The Effects of Physical Fitness on Physiological Arousal and Self-Reports of Stress

1986

Barbara Rene Staggs

University of Central Florida

Find similar works at: https://stars.library.ucf.edu/rtd

University of Central Florida Libraries http://library.ucf.edu

STARS Citation

Staggs, Barbara Rene, "The Effects of Physical Fitness on Physiological Arousal and Self-Reports of Stress" (1986). Retrospective Theses and Dissertations. 4851.
https://stars.library.ucf.edu/rtd/4851

This Masters Thesis (Open Access) is brought to you for free and open access by STARS. It has been accepted for inclusion in Retrospective Theses and Dissertations by an authorized administrator of STARS. For more information, please contact lee.dotson@ucf.edu.
THE EFFECTS OF PHYSICAL FITNESS ON PHYSIOLOGICAL AROUSAL AND SELF-REPORTS OF STRESS

BY

BARBARA RENE' STAGGS
B.A., Southern Illinois University, 1984

THESIS

Submitted in partial fulfillment of the requirements for the Master of Science degree in Clinical Psychology in the Graduate Studies Program of the College Arts and Sciences University of Central Florida
Orlando, Florida

Fall Term
1986
ACKNOWLEDGEMENTS

Many thanks to my mentors and friends; Burt Blau, Jack McGuire, and Dave Abbott for their intellectual and personal guidance throughout this endeavor. I appreciated their "unique" humor to the fullest and was grateful that our relationships were such that it existed.

I extend special thanks to my husband, Mark, who never failed in supporting me despite many graduate school tribulations during our first years of marriage. I also thank those people along with my husband, whose belief in my abilities many times exceeded my own. Notably, these people were my family and my dear friend Pete Fisher. Last, I thank Jeannie Mazzillo for her friendship, unlimited generosity of time and countless laughs in helping me prepare this thesis.
TABLE OF CONTENTS

INTRODUCTION .............................................. 1
METHOD ......................................................... 9
RESULTS ......................................................... 13
DISCUSSION ..................................................... 20
APPENDIX A ...................................................... 26
APPENDIX B ...................................................... 27
APPENDIX C ...................................................... 29
APPENDIX D ...................................................... 30
REFERENCES ..................................................... 31
ABSTRACT

Fitness level and trait anxiety were used as "independent" variables in a multiple regression study with physiological arousal and self-reported anxiety to a stressor as the "dependent" variables. Fitness level was determined by an established rating system of frequency, type, and duration of aerobic activity in which the subject reportedly engaged. Trait anxiety level was assessed by the trait portion of the State Trait Anxiety Inventory (STAI). Sixty undergraduate subjects were exposed to a situational stressor of reciting a memorized paragraph while viewing themselves being videotaped. Outcome measures of systolic blood pressure and self-reported distress were taken at various points throughout the study. Multiple regression/correlation was done to determine the relationship between fitness level and trait anxiety, and the relationship between systolic blood pressure and self-reports of distress. Significant findings included unique and joint contributions of fitness and trait anxiety to a lowering of Likert scale scores after the stressor. It was also found that sex and age uniquely and jointly contributed to the total change in blood pressure from the baseline to the posttreatment.
INTRODUCTION

Ancient philosophers through current-day scientists have spent a great deal of time pondering the question of the mind-body relationship. It appears that this relationship is likely to be reciprocal in nature. Psychosomatic medicine, a well-established facet of social science, continually investigates how emotion affects the body. On the other hand, others have investigated the influences that one's physical condition and/or participation in fitness activity can have upon cognitions and affect (Ewing, Scott, Mendez, & McBride, 1984; DeVries, 1981; Folkins, 1976; Gruber, 1975). In the study by Ewing et al. (1984), the immediate effect of exercise upon affect and cognition was investigated. Pretest measures of mood and cognition were taken from responses to a questionnaire and also to three different sets of inkblot cards. One-half of the subjects then exercised for a fixed rate of time (five minutes at 65-70% of their maximum projected safe heart rate) on a treadmill, while the other half did not. Control subjects had a seven minute rest period while being monitored by EKG electrodes. After that time they stood up and responded to the same questionnaires and inkblots as the treatment group. Posttest measures indicated that
both groups experienced significant reductions in negative mood, while only the exercised subjects had an increase in positive mood.

DeVries (1981), in his critical review of existing research, strongly suggested a manner in which exercise might effect emotions. He contended that exercise has a "tranquilizing effect" and supported this with what appeared to be conclusive physiological experimental evidence. For example, a sample of 10 elderly subjects chosen from 60 volunteers, all showed residual neuromuscular tension, as evidenced by pretest EMG readings. Treatment consisted of three types and each subject participated in all types, three times each. The treatment conditions were exercise at a heart rate of 100 beats per minute, exercise at a heart rate of 120 beats per minute, 400 mg of meprobromate (a tranquilizer), and 400 mg of lactose (a placebo). Results indicated that only the exercise significantly lowered electrical activity and that the meprobromate and placebo did not differ significantly from the control of the pretest electrical activity level.

Physiological correlates of various emotions provide a way to heighten objectivity and thus quantify information that may otherwise be inaccurately obtained through self-report methods alone. The importance of this point was evidenced in the present study by using
objective (physiological) and subjective means to quantify anxiety as related to fitness. Anxiety may be viewed as "a warning of impending danger" (Coleman, Butcher, & Carson, 1980). Although this "impending danger" may be real or imagined, the body subsequently responds in an automatic fashion. Hormones such as adrenaline are typically released and result in the activation of the autonomic nervous system, specifically, the sympathetic nervous system. The physiological result of this activation includes increased heart rate, increased respiration rate, and rise in blood pressure, to name a few (Greenfield & Sternbach, 1972).

Several physiological indices have been used in research of this type, with varying degrees of reliability. In a study by Cantor, Zillman, and Day (1978), it was found that systolic blood pressure was a more reliable measure of physiological change than heart rate and skin temperature and also resulted in a higher correlation with cardiovascular fitness. Accordingly, systolic blood pressure will serve as a "dependent" variable in the present study as well.

Since emotional arousal and physical fitness are linked at the physiological level, the alteration of one variable such as fitness should elicit differences in the other (i.e., emotional arousal). In other words, it is possible to observe emotional changes by observing
various changes in the autonomic nervous system. Likewise, increased fitness would also be expected to effect autonomic arousal due to its ability to enhance the efficiency of circulatory functioning. Almost 30 years ago, Michael (1957), in a review of relevant research contended; "[if one could improve the functioning of the autonomic nervous system,] more efficient reactions to stress would result" (p. 51). In this case, exercise might serve to produce this effect by increasing physiological fitness. Thus, any differences in emotional arousal will be observable physiologically based upon significant effects of exercise.

Several researchers have found evidence supporting the view that physical fitness does lead to significant change in emotional reactivity and cognition. Francis and Carter (1982) concluded that joggers maintained significantly lower levels of anxiety, hostility, and depression than their sedentary counterparts. Similarly, Folkins and Sime (1981) concluded that physical fitness leads to improved mood, self-concept, work behavior, and "appears to bolster cognitive performance during and after physical stress" (p. 373). Physical fitness resulting from exercise has also been reported to positively affect one's ability to cope with stress (Cantor et al., 1978; Michael, 1957; Gutin, 1966).
Stress might be construed as the "physiological and psychological response to any demand made upon the human organism..." (Gherman, 1981). Anxiety has been indicated as a psychological correlate of stress (Schwartz, Davidson, & Goleman, 1978). Therefore, environmental stress is likely to elicit an anxiety reaction under certain circumstances. Accordingly, Cantor et al. (1978) found that less fit individuals responded more intensely to stress with higher systolic blood pressure and skin temperature than did the more fit individuals.

There has, however, been conflicting evidence reported regarding the relationship between anxiety and fitness level. One study involved Army personnel who were randomly selected and voluntarily participated in a basic training program designed to improve physical fitness. This program consisted of such activities as push-ups, sit-ups, as well as a mile run for men and a 0.5 mile run for women. Although both men and women participated in the program, only the men displayed significant improvement in "measures of mood states, state anxiety, and physical self-concept" (p. 604) (Kowal, Patton, & Vogel, 1978). These differences between men and women may have resulted from the differing degrees of training imposed as a part of the military program.
Keller and Seraganian (1984) performed two studies relating physical fitness and psychosocial stress. Both studies appeared to be impressive in procedure and design. The first study employed three groups of men who were either physically trained, untrained, or in the process of training. Initially, the trained subjects showed faster autonomic recovery from stress (induced by a speeded learning task and an incongruous perceptual task) than did the untrained or training subjects. By the time of the last measure (nine weeks), all three groups' responses were indistinguishable. This conclusion suggests that fitness was a factor in producing more rapid autonomic recovery from a psychosocial stressor.

The second study involved 60 subjects, randomly assigned to 10 weeks of one of three programs. These groups were aerobic exercise, music appreciation, or meditation. Subjects were exposed to two of six psychosocial stressors in a counterbalanced fashion for each of the three groups. These stressors involved either cognitive tasks and/or perceptual tasks. Initially, all three groups' fitness levels were similar. Posttreatment, however, only the exercise group showed significant improvement as evidenced by faster heart rate and electrodermal recovery to baseline after exposure to a stressor as compared to the meditation and music
appreciation groups. These results suggest that aerobic fitness is associated with a more rapid physiological recovery from psychosocial stress.

Long (1984) compared the effectiveness of aerobic conditioning and stress inoculation to cope with stress. She found that aerobic conditioning caused lasting (maintained for at least three months) improvement in state and trait anxiety measures. The conditioning program was implicated as an effective method of "reducing self-reported stress and improving other psychological characteristics" (p. 537).

Finally, Kilduff (1984) investigated the relationship between physical fitness, anxiety level, and Type A behavior and discovered several trends. All information was obtained via use of several published questionnaires. One finding suggested that fitness level and Type A behavior were not related. More importantly, an inverse relationship was found between physical fitness level and trait anxiety.

These studies suggest that a negative relationship likely exists between physical fitness and anxiety and that both of these factors may be important as predictors of response to situational stress. This relationship was examined by assessing fitness level and comparing it to anxiety levels measured before and after exposure to a situational stressor. Physiological arousal (blood
pressure) and self-reported distress were recorded before and after the stressor.

The current study differed from others primarily in terms of the combination between each of the variables under investigation. It appears that while many studies incorporated one or more of these factors individually, none has yet compared them in a multiple correlational relationship. Additionally, a physiological component was used to verify or contradict recent research which has relied primarily upon self-report methods of data gathering.

It was hypothesized that both physiological arousal and cognitive stress would be a joint function of both fitness and trait anxiety. The unique contribution of fitness and trait anxiety to the multiple relationship was also determined.
METHOD

Subjects

A total of 60 undergraduate students from the University of Central Florida were recruited on a voluntary basis from several psychology and business classes. Thirty-nine females and 21 males participated in the study. Ages ranged from 17 to 47 with a mean age of 25.13.

Apparatus

Equipment used in the study included a stopwatch, a stethoscope, and a Standby Model baumanometer. Videotaping equipment consisted of a Sony Videocassette Recorder with a 3/4" cassette, model number VO-2600, a Sony Video Camera, model number AVC-3260, and a Magnavox Solid State television that was used as a monitor for the subjects to view themselves. A Realistic portable cassette tape recorder (model # CTR-56) was used to record the subject's recitation of memorized material.

Design

Subjects were measured on two "independent" variables; aerobic fitness and trait anxiety. These measurements preceded the stressor administration. "Dependent" variable measures included systolic blood pressure, self-reported distress levels (state anxiety
and on a Likert-type scale), and rated performance of the subjects' accuracy of recitation from an audiotaped recording of their performance. Systolic blood pressure, state anxiety, and self-reported distress levels on a Likert scale were all taken before and after the stressor administration.

**Procedure**

Subjects were informed of the nature of the requirements that would be asked of them in participating in this study, and then their signature was obtained on an informed consent form (Appendix A). Subjects were debriefed following participation.

Next, an activity questionnaire including type, frequency, and duration of physical activity was administered (Appendix B). Based on this information, a fitness level was determined by use of Cooper's aerobic points (Cooper, 1982). This system involves discriminating between various activities based upon empirically derived ratings of aerobic involvement required to perform each activity.

Trait anxiety (an "independent" variable) and state anxiety (a "dependent" variable) were also assessed at the same time as fitness. The State Trait Anxiety Inventory (STAI-Form Y) (Spielberger, Gorsuch, & Lushene, 1970) was used to obtain the above information. This published questionnaire is not available for viewing in
the appendices due to restrictions imposed by the publishing company to restrict access to this instrument only to qualified professionals. Therefore, qualified professionals may obtain copies of the STAI from Consulting Psychologists Press, Inc., 577 College Avenue, Palo Alto, CA 94306. The overall median alpha coefficients of reliability for the state portion and trait portion of the STAI for Form Y were .92 and .90, respectively. Construct validity for the STAI appeared to be relatively high with alpha coefficients ranging from .86 to .95 for contrasted groups of working adults, college students, high school students, and military recruits.

Subjects were also asked to subjectively rate the amount of stress they were experiencing at that particular moment in time via use of an original 7 point Likert scale (Appendix C). The last pretreatment measurement consisted of a baseline systolic blood pressure reading. This was obtained in the following manner. Subjects were initially asked to take a seat and to try to relax. The blood pressure apparatus was attached to the subject. At the end of 10 minutes, a systolic blood pressure reading was obtained.

All subjects received the following stressor condition treatment while remaining seated for the entire process. After the 10 minute relaxation period,
subjects were asked to memorize a short printed paragraph within three minutes. They were then asked to recite this paragraph while being videotaped (Lindley, Cunningham, & Abbott, 1978). At this time, the videotaping equipment was activated with the television monitor positioned so that the subjects could see themselves on the screen. Subjects then recited the paragraph.

Following this procedure, systolic blood pressure was once again taken. This occurred either at the point when the subject completed the recitation or at the point where he or she was unable to recite the script. A recovery blood pressure measure was taken after two minutes had elapsed. The self-report distress scales (state portion of the STAI and Likert scale) were administered a second time following the posttreatment measure of systolic blood pressure.

Performance of recitation was rated in a manner similar to that used in the Sentences subtest on the Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 1967). The scoring system entailed recording an error to be any omission or substitution of a word that was not previously indicated in the paragraph. This error score was then compared to the total number of words in the paragraph to achieve a total percentage score of correct words recited.
RESULTS

Data for the multiple correlation and regression were obtained from the completed questionnaires, accuracy of recitation of memorized material, and systolic blood pressure.

Pretest questionnaires were used to obtain scores for the dependent variables; state anxiety (SA1) and subjective rating of present anxiety on Likert scale (LS1). A baseline systolic blood pressure (BLBP) was also obtained as a pretest measure. Posttreatment dependent variable measures were taken for systolic blood pressure (PTBP), state anxiety (SA2), and Likert scale (LS2). Change scores from pre-treatment to posttreatment were computed which resulted in additional dependent variables of total change blood pressure (TCBP), change in state anxiety (CSA), change in Likert scale (CLS), and recovery change blood pressure (RCBP). RCBP is equal to the difference between PTBP and the recovery blood pressure reading at two minutes after the stressor administration. A performance measure was also taken for accuracy of recitation and was scored as number of errors (ERR). A percent correct score (PCR) was calculated for this last measure as well.
Four independent variables were used. They were total fitness points (TFP) which was derived from the subject's self-report of activities engaged in which was subsequently scored for aerobic points, trait anxiety (TA), sex (SEX), and age (AGE). Mean and standard deviations were computed on all of the dependent variables (BLBP, PTBP, TCBP, SA1, SA2, CSA, LS1, LS2, CLS, ERR, PCR, RCBP) and three of the independent variables (TA, TFP, AGE) (see Table 1).

The only significant finding when pretest measures in Table 1 were compared via t-test with posttest measures was that blood pressure increased significantly for all subjects, $t(59)=-9.91, p<.0001$. This increase was indicative of the difference between the baseline blood pressure and the posttreatment blood pressure, and shows that the subjects experienced sympathetic arousal in response to stress.

Preliminary Pearson bivariate correlations were computed between the independent variables (TFP, TA, SEX, AGE) and the dependent variables (TCBP, CSA, CLS, ERR, PCR). This information is exhibited in Table 2. A significant relationship was found between SEX and TCBP, $r=.469, p<.01$ for a two-tailed test. This indicates that the total amount of change in one's blood pressure while under stress is related to gender. More specifically, males' systolic blood pressure increased significantly
TABLE 1
MEANS AND STANDARD DEVIATIONS OF ALL VARIABLES FOR ENTIRE SAMPLE

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFP (total fitness pts.)</td>
<td>39.80</td>
<td>48.72</td>
</tr>
<tr>
<td>TA (trait anxiety - IV)</td>
<td>35.12</td>
<td>8.09</td>
</tr>
<tr>
<td>AGE (age - IV)</td>
<td>25.50</td>
<td>6.74</td>
</tr>
<tr>
<td>BLBP (baseline BP)</td>
<td>111.22</td>
<td>14.25</td>
</tr>
<tr>
<td>PTBP (posttreatment BP)</td>
<td>123.42</td>
<td>18.33</td>
</tr>
<tr>
<td>RCBP (recovery change BP)</td>
<td>9.80</td>
<td>7.09</td>
</tr>
<tr>
<td>TCBP (total change BP)</td>
<td>12.20</td>
<td>9.53</td>
</tr>
<tr>
<td>SA1 (state anxiety pre)</td>
<td>36.83</td>
<td>7.54</td>
</tr>
<tr>
<td>SA2 (state anxiety post)</td>
<td>34.85</td>
<td>9.54</td>
</tr>
<tr>
<td>CSA (change state anxiety)</td>
<td>-2.03</td>
<td>8.61</td>
</tr>
<tr>
<td>LS1 (Likert scale pre)</td>
<td>3.52</td>
<td>1.11</td>
</tr>
<tr>
<td>LS2 (Likert scale post)</td>
<td>3.45</td>
<td>1.31</td>
</tr>
<tr>
<td>CLS (change Likert scale)</td>
<td>-0.07</td>
<td>1.49</td>
</tr>
<tr>
<td>ERR (errors in recitation)</td>
<td>3.63</td>
<td>3.81</td>
</tr>
<tr>
<td>PCR (% correct recitation)</td>
<td>89.87</td>
<td>10.59</td>
</tr>
</tbody>
</table>
### TABLE 2

**PEARSON BIVARIATE $r$ CORRELATIONS BETWEEN INDEPENDENT (IV) AND DEPENDENT (DV) VARIABLES**

<table>
<thead>
<tr>
<th>DV</th>
<th>SEX</th>
<th>AGE</th>
<th>TFP</th>
<th>TA</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCBP</td>
<td>.4686***</td>
<td>.2529*</td>
<td>.1677</td>
<td>-.0185</td>
</tr>
<tr>
<td>CSA</td>
<td>-.0545</td>
<td>-.1753</td>
<td>-.2169</td>
<td>.0037</td>
</tr>
<tr>
<td>CLS</td>
<td>-.1556</td>
<td>-.1262</td>
<td>-.2822**</td>
<td>-.1606</td>
</tr>
<tr>
<td>ERR</td>
<td>.0342</td>
<td>-.0112</td>
<td>-.1203</td>
<td>.1549</td>
</tr>
<tr>
<td>PCR</td>
<td>-.0007</td>
<td>-.0406</td>
<td>.0343</td>
<td>-.1041</td>
</tr>
</tbody>
</table>

*** - $p<.01$ (two-tailed)
** - $p<.05$ (two-tailed)
* - $p<.06$ (two-tailed)
more under stress than did females'. Another significant relationship was found between CLS and TFP, r=.282, p<.05. This indicates that the change in Likert scale self-report of distress is related to one's degree of fitness. No other independent variables had significant bivariate correlations with any dependent variables, but AGE did approach significance with TCBP, r=.253, p<.06 for a two-tailed test.

Next, multiple regression/correlations were carried out for each of the primary dependent variables (TCBP, CSA, CLS, ERR, and PCR) by using a backward solution. Backward solution initially incorporates all independent variables in relation to the dependent variable and sequentially eliminates the least contributive non-significant (POUT=.10) independent variable with each step.

With TCBP as the dependent variable, only AGE and SEX were found to significantly enter into a multiple relationship, final R=.555, F(2,57)=12.67, p<.00001. The semipartial correlations of AGE and SEX with TCBP were both also significant with sr=.502, p<.00001 for SEX and sr=.311, p<.007 for AGE. The multiple R squared for SEX and AGE was .308. These data show that blood pressure arousal under stress is positively and significantly related to both SEX and AGE, with no significant relationship to self-reported fitness level.
When RCBP was used as the dependent variable, no significant relationship ensued with any of the independent variables, initial $R=.332$, $F(4,55)=1.70$, $p<.1634$. Thus, none of the independent variables significantly contributed to the degree of recovery from blood pressure arousal.

CSA as the dependent variable yielded no significant multiple relationship with any of the independent variables, initial $R=.286$, $F(4,55)=1.23$, $p<.3103$. This indicates that change in state anxiety score is not related to fitness or any of the other independent variables investigated.

With CLS as the dependent variable, TA and TFP were found to significantly enter into a multiple relationship, final $R=.355$, $F(2,57)=4.11$, $p<.025$. The semipartial correlations for TA and TFP with CLS were $sr=-.216$, $p=.087$ for TA and $sr=-.317$, $p=.013$ for TFP. Hence, TA and TFP uniquely and jointly contributed to a relationship with CLS, indicating that both higher fitness and higher trait anxiety levels produced greater lowering of Likert scale self-reports in response to stress.

The dependent variable of ERR was not significantly related to any of the independent variables investigated and accordingly, all of the independent variables were discarded by the final step, initial $R=.190$,
\[ F(4,55) = 0.517, \ p = 0.724. \] Consequently, neither fitness or the other independent variables were significantly related to the number of errors of recitation.

Last, with PCR as the dependent variable, no significant multiple relationship was discovered as none of the independent variables survived in the final step, initial \( R = 0.108, F(4,55) = 0.162, \ p = 0.957. \) Therefore, neither fitness nor any of the other independent variables contributed uniquely or jointly to a relationship with the percent of correct words recited.
DISCUSSION

A review of the significant relationships from the multiple regression/correlation analyses include the following. First, it was found that a multiple relationship existed between TCBP as the dependent variable, and SEX and AGE as the independent variables. SEX and AGE were uniquely and jointly related to the arousal of an individual's blood pressure change under stress. Males experienced greater stress change in their blood pressure than did females and the degree of this change increased with age. Fitness was not related to blood pressure change under stress, nor was it related to recovery from blood pressure arousal under stress. This was in contrast to findings of Cantor et al. (1978) as well as Keller and Seraganian (1984). The reason for this contrast of findings may have been due to the fact that the others assessed fitness by using physiological indices in response to an exercise task while in the present study, fitness was assessed through a self-report method. This is not to say that self-reported information is invalid, but that there is greater chance for inaccuracies to occur in using this method. Therefore, it seems more likely that a significant relationship may have been elucidated if present if one were to have compared similarly obtained measures.
The variables of SEX and AGE, although not factors in the original hypothesis, did provide additional useful information. The significant relationship between AGE and TCBP confirms the obvious in the sense that blood pressure tends to increase to a larger extent for the older subjects. Increased age obviously incurs more circulatory disorders such as high blood pressure and arteriosclerosis and may suffice as one possible explanation for this finding. On the other hand, the fact that SEX was related to TCBP causes one to be curious as to why males' blood pressure increased significantly more than females' given the same treatment. It could be that the sex of the experimenter (female) may have influenced the change in males' blood pressure due to self-imposed stress by the males to perform optimally to impress the experimenter. An attempt was made to guard against this by the female experimenter wearing a white laboratory coat when in contact with the subjects.

A second finding indicated that a significant multiple relationship existed between the dependent variable of CLS and independent variables of TA and TFP. It is interesting to note that Likert scale responses were lower following the treatment as opposed to pretreatment, thus causing a reduction in CLS. This suggests that anticipatory anxiety was in operation prior
to treatment administration and that by definition, the subjects were experiencing anxiety in anticipation of "impending danger" (Coleman et al., 1980). Perhaps this perceived danger was related to the subjects' fear of not performing their recitation to an acceptable level either by their own standards or by those they believed were expected by the experimenter.

Anticipatory anxiety was found to exist for the entire sample and was thus not due to the gender of the experimenter. This finding was consistent with the main hypothesis in that fitness and trait anxiety uniquely and jointly contributed to CLS leading to a reduction in self-reported anxiety after a stressor. More specifically, the higher the fitness and trait anxiety, the greater the lowering of score on the Likert scale in response to stress.

Clinical implications of these findings suggest that increased fitness may play an important role in how a client responds to stress. Based upon findings from the present study, it can be expected that a more fit client will probably be less distressed after a stressor than one who is less fit. This was also true for high trait anxious subjects. So aerobic exercise, if safely prescribed, should enhance one's ability to cope with stress by causing one to be more resilient, or reset faster after experiencing a stressful situation. In
other words, clients who are more fit and more trait anxious are less likely to have difficulty in dealing with enduring detrimental effects of stress after a stressor than their counterparts. Curiously, high trait anxiety was a factor in contributing to individuals reporting being less distressed after a stressor. One possible explanation for this might be that high trait anxious individuals are more sensitive to recognizing changes in their anxiety level as it reduces from an already high level. Since anticipatory anxiety was experienced by all subjects, it seems that by addressing this in a therapeutic context it would be beneficial in general by increasing the client's adaptive coping responses to stress. As mentioned earlier, the anxiety experienced prior to the stressor resulted from the subject's belief that danger was impending (Coleman et al., 1980). Cognitive restructuring or Rational-Emotive Therapy would probably prove to be useful in alleviating fears that have been induced by self-imposed expectations by the client. In addition, it appears that most of the subjects tended to view stress as something negative and that it should be avoided. Perhaps positively reframing this belief with the client would further help to reduce the anticipatory anxiety. One way of doing this might be to suggest that not all stress is "bad" and that many stresses may be better viewed as challenges rather than
something that will defeat you. Helping the client to a more positive outlook and providing tools with which they can use to cope should enable them to feel more capable in the face of an impending stressful situation. Therefore, clients may then anticipate a sense of mastery in coping with stress rather than overreact with anxiety due to irrational self-imposed expectations.

If research is to be done investigating these same relationships, several modifications are recommended. First, fitness should be more accurately determined. In order to reduce error in the subjects' self-reports of fitness, perhaps an interview situation could be implemented rather than using a paper and pencil method. Most certainly in doing this, one should control for sex of the interviewer to the interviewee to reduce the chances that the subject will try to impress the interviewer.

Second, self-report questionnaires which have less face validity would be better used than the ones in this study, if at all possible. It might have been that some subjects may not have responded honestly. They might have tried to either please the experimenter with what they believed was the hypothesis of the study, or simply tried to present a more positive or negative view of themselves.
Third, some medical information might have been helpful in using blood pressure as a measure of stress. For example, a history of high or low blood pressure for the individual may have confounded the results even in examining the change in one's blood pressure as a variable. The use of any medications, drugs, or alcohol might also have affected blood pressure and would be useful for the experimenter to know. Last, inquiry should be made as to the presence of any medical problems which might also have an effect on the changes one's blood pressure undergoes.

Last, an attempt should be made to determine if subjects are already under any undue stress from other stressors in their life. This is particularly true for any stresses that may have been experienced enroute to the experiment. Individuals who may have undergone significant stress outside of the experiment may then be selected against in order to ensure a more pure effect of the treatment stressor on the subjects' reactions in the study.
APPENDIX A

REQUIREMENTS OF PARTICIPATION AND INFORMED CONSENT

If you choose to participate in this study which is intended to compare fitness level with coping styles, several activities will be required of you. The first part of participation will involve responding to four short questionnaires, all of which should require no more than 20-30 minutes. The first of these questionnaires entails reporting type, frequency, and duration of physical activity for an "average" week. Next, your coping style will be determined through information obtained from a front and back page of a written questionnaire. Last, you will be asked to rate the amount of stress you are feeling at that moment in time.

After the basic information has been completed, you will then be asked to relax for a 10 minute period at which point your blood pressure will then be taken. Subsequently, you will be asked to memorize a short paragraph. After three minutes, videotaping equipment will be turned on and you will be asked to recite the paragraph. The television monitor will be turned toward you so that you can see yourself. After you have finished your recitation, blood pressure will be measured again. One side of the questionnaire will be administered again as well as the rating scale of how stressed you feel at that time. Total participation time is estimated to be approximately 50 minutes.

I, ___________________________, agree to participate in the study described above, currently being conducted by Barbara R. Staggs, Clinical Psychology student, under the supervision of David W. Abbott, Professor of Psychology at the University of Central Florida. I have been informed of the nature of this research and I understand that my responses will be held in the strictest confidence and will be used only as data collected for this study. I further consent to the use of such data in any publication of the results of the study, under the assurance that my participation will be both anonymous and confidential. I understand that my participation is voluntary and that I may terminate at any time without penalty or prejudice.

Participant's Signature: _______________________________________
Date: ____________________________

26
APPENDIX B

FITNESS SURVEY

Sex: M  F  Age:__________

Exercise Data

Below is a list of physical activities. Please indicate those activities you regularly participate in and are currently engaged in. List the number of days each week you do the activity and the average amount of time you spend on each activity per day. List only the ACTUAL time you spend IN THE ACTIVITY.  DO NOT COUNT RESTS OR BREAKS!!

Example:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Days/week</th>
<th>Amount</th>
<th>Units</th>
<th>Duration(hr/min/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jog/run</td>
<td>3/week</td>
<td>2.50</td>
<td>miles</td>
<td>:23:30</td>
</tr>
<tr>
<td>Tennis</td>
<td>6/week</td>
<td>3.0</td>
<td>games</td>
<td>2:00:00</td>
</tr>
</tbody>
</table>

**************************************************************************

<table>
<thead>
<tr>
<th>Activity</th>
<th>Days/week</th>
<th>Amount</th>
<th>Units</th>
<th>Duration(hr/min/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jog/Run</td>
<td></td>
<td></td>
<td>miles</td>
<td></td>
</tr>
<tr>
<td>Walk</td>
<td></td>
<td></td>
<td>miles</td>
<td></td>
</tr>
<tr>
<td>Stationary running</td>
<td></td>
<td></td>
<td>steps/ min</td>
<td></td>
</tr>
<tr>
<td>Cycling</td>
<td></td>
<td></td>
<td>miles</td>
<td></td>
</tr>
<tr>
<td>Stationary cycling*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swimming</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tennis(sgl)</td>
<td></td>
<td></td>
<td>games</td>
<td></td>
</tr>
<tr>
<td>Tennis(dbs)</td>
<td></td>
<td></td>
<td>games</td>
<td></td>
</tr>
<tr>
<td>Badminton(sgl)</td>
<td></td>
<td></td>
<td>games</td>
<td></td>
</tr>
<tr>
<td>Badminton(dbs)</td>
<td></td>
<td></td>
<td>games</td>
<td></td>
</tr>
<tr>
<td>Stair climbing</td>
<td></td>
<td></td>
<td>steps</td>
<td></td>
</tr>
<tr>
<td>Golf</td>
<td></td>
<td></td>
<td>holes</td>
<td></td>
</tr>
<tr>
<td>Calisthenics</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Rope Skip</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Hockey</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Soccer</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Football</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Skiing</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Volleyball</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Handball</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Wrestling</td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
</tbody>
</table>

27
<table>
<thead>
<tr>
<th>Activity</th>
<th>Days/week</th>
<th>Amount</th>
<th>Units</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic dance</td>
<td>/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight lifting</td>
<td>/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td>/</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Enter body weight in amount column; resistance in units column.

** These activities require duration information only.
APPENDIX C

Please select the number on the scale below that best corresponds to how you are feeling at the present moment in time.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Calm</td>
<td>Somewhat Anxious</td>
<td></td>
<td></td>
<td></td>
<td>Extremely Anxious</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX D

Good evening, ladies and gentlemen. I would like to welcome you to the Hanover Fine Arts Center. The San Landro Symphony Orchestra will perform for your pleasure this evening, beginning at 9:00 p.m. Thank you for attending.
REFERENCES


