1. REVIEW OF LITERATURE SUMMARY

TITLE	SAMPLE	PURPOSE	MEASUREMENT	RESULTS
The stages of exercise scale and stages of exercise behavior in female adults (Cardinal, 1995)	178 female --represented 30.7% of female clerical staff at major urban university; mean age=38.6; 62.4% African American, 30.3% Caucasian, 6.7% Latino	To see if subjects classified by stages of exercise scale (SOES) differ in terms of exercise level, physical activity level, and VO2 max	SOES, physical activity measures: Blair's self-report physical activity instrument to measure energy expenditure; Leisure time exercise questionnaire to assess exercise behavior; Univ of Houston non-exercise test to predict VO2 max	Using a one-way ANOVA, it was found that the SOES was able to differentiate between subjects classified by stage in terms of exercise behavior, physical activity expenditure, and VO2 max ($p < .017$)
The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change (DiClemente, 1991)	691 subjects from Texas and 775 subjects from Rhode Island; smokers recruited to represent 4 groups: precontemplation, contemplation, preparation, and action	To test the stages of change model with a large sample of smokers volunteering for a minimal intervention program	Smoking abstinence self-efficacy, perceived stress scale, fagerstrom tolerance questionnaire, smoking decisional balance, smoking processes of change scale, smoking history	Using regression and logistic regression procedures, stage differences predicted attempts to quit smoking and cessation at one and six month follow-ups ($p < .01$)
Applying the transtheoretical model to a representative sample of smokers (Fava, 1995)	N=4,144 smokers; Mean age=40.7; Male (44.3%), Female (55.7%); 95.7% white	To determine whether the relationship between the early stages of change with other constructs of the transtheoretical model can be validated	Measures of smoking behavior; stages of change (only measured precontemplation, contemplation, & preparation); processes of change inventory; decisional balance inventory; situational temptation inventory	Using ANOVA to compare traditional smoking measures across stages of change, significant effects were found for the number of cigarettes smoked per day, minutes to 1st cigarette of day, quit attempts in past year, quit attempts in lifetime, and age of initiation of smoking ($p < .0001$)
Self-efficacy and the stages of exercise behavior change (Marcus, 1992)	1,063 government employees (mean age = 41, 23% female, 77% blue collar) and 429 hospital employees (mean age =41, 85% female, 38% blue collar)	To examine the application of constructs concerning stage of readiness to change and self-efficacy to exercise	stage of change measure and self-efficacy measure	Using a one-way ANOVA and Tukey post-hoc comparisons, scores on efficacy items significantly differentiated employees at most stages ($p < .001$); precontemplators scored lowest and maintainers scored highest on self-efficacy ($p < .05$)
The stages of exercise behavior (Marcus, 1993)	235 employees at 2 worksites, retail outlet and manufacturer; 64% female, mean age = 40.6	To examine the application of the transtheoretical model to the study of exercise behavior	Stages of exercise behavior questionnaire and the 7-day physical activity recall questionnaire	Using one-way ANOVA and post-hoc Tukey comparison, one's stage of exercise behavior appears to be differentiated by self-reported physical activity ($p < .001$)

**TABLE 3-1. (CONT.) REVIEW OF LITERATURE
SUMMARY**

TITLE	SAMPLE	PURPOSE	MEASUREMENT	RESULTS
Stages of change and decisional balance for 12 problem behaviors (Prochaska, 1994)	12 separate samples with a total N=3,858	investigate generalization of transtheoretical model across 12 problem behaviors	stage of change measure and decisional balance instrument (to measure pros and cons)	clear commonalities were observed across the 12 areas between the pros and cons and stage of change for the various problem behaviors; cons of changing problem behavior higher than pros for precontemplation stage, opposite true for those in action stage
Attendance and outcome in a worksite weight control program: Processes and stages of change as process and predictor variables (Prochaska, 1992)	184 hospital staff members enrolled in a weight program; 91% female, 63% married, mean age = 40	To assess client changes as they proceeded through a behavioral weight control program	Processes of change scale, ways of coping checklist, stages of change questionnaire, self efficacy questionnaire, social support scale, & demographics and weight control history questionnaire	Using univariate ANOVAs and Neuman-Keuls follow-up tests, significant shifts from contemplation to action occurred ($p < .001$); social support from a friend and spouse were best pretreatment predictors of weight loss, accounting for 17% of outcome variance
Social support and efficacy cognitions in exercise adherence: A latent growth curve analysis (Duncan, 1993)	sedentary male (n=41) and females (n=44) ages 45-64 in a federally funded exercise program	To determine whether self-efficacy served a mediational role in the influence of social support on exercise behaviors	Self-efficacy (two measures), exercise behavior (participation behaviors in structured exercise program), and social support (Social Provisions Scale)	Using confirmatory factor analysis, the indirect effect of social support via self-efficacy was significant ($p < .01$), while direct effect of social support on exercise behavior was insignificant
Identification of correlates of physical activity among Latino adults (Hovell, 1991)	127 Latino adults; mean age = 43.3, 62% male	To identify determinants of exercise in the Latino population	Questionnaire design included 24 independent variables including friend support and two dependent variables for vigorous activity and walking	Using multiple regression analysis, correlation between walking and friend support was .30, correlation between vigorous activity and friend support was .42
Social support for smoking cessation and abstinence: The lung health study (Murray, 1995)	3,923 men and women with mild to moderate airway obstruction; mean age = 48.5, 62.4% male, 95.8% Caucasian	To evaluate how social support is related to success at quitting smoking and continued abstinence	smoking status and carbon monoxide were measured after intervention program at 4 and 12 month follow-ups	Using logistic regression analysis, at the end of a 12 week program and after 1 year, a significant relationship was found between presence of a support person for males, but not for females

**TABLE 3-1. (CONT.) REVIEW OF LITERATURE
SUMMARY**

TITLE	SAMPLE	PURPOSE	MEASUREMENTS	RESULTS
The effects of self-monitoring and reinforcement on exercise adherence (Noland, 1989)	35 fit persons who had just completed exercise program and 42 sedentary persons	To compare the effects of self-monitoring and reinforcement on subject's adherence to an exercise program	self-monitoring exercise behavior forms to record all exercise activities, physiological measurements (ergometry test to assess cardio fitness and body density using hydrostatic weighing)	reinforcement groups (M=2.29) reported significantly higher frequency of exercise per week than control group (M=1.36)
Incorporating social support into a community wide smoking cessation contest (Pirie, 1997)	734 adult smokers who participated in community-wide smoking cessation contest	To investigate the impact of an intervention designed to increase the use of supportive others by participants in a smoking cessation contest	telephone interview used 3-4 months after contest completion; smoking status was asked and perceived level of support from support person was assessed	Using logistic regression analysis, it was confirmed that self-reported smoking cessation rates were significantly higher among those who chose to name a support person compared to those who did not have a support person
Behavioral and psychosocial predictors of physical performance: MacArthur Studies of Successful aging (Seeman, 1995)	high-functioning men and women aged 70-79, N=4,030	To determine what factors predict higher levels of physical activity/ability as opposed to simply the absence of disability	90 minute, face-to-face interview used to gather detailed assessments of physical and cognitive performance, health status, and social and psychological characteristics	Using multivariable linear regression models, Significant associations with better performance were found for participation in moderate/strenuous activity and greater frequency of emotional support from social network
Social support for exercise: Relationship to physical activity in young adults (Treiber, 1991)	230 elementary school teachers and 238 parents from Georgia; all teachers and majority of families classified as middle class	To assess the relationships between self-reported physical activity and social support for exercise	Baecke Physical Activity Scale, Sallis Social Support Scale; cases were separated into ethnic and gender groups	Using Pearson correlations, social support for exercise positively correlated with physical activity, but relationships were mediated by race, gender, type of support, and type of physical activity
Starting participation in an employee fitness program: Attitudes, social influences, and self-efficacy (Lechner, 1995)	488 employees from 2 work sites; mean age = 36, 87% men	To identify the determinants of starting participation in an employee fitness program	one questionnaire passed out--included questions about attitude, social influence, self-efficacy expectations, intention, and demographics	A stepwise multiple regression analysis showed that self-efficacy explained 27% of the variance, while attitude and social influence accounted for 5% and 1% of the variance, respectively (p<.001)

**TABLE 3-1. (CONT.) REVIEW OF LITERATURE
SUMMARY**

TITLE	SAMPLE	PURPOSE	MEASUREMENTS	RESULTS
The influence of self-efficacy on exercise intensity, compliance rate, and cardiac rehabilitation outcomes among coronary artery disease patients (Jeng, 1997)	33 coronary artery disease patients; 81% female, 94% Caucasian, Mean age = 65.9 yrs	To examine the impact of exercise self-efficacy on exercise behaviors and outcomes	Graded exercise test to measure VO2 max, exercise confidence scale to measure self-efficacy, fatigue/stamina scale, depression scale, and a health survey	Significant differences in walking scores ($F = 5.427, p = .0017$), biking confidence scores ($F = 12.717, p = .0001$), and total confidence scores ($F = 12.578, p = .0001$) were observed from the beginning of the program to the end of the program
Participation in an employee fitness program: Determinants of high adherence, low adherence, and drop-out (Lechner, 1995)	236 employees involved in employee fitness program; mean age = 36.7, 83% engaged in active police work	To identify the determinants of adherence levels in an employee fitness program	Questionnaire included questions about attitude, social influence, self-efficacy expectations, and demographic variables; exercise level recorded for each participant based on exercise program	Using stepwise multiple regression analysis, the following correlations between determinants and exercise frequency were found: self-efficacy indirectly=.50, self-efficacy directly=.43, attitude=.31, social support=.18
Self-efficacy and the maintenance of exercise participation in older adults (McAuley, 1993)	44 subjects who were previous participants in a five month long exercise program	To determine the role played by exercise self-efficacy in the maintenance of exercise participation of previously sedentary adults four months after the termination of a formal exercise program	Exercise behavior was measured from a phone interview and a Seven Day Physical Activity Recall Questionnaire; Self-efficacy questionnaire	Significant correlation between self-efficacy and increased exercise activity after end of program ($p < .05$); multiple regression analysis showed that only self-efficacy explained a significant proportion of variance (12.5%, $p < .01$) in predicting overall exercise behavior
Social support and readiness to make dietary changes (Sorenson, 1998)	1,359 employees of community health centers based in eastern Massachusetts	To examine the relationship between reported social support and readiness to increase fruit and vegetable consumption based on the transtheoretical model	Fruit and vegetable intake measure, readiness for dietary change, coworker and household support for healthy eating, and worker characteristics	Using bivariate analyses, both coworker ($p < .0018$) and household support ($p < .0377$) were significantly associated with readiness for dietary change

CHAPTER 4

METHODS

RESPONDENTS

The source of respondents for this study was U.S. Air Force members from U.S. Strategic Command at Offutt Air Force Base, Nebraska. Since all Air Force members of U.S. Strategic Command have the opportunity to participate in the exercise program, all members were eligible to participate in the study. Prior to the study, approvals from the U.S. STRATCOM Legal and Public Affairs offices were obtained (See Appendix B) and an exemption (IRB #: 085-98-EX) under 45 CFR 46:101b, category 2 from the University of Nebraska Institutional Review Board was received on August 28, 1998 (See Appendix C).

DATA COLLECTION

The goal of the data collection was to obtain a power of 0.8 and an alpha of 0.05. To reach this goal 46 respondents were needed for each of the five stages of change or 230 respondents overall. Expecting a return rate of approximately 80 percent on the questionnaire, 281 questionnaire packets were passed out at the two side entrances of the U.S. STRATCOM building in the hopes of obtaining the 0.8 power. The questionnaire packet included instructions on how long it would take to complete the questionnaire, why it was beneficial to do the questionnaire, and a self-addressed, stamped envelope to return the questionnaire once they had completed it. The response rate for the questionnaires was 64.8% with 182 of the questionnaires being returned. Three of the questionnaires were filled out incorrectly or incompletely, leaving an n equal to 179. Individual results of the questionnaire were confidential.

The questionnaire consisted of four parts. The first part of the questionnaire was the stage of exercise scale (Cardinal, 1995). This is a five-point categorical scale that allows

the person to choose which stage of change they are in (i.e, 0 = precontemplation through 4 = maintenance). This scale is based on the transtheoretical model and was used to classify individuals as to which stage of change they were in. Cardinal established a test-retest reliability of this instrument by using a convenience sample of 12 subjects. The subjects completed the instrument on two occasions and the correlation was found to be highly significant. The Spearman's rho for the instrument was 1.00 ($p < .0001$).

The second part of the questionnaire measured self-efficacy. This three item instrument measure the person's confidence in their ability to exercise (Long et al., 1996). It used a ten point scale that ranged from one (not at all confident) to ten (totally confident). The score was the sum of the three items

The third part of the questionnaire measured social support via a Sallis social support scale (Sallis, Grossman, Pinski, Patterson, and Nadr, 1987). This 12 item instrument measured the frequency of support of exercise from family and friends within the last three months. It used a five point scale (1 = none to 5 = very often) and it also had a "does not apply" answer choice. If a respondent marked the "does not apply" choice, the item was given no score and left blank. Based on the point scale, a total was summed overall for each category (family and friends) to determine the amount of social support being received. The test-retest reliability for this instrument was 0.77 ($p < .001$) and Cronbach's alpha was 0.91.

The final part of the questionnaire consisted of demographic questions to include age, sex, marital status, rank, and race. These questions were used to determine the characteristics of the sample.

STATISTICAL ANALYSIS

Descriptive statistics were used to compute the demographic characteristics. Chi-square analysis was used to examine the relationship between the demographic

variables and the stage of change. Since the data was not normally distributed, a Kruskal-Wallis ANOVA was used to compare the stages of change with self-efficacy and social support scores. Self-efficacy and social support were the dependent variables while the stage of change served as the independent variable. The sum of self-efficacy and social support for each stage of change was compared. If the difference in the sums was greater than what would be derived from sampling error, than a significant difference existed. The post hoc test used to see which stages were significantly different from each other was the Bonferroni test. Logistical regression was used to predict the stage of change for exercise behavior based on the variables of social support, self-efficacy, age, sex, race, and rank. For this analysis, social support and self-efficacy were the independent variables as they were used to predict the stage of change, the dependent variable. EPI INFO 6.04b and SPSS statistical software were used to calculate the results.

CHAPTER 5

RESULTS

The purpose of the results chapter was to determine how social support and self-efficacy function in each stage of change for exercise behavior and also to determine to what extent social support and self-efficacy can predict what of stage of change a person is in. The initial part of the chapter looks at the demographic characteristics of the sample, the middle part of the chapter examines the role of social support and self-efficacy in the exercise stages of change, and the last part of the chapter uses logistic regression to see if the exercise stage of change can be predicted using social support, self-efficacy, and the demographic variables.

Table 5.1 lists the demographic characteristics of the sample. Of all the respondents, 77.1% were male and 82.7% were Caucasian. The majority of the respondents were married (74.9%) and enlisted (72.1%). No respondents were in the precontemplation stage, while the preparation and maintenance stages each accounted for 40.8% of the sample.

The age characteristics of the sample, as well as the scores for social support and self-efficacy for exercise, are listed in Table 5.2. The mean age of the sample was 32.78 years ($sd = 6.74$) with ages ranging from 19 to 54. The total possible social support scores for both family and friends ranged from 12 to 60, while observed scores ranged from 12 to 55 for family social support and 12 to 53 for friend social support. The mean for the family social support score was 27.05 ($sd = 11.11$), while the mean for the friend social support score was slightly lower with a 26.20 ($sd = 10.14$). The total possible self efficacy scores ranged from 3 to 30, while the observed scores ranged from 8 to 30. The mean self-efficacy score was 25.54 ($sd = 4.65$), indicating the respondents were fairly confident in their ability to exercise. Although the total n equaled 179, 42 respondents

TABLE 5.1 Demographic characteristics of the sample (n=179)

Variable	Frequency	Percent
Sex		
Male	138	77.1
Female	41	22.9
Race		
Caucasian	148	82.7
Black	19	10.6
Other	12	6.7
Marital Status		
Married	134	74.9
Single	45	25.1
Rank		
Officer	50	27.9
Enlisted	129	72.1
Stage of Change		
Precontemplation	0	0
Contemplation	9	5.0
Preparation	73	40.8
Action	24	13.4
Maintenance	73	40.8

for both the family and friend categories marked “does not apply” in the social support portion of the questionnaire, leaving an n of only 137. Similarly, only 125 of the 179 respondents completely filled out the social support portion of the questionnaire without marking “does not apply.”

TABLE 5.2 Age and social support and self-efficacy scores for exercise

Variable	Sample size	Possible range	Actual range	mean	sd
Age	179	-	(19-54)	32.78	6.74
Social Support					
Family	137	(12-60)	(12-55)	27.05	11.11
Friend	137	(12-60)	(12-53)	26.20	10.14
Self-efficacy	179	(3-30)	(8-30)	25.54	4.65

The frequency of the demographic characteristics for each exercise stage of change can be seen in Table 5.3. The percentage that each type of demographic accounts for is listed by each exercise stage of change.

Table 5.4 depicts the social support and self-efficacy scores for exercise in each stage of change. For the friend social support scores, the mean score increased from the contemplation stage (mean = 20.22) to the maintenance stage (mean = 28.71). For the family social support scores, the mean score also increased from the contemplation stage (mean = 19.00) to the maintenance stage (mean = 28.89). Following the same trend, self-efficacy scores progressively increased from the contemplation (mean = 22.44) to the maintenance stage (mean = 27.90).

A Kruskal-Wallis one-way ANOVA was used to determine if significant differences existed among the stages of change for social support and self-efficacy. The results of this analysis are listed in Table 5.5. Although friend social support showed a definite increasing trend from the contemplation stage to the maintenance stage, no significant difference was found among the stages using the Kruskal-Wallis one-way ANOVA. The same increasing trend was found for family support. However, no significant differences

TABLE 5.3 Frequency of demographic characteristics by exercise stage of change

	<u>Contemplation</u>		<u>Preparation</u>		<u>Action</u>		<u>Maintenance</u>	
	freq	%	freq	%	freq	%	freq	%
Sex								
Male	8	88.9	57	78.1	19	79.2	54	74.0
Female	1	11.1	16	21.9	5	20.8	19	26.0
Race								
Caucasian	8	88.9	66	90.4	19	79.2	55	75.3
Black	0	0.0	5	6.9	2	8.3	12	16.5
Other	1	11.1	2	2.7	3	12.5	6	8.2
Marital Status								
Married	7	77.8	56	76.7	18	75.0	53	72.6
Single	2	22.2	17	23.3	6	25.0	20	27.4
Rank								
Officer	2	22.2	16	21.9	7	29.2	25	34.2
Enlisted	7	77.8	57	78.1	17	70.8	48	65.8

among the stages existed. Of note, both friend and family support scores were fairly close to achieving the $p < .05$ level of significance. Using a Kruskal-Wallis one-way ANOVA, self-efficacy was found to be significantly different between the stages of change ($p < .05$). The Bonferroni post-hoc test found significant differences in self-efficacy scores between the contemplation and maintenance stages and the preparation and maintenance stages. The mean self-efficacy difference between the contemplation and maintenance stages was 5.56 ($p < .05$) and the mean self-efficacy difference between the preparation and maintenance stages was 4.38 ($p < .05$).

TABLE 5.4 Social support and self-efficacy scores for exercise in each stage of change

	<u>Friend support</u>		<u>Family support</u>		<u>Self-efficacy</u>	
	mean	sd	mean	sd	mean	sd
Contemplation	20.22	5.43	19.00	5.68	22.44	4.59
Preparation	25.05	10.14	26.63	11.34	23.52	5.12
Action	26.35	8.40	26.72	13.80	25.63	3.91
Maintenance	28.71	10.83	28.89	10.05	27.90	3.01
Total	26.20	10.14	27.05	11.11	25.54	4.65

Table 5.6 shows the relationship between the categorical demographic variables and the exercise stages of change. None of the variables had a statistically significant relationship with the stages of change.

The scores for family and friend support and self-efficacy, as well as the demographic variables, were entered into a logistic regression analysis comparing those in the action and maintenance stages against those in the contemplation and preparation stages. Table 5.7 show that the odds of being in the action and maintenance stages versus the contemplation and preparation stages were significantly higher for those with higher friend social support and self-efficacy scores with log odds ratios of 1.04 and 1.25, respectively.

TABLE 5.5 Kruskal-Wallis ANOVA results for social support and self-efficacy compared to exercise stage of change

	Kruskal-Wallis H	df	p value
Friend support	7.116	3	0.0683
Family support	7.032	3	0.0709
Self-efficacy	38.302	3	0.0001*

* denotes significant association

In additional analysis, Table 5.8 shows the results of using the significant variables of friend social support and self-efficacy from Table 5.7 in a logistic regression analysis. A significant association was found with having higher self-efficacy scores and being in the action and maintenance stages ($p < .05$). By taking the variables of family social support, age, sex, marital status, race, and rank away, the predictive value of self-efficacy increased from 1.25 (see Table 5.7) to 1.31. Of note, this table also shows that self-efficacy accounts for 10.9% of the variance. The same was not true for friend social support. Once isolated with self-efficacy, the odds ratio remained at 1.04; however, it ceased to be significant. Friend social support also only accounted for 0.67% of the variance.

TABLE 5.6 Relationship between categorical demographic variables and exercise stage of change

	chi-square	<u>Stage of change</u> df	p value
Sex	1.21	3	0.75
Marital status	0.37	3	0.95
Rank	2.92	3	0.40
Race	8.89	6	0.18

TABLE 5.7 Analysis of maximum likelihood estimates of explanatory variables taken one at a time for action/maintenance stage versus contemplation/preparation stage

Variable	df	Parameter estimate	SE	Wald's Chi-square	p value	Odds Ratio (95% CI)
Intercept	1	-0.5390				
Family social support	1	0.0216	0.0157	1.886	0.1697	1.02 (0.99, 1.05)
Intercept	1	-1.0407				
Friend social support	1	0.0369	0.0177	4.3734	0.0365*	1.04 (1.00, 1.07)
Intercept	1	-5.5261				
Self-efficacy	1	0.2221	0.0429	26.8358	0.0000*	1.25 (1.14, 1.36)
Intercept	1	0.2474				
Age	1	-0.0024	0.0223	0.0118	0.9135	1.00 (0.95, 1.04)
Intercept	1	0.1161				
Sex	1	0.2288	0.3600	0.4039	0.5251	1.26 (0.62, 2.55)
Intercept	1	0.1195				
Marital status	1	0.1941	0.3479	0.3113	0.5769	1.21 (0.61, 2.40)
Intercept	1	1.0986				
White	1	-1.0986	0.6866	2.5600	0.1096	0.33 (0.08, 1.28)
Black	1	-0.0690	0.8461	0.0066	0.9350	0.93 (0.18, 4.90)
Intercept	1	0.5753				
Rank	1	-0.5598	0.3432	3.8132	0.1029	0.57 (0.29, 1.12)

TABLE 5.8 Analysis of maximum likelihood estimates of explanatory variables found to be significant for the action/maintenance stage versus contemplation/preparation stage

Variable	df	Parameter estimate	SE	Wald's Chi-square	p value	Odds ratio (95% CI)	R²
Intercept	1	-7.8961					
Friend social support	1	0.0356	0.0197	3.2754	0.0703	1.04 (1.00,1.08)	0.0067
Self-efficacy	1	0.2221	0.0429	26.8358	0.0000*	1.31 (1.17,1.46)	0.1092

Note: -2 log likelihood for this model was found to be 152.698 with 2 df ($p < 0.0001$)

CHAPTER 6

DISCUSSION

As expected in using a sample of military personnel, a high number of people were already conducting regular exercise. Those in the action and maintenance stages accounted for approximately 54% of the sample. Also of note, zero people were in the precontemplation stage and only 5% of the sample was in the contemplation stage. This is not surprising considering military personnel are held accountable for maintaining a high level of physical fitness. The rest of the sample was made up of those people who were engaged in exercising, but they were not doing this regularly. This group of people in the preparation stage made up nearly 41% of the sample. Since the majority of military personnel are already exercising regularly and only a small percentage of personnel are not exercising at all, this large group of people would be the best stage to focus on for exercise interventions at the military worksite.

For social support, the mean scores for family ($m = 27.05$) and friend ($m = 26.20$) social support were very similar. The mean scores for both family and friend social support increased from the contemplation to the maintenance stage. Although the Kruskal-Wallis ANOVA did not show any significant differences among the stages, the p values for friend support ($p = .068$) and family support ($p = .071$) were very close to achieving the .05 level of significance. This would suggest that the relationship between social support and exercising regularly warrants further study to understand how social support functions in the various stages of change.

The self-efficacy score also got increasingly higher from the contemplation to the maintenance stage. The Kruskal-Wallis ANOVA revealed the stages to be significantly different ($p < .05$). The results of the Bonferroni post hoc test found that significant

differences existed between the contemplation and maintenance stages, as well as between the preparation and maintenance stages.

Logistic regression analysis was used to determine the value of using social support, self-efficacy, and the demographic variables as predictors for exercise stage of change. Those in the action and maintenance stages were compared against those in the contemplation and preparation stages. In other words, the characteristics of the regular exercisers were compared against those in the sample who were not regular exercisers. The results found that the odds of being a regular exerciser were significantly higher for those with higher friend social support ($p < .05$) and self-efficacy ($p < .05$) scores.

The significant variables of friend social support and self-efficacy were further analyzed in logistic regression analysis by taking out the variables of sex, marital status, rank, age, and race. This time a significant association was found between self-efficacy and being in the action and maintenance stages versus the contemplation and preparation stages ($p < .05$). Self-efficacy was found to account for 10.92% of the variance while friend social support was found to account for only 0.67% of the variance. This finding further supports the strong link high self-efficacy has for being a predictor of being a regular exerciser. The low amount of variance that social support accounts for suggests that while having a high amount of friend social support is beneficial, it does not significantly predict stage of change for exercise based on this model. This finding is important in that self-efficacy can be focused on for an intervention program at the military worksite. As mentioned earlier, if the intervention concentrates on those in the preparation stage, the goal of the program would be to increase self-efficacy in this group. The findings of this study suggest that this would increase the odds of getting these people into the action and maintenance stages of regular exercise.

Future studies would benefit by using a longitudinal study to see how self-efficacy and social support affects stage of change over time. This study was only looking at a moment in time to get a baseline reading of stage of change characteristics for exercise. A longitudinal study would allow the researcher to see how stage of change is affected as a person's self-efficacy and social support scores fluctuate over time. This would also give the researcher a chance to model those people who were moving up in the stages of change, as well as those who relapsed to a lower stage of change for exercise. Relapse is an important piece of the stage of change model and one that was not examined in this study. Additionally, a more in depth study could use methods to verify self-reports of social support and exercise behavior. This would be an important next step in getting more accurate results for these variables.

This study provides important insights given that no studies have focused on the relationship between the exercise determinants of self-efficacy and social support with people in varying stages of change for exercise in a military sample. All research to date in these areas have examined samples at civilian worksite settings. The findings of this study demonstrate that self-efficacy has the potential to play a key role in getting military personnel to exercise regularly. The use of the transtheoretical model provides a useful guide with which to group people according to their exercise habits. Exercise intervention programs at the military worksite may benefit from trying to increase the levels of self-efficacy of its members in the preparation stage of regular exercise. This may speed up the process of getting people to move up to the action and maintenance stages of change.

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APPENDIX A

EXERCISE AND SOCIAL SUPPORT QUESTIONNAIRE

Dear prospective participant,

You are cordially invited to be part of a study on exercise participation among Air Force members. The purpose of this study is to investigate the role of social support in the participation and maintenance rates of exercise behavior of Air Force personnel at U.S. Strategic Command . By completing this questionnaire, you will play a part in helping to understand how social support can be used to improve exercise participation.

This questionnaire consists of four parts. The first part is to identify your present exercise behavior, the second part is to measure how confident you are about exercising, the third part is to identify the amount of social support you are receiving towards exercise, and the fourth part is for demographics. The approximate amount of time for completing this questionnaire is ten minutes. Please return completed questionnaires one week from the time of receipt. Completed questionnaires can be returned in the provided self-addressed stamped envelope and individual results are confidential. Completion of the attached questionnaire serves as your informed consent to participate in the study.

This data is being collected as part of a thesis requirement for completion of a Master of Science degree in Health Education. Your support in this endeavor is much appreciated. Questions can be directed to Jerry Wilson at 339-4232. Thank you for your participation.

PART I. Regular exercise equals performing moderate amounts of physical activity three or more days a week.

Examples of moderate amounts of physical activity are as follows:

- Washing and waxing a car (45-60 minutes)
- Washing window or floors (45-60 minutes)
- Playing volleyball (45 minutes)
- Playing touch football (30-45 minutes)
- Gardening (30-45 minutes)
- Walking 2 miles (30 minutes)
- Shooting basketball (30 minutes)
- Bicycling 5 miles (30 minutes)
- Dancing fast (30 minutes)
- Pushing a stroller 1 1/2 miles (30 minutes)
- Raking leaves (30 minutes)
- Water aerobics (30 minutes)
- Swimming laps (20 minutes)
- Jumping rope (15 minutes)
- Running 1 1/2 miles (15 minutes)
- Shoveling snow (15 minutes)
- Stairwalking (15 minutes)

Please circle the number which best describes your present exercise behavior.

4 ----- I presently exercise on a regular basis and have been doing so for longer than 6 months.

3 ----- I presently exercise on a regular basis, but I have only begun doing so within the past 6 months.

2 ----- I presently get some exercise, but not regularly.

1 ----- I presently do not exercise, but I have been thinking about starting to exercise within the next 6 months.

0 ----- I presently do not exercise and do not plan to start exercising in the next 6 months.

PART II. The following questions measure how confident you are in doing certain exercise activities. For each of the following questions, please rate the number that corresponds to your confidence that you can do the tasks regularly at the present time.

How confident are you that you can . . .

Not at all
confident 1 2 3 4 5 6 7 8 9 10 Totally
confident

1. Do gentle exercises for muscle strength and flexibility three to four times per week (range of motion, using weights, etc.)? _____
2. Do an aerobic exercise such as walking, swimming, or bicycling three to four times each weeks? _____
3. Exercise without getting injured or making your existing injuries worse? _____

PART III. Below is a list of things people might do or say to someone who is trying to exercise regularly. If you are not trying to exercise then some of the questions may not apply to you, but please read and give an answer to every question.

Please rate each question twice. Under each column, rate how your family and friends have said or done what is described during the last 3 months. Please write one number from the following rating scale in each space.

None	Rarely	A few times	Often	Very often	Does not apply
1	2	3	4	5	8

During the past three months, my family and friends:

- | | Family | Friends |
|-----------------------|--------|---------|
| 1. Exercised with me. | _____ | _____ |

None	Rarely	A few times	Often	Very often	Does not apply
1	2	3	4	5	8

During the past three months, my family and friends:

	Family	Friends
2. Gave me encouragement to stick with my exercise program.	_____	_____
3. Changed their schedule so we could exercise together.	_____	_____
4. Offered to exercise with me.	_____	_____
5. Gave me helpful reminders to exercise (“Are you going to exercise tonight?”).	_____	_____
6. Planned for exercise on recreational outings.	_____	_____
7. Discussed exercise with me.	_____	_____
8. Talked about how much they like to exercise.	_____	_____
9. Helped plan activities around my exercise.	_____	_____
10. Asked me for ideas on how they can get more exercise	_____	_____
11. Took over chores so I had more time to exercise.	_____	_____
12. Made positive comments about my physical appearance.	_____	_____

PART IV. Please answer the following demographic questions.

1. Age _____
2. Sex (circle one) MALE FEMALE
3. Race _____
4. Marital Status (circle one) MARRIED SINGLE
5. Rank _____

APPENDIX B



DEPARTMENT OF DEFENSE
UNITED STATES STRATEGIC COMMAND

Reply To:
USSTRATCOM/J060


24 July 1993

MEMORANDUM FOR J21

Subject: Permission to Conduct a Graduate Project by Capt Wilson

1. Reference Capt E. Jerry Wilson's request to distribute a survey regarding "the influence of social support on stages of change for exercise on Air Force personnel" to USSTRATCOM personnel. There are no legal impediments to the approval of Capt Wilson's request.
2. Capt Wilson is conducting this survey in his private capacity as a graduate student at University of Nebraska at Omaha. He must conduct the survey consistent with DoDI 1100.13
3. DoDI 1100.13, Surveys of DoD Personnel, governs this area. Response by DoD personnel to non-Governmental surveys, such as this one, addressed to them as individuals will "be neither encouraged nor discouraged, except that replies are not authorized to questions eliciting responses which might include or be based on (1) classified information, or (2) information derived from performance of official duties if the opinion or information is not available to the general public." Paragraph 6(b). The information solicited should be equally available to anyone who asks.
4. Completion of the survey would be an off-duty endeavor for USSTRATCOM personnel. Those completing the survey must be volunteers. An additional concern is that unfavorable responses to the survey could reflect poorly on USSTRATCOM. That concern is not great in this area; the survey questions relate to personal health behavior rather than operations.
5. We are concerned about the plan to distribute the surveys. The letter request did not indicate how Capt Wilson intended to distribute the surveys. It is essential that the distribution be done without any pressure on the personnel to participate. It must be distributed on personal time (e.g. lunch hour, before/after the normal work day). Further, the distribution should not occur at the main entrance/exit to building 500, as this is an area where distinguished visitors and senior personnel enter and leave the building. This project must be conducted in a manner least disruptive of daily STRATCOM business.

6. The introductory letter accompanying the survey lists Capt Wilson's duty phone number as the number at which he can be reached regarding this project. That number should be changed to his home or school number.
7. In addition, this project should be reviewed and approved by Public Affairs, J020, in advance of proceeding.
8. Further questions may be directed to me at extension 4-6321.



BYARD Q. CLEMMONS
CDR, JAGC, USN
Acting Staff Judge Advocate

Attachment
a/s



DEPARTMENT OF DEFENSE
UNITED STATES STRATEGIC COMMAND
OFFUTT AIR FORCE BASE, NEBRASKA 68113-6023

Reply To:
J020

6 Aug 98

MEMORANDUM FOR J2711

Subject: Permission to conduct a Graduate Project Survey by Captain E. Jerry Wilson.

1. Capt. Wilson's request to distribute a survey regarding exercise habits to USSTRATCOM personnel is approved within the following guidelines and recommendations.
2. J020 agrees that you need to make changes as recommended by J060. Additionally, we agree that your survey holds no legal impediments as long as you adhere to DoDI 1100.13. In that respect, J020 recommend the following:
 - a. Ensure your cover letter and survey form eliminate any reference to your rank, military affiliation and/or association with USSTRATCOM in order to avoid the appearance of this being an in-house, authorized government survey.
 - b. Distribution of your survey should be accomplished only at either the North (Theater) or South Parking entrances to Bldg 500. Further, distribution must be accomplished exterior to the building and freely to any or all who agree to accept or request a copy of the survey.
3. Your final report must conform to SAI 407-1, Clearance of Information to the General Public. J020 is the action agency for that clearance for public release and I can answer any questions you have in that regard.


JOHNN KENNEDY, Capt, USAF
Chief, Security & Policy Review

cc: J060

APPENDIX C



Institutional Review Board (IRB),
Office of Regulatory Affairs (ORA)
University of Nebraska Medical Center
Eppley Science Hall 3018
986810 Nebraska Medical Center
Omaha, NE 68198-6810
(402) 559-6463
Fax (402) 559-7845
E-mail: irbora@unmc.edu
<http://info.unmc.edu/irb/irbhome.htm>

August 28, 1998

Estel Jerry Wilson
5120 South 98th Court, #6
Omaha, NE 68127

IRB#: 085-98-EX

TITLE OF APPLICATION/PROTOCOL: The Influence of Social Support on Stages of Change for Exercise on Air Force Personnel

Dear Mr. Wilson:

The IRB has reviewed your Exemption Form for the above-titled research project. According to the information provided, this project is exempt under 45 CFR 46:101b, category 2. You are therefore authorized to begin the research.

It is understood this project will be conducted in full accordance with all applicable sections of the IRB Guidelines. It is also understood that the IRB will be immediately notified of any proposed changes that may affect the exempt status of your research project.

Please be advised that the IRB has a maximum protocol approval period of five years from the original date of approval and release. If this study continues beyond the five year approval period, the project must be resubmitted in order to maintain an active approval status.

Sincerely,

A handwritten signature in cursive script, appearing to read 'E. Prentice', written in dark ink.

Ernest D. Prentice, PhD
Vice Chair, IRB

EDP:jljg