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Relationships Between the Four Temperament Types: Sanguine, Choleric, Phlegmatic, and Melancholic, and Leisure Time Physical Activities

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ABSTRACT

RELATIONSHIPS BETWEEN THE FOUR TEMPERAMENT TYPES:
SANGUINE, CHOLERIC, PHLEGMATIC, AND MELANCHOLIC,
AND LEISURE TIME PHYSICAL ACTIVITIES

by

Herbert W. Helm Jr.

Chairman: W. Peter Blitchington

ABSTRACT OF GRADUATE STUDENT RESEARCH

Thesis

Andrews University

Department of Education

Title: RELATIONSHIPS BETWEEN THE FOUR TEMPERAMENT TYPES:
SANGUINE, CHOLERIC, PHLEGMATIC, AND MELANCHOLIC,
AND LEISURE TIME PHYSICAL ACTIVITIES

Name of researcher: Herbert W. Helm Jr.

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Ph.D.

Date completed: August 1980

Problem

The physical health of a person seems to be an important issue in today's society. It would seem reasonable to hypothesize that the temperament of an individual may be a predisposing factor toward or against participation on a regular exercise program. It was the purpose of this study to determine what relationship exists between a person's temperament type and the amount of leisure time physical activity he or she performs.

Method

One-hundred and ninety-three college students participated in this study. The "Temperament Inventory" was used to determine a person's score on each of the four temperament types. The "Minnesota Leisure Time Activity Questionnaire" was used to determine a person's AMI (Activity Metabolic Index) score. Stepwise multiple regression was used to analyze the influence of the sex of an individual and the four temperament types on the AMI score.

Results

Statistically significant results were found for sex and for the sanguine temperament, at the .01 level. Sex accounted for approximately 4.5 percent of the variance, and sanguine accounted for a little over 1 percent of the variance; together they explained approximately 6 percent of the variance.

Conclusions

The sex of an individual and the sanguine temperament were found to have a significant relationship to leisure-time physical activity, as measured by the Minnesota Leisure Time Activity Questionnaire. However while these were found to be statistically significant in this study, it is of little practical value in explaining the variance of the AMI scores.

Andrews University
School of Graduate Studies

RELATIONSHIPS BETWEEN THE FOUR TEMPERAMENT TYPES:
SANGUINE, CHOLERIC, PHLEGMATIC, AND MELANCHOLIC,
AND LEISURE TIME PHYSICAL ACTIVITIES

A Thesis
Presented in Partial Fulfillment
of the Requirements for the Degree
Masters of Arts

by
Herbert W. Helm Jr.

August 1980



RELATIONSHIPS BETWEEN THE FOUR TEMPERAMENT TYPES:
SANGUINE, CHOLERIC, PHLEGMATIC, AND MELANCHOLIC,
AND LEISURE TIME PHYSICAL ACTIVITIES

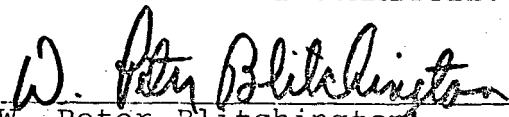
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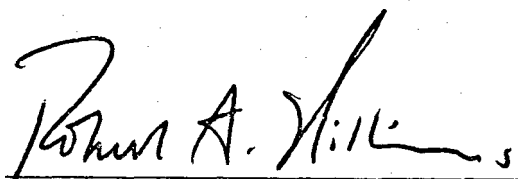
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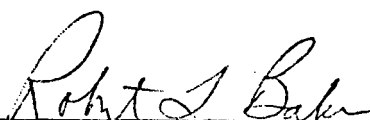
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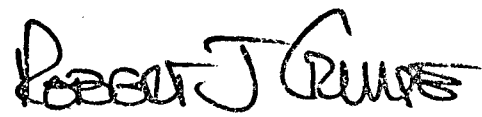

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CHAPTER I

INTRODUCTION

Background of the Study

Hippocrates was apparently the first one who was instrumental in the theorizing of the four Greek temperaments: sanguine, choleric, phlegmatic, and melancholic.

This theory linked four bodily fluids to distinctive personality attributes. For example, an excess of bile would cause a person to be chronically angry, hence the word choleric (angry), which literally means bile. Similarly, an excess of black bile would cause a person to be chronically sad, hence the term melancholy, which literally means black bile (Buss & Plomin, 1975).

Although his theory of humors has not stood the test of time, the four categories have been helpful to modern researchers (Cruise, Blitchington, and Futcher, forthcoming,). However Hippocrates' work did help to lay the groundwork for two famous men who linked personality to physique. The men were Earnest Kretschmer and William Sheldon (Tillman, 1965).

Earnest Kretschmer grouped the body types into four classifications based upon the physique:

1. Asthenic, these individuals are lean, tall, and shallow chested for their body weight, in the Greek asthenic has the meaning of "without strength."

2. Athletic, these individuals are robust, strong,

and have a well-developed chest, in the Greek athletic has the meaning of "a contender for a prize."

3. Pyknic, these individuals are broad, round figured, with a heavy neck, in the Greek pyknic has the meaning of "thick."

4. Dysplastic, these are the individuals who are abnormally formed, in the Greek dysplastic has the meaning of "badly formed" (Bucher, 1975).

Kretschmer's work gave an impetus to William Sheldon. He proposed that there were three basic body types: ectomorph, endomorph, and mesomorph, and that these related to a person's temperament or personality. The personality type each is related to is cerebrotonia, viscerotona, and somatonia, respectively. Sheldon found high correlations between the body type and the personality; however, the main problem was that the same person who estimated the body type also estimated the personality. Later researchers corrected this and found that there was still a correlation, although the correlation was much lower. Sheldon was not able to establish that any of the personality traits were inheritable, however, he was able to establish that personality had some correlation to body type, (Buss & Plomin, 1975).

Much of the modern research of the four-temperament theory has been done by Eysenck. His test, the Eysenck Personality Inventory (EPI), measures two dimensions of personality, first, high/low neuroticism, and secondly,

introversion/extroversion--together they make up the four temperaments (See fig. 1).

The two dimensions of personality, or temperament, are introversion/extroversion (E) and high/low neuroticism (N). In combination they comprise four temperaments: neurotic introvert, neurotic extrovert, stable introvert, and stable extrovert, corresponding to Hippocrates' melancholic, choleric, phlegmatic, and sanguine, respectively. (Cruise, Blichington, & Fatcher, forthcoming).

Introversion/Extroversion (E) and high/low neuroticism (N) and their general relationship to the four temperament types.

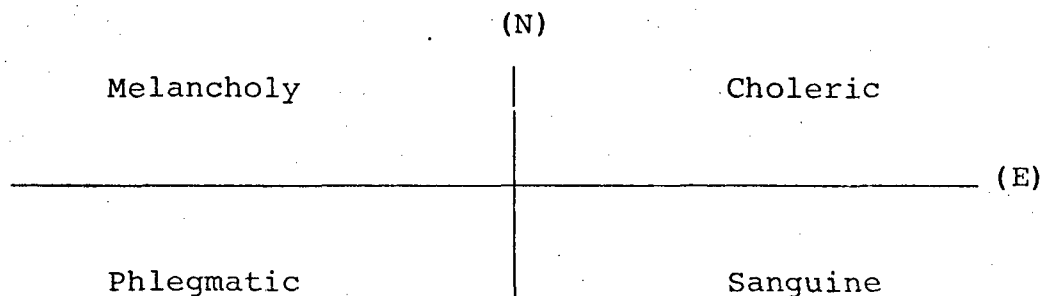


Figure 1.

While modern research today does not study the relationship between a person's personality and their body type, a number of studies have been done on personality as it relates to physical fitness (Weber, 1952; Tillman, 1965; Buccola & Stone, 1975; Tharp and Schlegel-milch, 1977).

There were two reasons originally for doing research in this area of psychology of sport: (1) man's inability to adjust to the complexities of life, and (2) physical educators attempting to justify their presence

in the academic world (Sevier, 1974).

In today's society there appears to be more of an acceptance of looking at the psychological side of people and their sports. In the 1960's psychology was a scare word for those who participated in the world of sports. By the 1970's the view had changed and the psychologist was at least viewed as a teacher. Now going into the 1980's, the combining of sports and psychology appears to be one of the major growing areas of research (Runner's World, 1980).

With this new plunge into the area of sport psychology and the evidence there appears to be of the benefits of a systematic exercise program, it is important to ask why so many people still seem immuned to exercise.

Thus, a critical question that confronts health educators is why some people embark on regular exercise programs while others do not. It is not unreasonable to hypothesize that personality characteristics may be predisposing factors toward or against participation (Renfrow & Bolton, 1979).

Most of the variance of personality traits can be reduced to two factors: (1) introversion/extroversion, and (2) high/low neuroticism (anxiety or emotionality). Therefore it would appear logical that temperament should be the starting point of "predisposing factors toward or against participation" in regular exercise programs for two reasons: (1) it is the inherited or inborn part of a personality, and (2) temperament influences almost all aspects of a person's life.

Statement of the Problem

The area of physical activity is unique in at least one aspect: people are concerned about it but not enough to motivate a majority of them to embark on their own regular exercise program. One reason may be that physical activity on a regular basis encompasses two major domains. First, it encompasses the physical domain, the exercising of the muscular, cardiovascular, and respiratory systems, to mention a few. Secondly, it encompasses the psychological domain, the motivating of oneself despite other factors to exercise regularly. It is more probable that it is the factors within the psychological domain rather than any discomforts that the physical domain may produce (for example: sore or aching muscles) which hinders people from participating in regular exercise programs.

When one thinks of the domain of psychology, one of the first areas considered is that of the personality or temperament of a person--temperament being those aspects of a person's personality which are inherited. It would seem therefore that in order to increase a person's participation in a regular exercise program it would appear logical to understand how temperament relates to participation in physical activities.

While there have been a number of studies relating personality to various aspects of physical activity (Weber, 1952; Harris, 1957; Tillman, 1965; Hammer & Wilmore, 1973; Young & Ismail, 1976), there have been no studies attempting

to relate the four Greek temperaments to physical activity. Therefore, due to the lack of knowledge of the relation of physical activity to temperament, it was the purpose of this study to investigate the extent to which each of the four temperament types has an influence on the amount and intensity of leisure-time physical activity a person performs.

Purpose of the Study

The purpose of this study was to determine what relationship exists between a person's temperament type and the amount of physical activity he/she performs. The physical activity was determined by an Activity Metabolic Index (AMI), which is determined by the product of the intensity code of a given activity and the duration of minutes that activity was performed that year. The AMI is taken from the Minnesota Leisure Time Activity questionnaire (Taylor, 1978).

Significance of the Study

The empirical information gained from this study could be used in the growing number of life-style fitness-oriented classes across the country. The information gained could be significant in the following aspects.

1. It could help the leaders and/or teachers of these classes to better understand how their clientel's temperament affects the amount of leisure-time physical activity in which they participate.

2. It could help the leaders and/or teachers of these classes to better understand how certain temperaments are more prone to participate in certain intensities of activities.

3. With the knowledge of the first two aspects, this could help the leaders and/or teachers to design a more progressive program for each of their clientele, based upon the clientele's temperament.

4. The information gained may also help to make the goals of the fitness program more realistic for each person, or even help to readjust the goals.

Basic Assumptions

In this study it was assumed that:

1. Most people have a desire to improve their fitness level, even if at the present time they appear to be doing nothing about it.

2. The participants gave honest answers to both the "Temperament Inventory" and to the "Minnesota Leisure Time Activities" questionnaires.

Null Hypothesis to Be Tested

The following null hypothesis was presented:

The sex of an individual and the four temperaments as measured by the "Temperament Inventory" are not significantly correlated with the AMI (Activity Metabolic Index).

Delimitations

The delimitations of this study are summarized as follows:

1. Due to practical considerations, the population of this study was confined to college students.
2. This study was delimited to college students attending Andrews University, Berrien Springs, Michigan. Therefore any conclusions of this study can only be applicable in situations relevant to this population.

Limitations of the Study

The limitations of the study are summarized as follows:

1. This was a correlational study and therefore does not prove causation. However it may be useful in attempting to solve the problem.
2. The leisure-time physical activity performed by the individual must have been done in the last twelve months.
3. A limitation of this ex-post facto study was that the students were an intact group attending Andrews University. Therefore the results were determined to some extent by the self-selection of these students who attend Andrews University.

Definition of the Terms

Leisure-Time Physical Activities are the physical activities which an individual participates in outside of

his or her working environment. These physical activities are broken down into nine major sections by the Minnesota Leisure-Time Activity questionnaire. These are: (1) walking and miscellaneous, (2) conditioning exercise, (3) water activities, (4) winter activities, (5) sports, (6) lawn and garden activities, (7) home repair activities, (8) fishing and hunting, and (9) other.

Activity Metabolic Index (AMI). Formula: $AMI = I \times D$. In this formula (D) equals the duration of minutes for that activity for the year. (I) is the intensity code of the activity. "Intensity codes are based on experimentation in which rates of oxygen consumption (VO_2) were measured while people performed various activities" (Taylor, 1978).

Temperament is the inherited part of a person's personality. It remains basically stable throughout a person's life and affects almost every aspect of that person's life. In this study the temperament was based upon the four temperament theory. The melancholic and phlegmatic are the predominantly introverted and the sanguine and choleric are predominantly extroverted. The test used in this study gives scores on all four of the temperament scales since the behaviors and traits of a given temperament type can be modified or changed depending upon the secondary temperament(s) (Cruise & Blitchington, 1979).

Choleric traits are those most often associated (but not necessarily always) with the choleric temperament type: (a) bold, (b) aggressive, (c) insensitive, and (d) energetic (Cruise & Blitchington, 1979).

Sanguine traits are those most often associated (but not necessarily always) with the sanguine temperament type: (a) sociable and outgoing, (b) distractible, (c) scatterbrained and unorganized, and (d) cheerful and care-free (Cruise & Blitchington, 1979).

Melancholy are those traits most often associated (but not necessarily always) with the melancholy temperament type: (a) anxious and emotional, (b) creative, (c) conscientious and perfectionistic, and (d) moody and sensitive (Cruise & Blitchington, 1979).

Phlegmatic are those traits most often associated (but not necessarily always) with the phlegmatic temperament type: (a) calm and easygoing, (b) tactful and diplomatic, (c) bland, and (d) flexible (Cruise & Blitchington, 1979).

Outline of the Thesis

Chapter I was an introductory chapter to the study. It included the background of the study, the statement of the problem, the purpose of the study, the significance of the study, the basic assumptions, the null hypothesis to be tested, the delimitations of the study, the limitations of the study, and a definition of the terms.

Chapter II reviews the relevant literature and research on the subject of temperament (in most studies the term "personality" is used) and physical activity.

Chapter III outlines the methodology, research tools, procedures as well as the method of analysis to be used in this study.

Chapter IV gives an analysis of the data with statistical information for the hypothesis.

Chapter V presents the conclusions, implications, and suggested recommendations for further research.

CHAPTER II

REVIEW OF THE LITERATURE

No studies were found in the literature relating the four temperament types to the amount of leisure-time physical activity performed. Personality has, however, been studied as it relates to physical fitness. Therefore, since temperament is the inherited part of a person's personality, those studies relating personality characteristics to physical fitness are cited. The studies that are cited in this chapter are divided into two groups:

1. Correlation or ex post facto studies: those studies which relate personality characteristics to physical fitness.

2. Experimental studies: those studies that measure a subject's personality characteristics before and after a physical fitness program.

Correlation or Ex Post Facto Studies

A study by Weber (1952) on 246 freshman men examined the relationship between physical fitness and personality traits. The personality scores were measured by the Minnesota Multiphasic Personality Inventory. Weber found no significant relationship between physical fitness and the nine scores of the MMPI. Therefore, according to

the results of this study the physically fit have no more stable personality traits than do the non-physically fit.

Harris (1957) compared physical performance and psychological traits of college women of high and low fitness groups. The psychological traits were measured by the Edwards Personal Preference Schedule. Anxiety was measured by Taylor's Manifest Anxiety Scale. No significant difference was found between the high and low fitness groups on the anxiety scale. But the high fitness group scored significantly higher on the personality variables of interception and endurance. Interception "purports to measure how one analyzes one's motives, observes others, and how to put one's self in another's place" (p. 56).

Harris (1965) studied psychological characteristics of university women with high and low fitness ratings. There were no significant differences found in personality traits between women in the high and low fitness groups. However significant differences were found within the groups.

Those individuals scoring lowest on physical fitness demonstrated more feelings of inferiority and insecurity than the high fit group. Those individuals within the low fit group who scored higher on fitness were more inclined to do their best, to be successful, and to accomplish tasks requiring skill and effort (Harris, 1965).

Wilson (1967) compared health status, personality traits, and academic achievement to high and low physical fitness. He used case studies of twenty freshman men at

the University of Oregon. To assess the personality traits he used the California Psychological Inventory. Wilson found in his comparison of personality traits to physical fitness that "in general the mean of the two groups were too close to warrant inference of significant differences in personality from a social interaction point of view" (p. 153).

Bowles (1968) studied 200 college freshman to determine the relationship between social adjustment and physical fitness. He found a low negative relationship, or none at all, between social adjustment and physical fitness.

McClenney's (1969) primary purpose was to determine if there are any significant psychological differences between college men with high fitness and those with low fitness. The interaction of F-ratios was not significant for relationships between physical fitness and either the academic aptitude or self-concept scales. Therefore the null hypotheses had to be retained for each. Only two significant interactions were found in relating physical fitness to personality characteristics, based on the 16PF. Highly fit subjects tended to be more group dependent and more trusting than low fit subjects. The main overall conclusion is that there is no significant difference in the relationship of high and low fitness groups to psychological traits as measured by the 16PF.

Hart (1974) studied the relationship between

personality traits of 257 female volunteers and expressed attitudes towards physical activity. The second aspect of the study was to determine if there were any differences between the personality traits and expressed attitudes of the three groups she used. The women came from one of three different groups: (a) physical fitness service courses, (b) intermural participants, and (c) intercollegiate athletic participants. With use of the Pearson r correlation of coefficient it was determined that in general there was no personality profile for women who participated in either intermurals, intercollegiate athletics, or service courses. The Fisher z_r transformation determined that in general there were no patterns or differences in the personality-attitude relationships among women in the various groups.

Hartung and Farge (1977) compared the psychological and physiological traits of middle-aged runners and joggers to that of other groups. Two age groups were used, the younger age group consisted of 40-49 year olds and the older age group consisted of 50-59 year olds. The Cattell 16PF Questionnaire was used to assess the personality traits. The researchers found one significant difference ($p < .01$) between those who had run marathons and those who had not: Those who had run marathons were higher on the Factor M, indicating them to be more imaginative. Between the age groups, only on Factor Q_2 , indicating self-sufficiency, was the younger group higher ($p = .09$).

The sample was significantly different on 7 Factors on the 16PF from the overall population. On Factor A the sample was lower, meaning more reserved or aloof; on Factor B they were higher, meaning high in intelligence and fast thinking; on Factor F they were lower, meaning more sober or serious; on Factor H they were lower, meaning more shy or withdrawn; on Factor M they were higher, meaning more strength of imagination; on Factor N they were lower, meaning more forthright and genuine but socially clumsy; on factor Q₂ they were higher, indicating self-sufficiency. "Runners apparently either possess or develop high levels of self-sufficiency and imagination, along with the intelligence to foresee the positive benefits of their activity" (p. 547).

Renfrow and Bolton (1979) compared personality functioning, based on the Cattell 16PF, of active and inactive adult males. In this ex post facto study, the two groups were different on six of the primary factors. On Factors A, G, and N, the active group was lower, indicating them to be more reserved, expediant, and forthright, respectively. On Factors L, Q₁, and Q₂, the active group was higher, indicating them to be more suspicious, liberal, and self-sufficient, respectively. Significant differences were also found on four of the secondary patterns. Here the active group was found to be less discreet, lower in superego strength, more alert, and more independent.

Experimental Studies

Tillman (1965) examined the relationship between physical fitness and personality characteristics, based on the following tests: the A-S Reaction Study of Allport, the Cattell 16PF Questionnaire, and the Kuder Preference Record - Form C. The first portion of the study examined the personality traits of junior and senior high school boys who were high and low in fitness. The second portion of the study took boys with low fitness and divided them into an experimental group and a control group. After a nine-month physical fitness program, the experimental group was compared to the control group using the personality tests. He found that on the A-S Reaction Study that the more physically fit group had a significantly higher rating of ascendance. On the 16PF the higher physically fit group appeared more surgent (Factor F), to have greater social dependence (Factor Q_2), and to be less tense (Factor Q_4). On the Kuder Preference Record - Form C, the lower physically fit group scored significantly higher on the computational, musical, and clerical scores, while the higher fit group preferred outdoor activities, had higher scientific and mechanical scores, and had more of a social service interest. A comparison of the experimental and control groups showed:

The experimental group mean change (-1.81) on the clerical score of the Kuder Preference Record Form C differed significantly from the mean change (2.29) of the control group on the same score. A high score denotes interest. This was the only

personality item of the three tests on which there was a significant difference (p. 487).

Calandra (1971) examined the relationship between selected traits of cardiovascular fitness and selected personality traits. He also studied the effect of alteration of cardiovascular fitness, and the modifications it would produce, on personality traits. The personality traits were measured by the Guilford-Zimmerman Temperament Survey. The personality traits measured were "General Activity, Restraint, Ascendence, Sociability, Emotional Stability, Objectivity, Thoughtfulness, Personal Relations, and Masculinity" (p. 3777-A). The experimental group participated in a circuit training program for eight weeks. Calandra found no significant differences between the relationship of selected traits of cardiovascular fitness and selected traits of personality. He also found that while the circuit training program did increase cardiovascular fitness it did not modify the selected traits of personality.

Collingwood (1972) studied twenty-five matched male rehabilitation clients. The experimental group participated in a four-week physical training program. He then assessed the effect the training program had on the groups' personal attitudes and physical, intellectual, and emotional behaviors. The experimental group showed greater significant changes in the following over the matched control group: "in physical fitness performance, body attitude,

positive self-attitude, self-acceptance and emotional-interpersonal behaviors" (p. 585).

A study by Hammer and Wilmore (1973) attempted to correlate personality traits with physiological alterations that occurred during a ten-week jogging program to determine the differences in "Hi-Lo" fitness groups and "Hi-Lo" anxiety groups when compared to psychological variables and to determine if age was a factor, when comparing the physiological and psychological traits and physiological alterations. The Cattell 16PF Questionnaire and the Taylor Manifest Anxiety Scale were used on the fifty-three subjects to assess personality traits and anxiety, respectively. While a number of correlations between the various psychological variables and physiological variables were found to be significant they were relatively low.

In conclusion, concerning the results of this study, it may be stated that anxiety is related to greater physiological responsiveness in Hi-Fit groups, and negatively correlated to ego strength. In Lo-Fit groups, aggressiveness is correlated with anxiety and negatively related to conscientiousness. Emotional stability and anxiety are generally negatively related. Age was not a factor when considering the relationships of psychological traits and physiological alterations (p. 245).

Mayo (1974) examined seventh- and eighth-grade girls and selected personality characteristics before and after one of the following programs for a semester; (a) an aerobic program, (b) an anaerobic conditioning program. The Cattell Jr.-Sr. High School Personality Questionnaire

and the Personal Contact Scale were used to assess the personality characteristics. The Treatment group (aerobic) and the Comparison group (anaerobic) ran for twenty minutes. The twenty girls who went the farthest were designated as "high fitness" while the twenty girls who were the slowest were designated "low-fitness." By the use of chi-square, analysis of variance, and analysis of covariance no significant differences were obtained between the "high-fitness" and "low-fitness" groups as measured by the Cattell Jr.-Sr. High School Personality Questionnaire or the Personal Contact Scale.

Buccola and Stone (1975) examined the effects of a fourteen-week program of either walk-jogging or cycling on physiological and personality variables in aged men. The men were volunteers and ranged from sixty to seventy-nine years old. The personality variables were measured by the Cattell 16 Personality Factor Questionnaire. After the fourteen-week training program the cyclers showed no significant personality changes, the walk-joggers, however, were less surgent and more self-sufficient ($p < .05$). Following the training program comparisons between the cyclers and walk-joggers found cyclers to be more surgent and tough-minded than joggers ($p < .02$).

A study by Sharp and Reilley (1975) examined the relationship between physical fitness and selected personality traits. The traits were assessed by the Minnesota Multitphasic Personality Inventory. The second part of

the study was designed to determine if a change in the physical fitness would change personality traits in college males. The results indicated that physical fitness scores are related to certain selected personality traits. It was also found that subjects who scored the highest on the aerobic test gained the most psychologically but the least physically. While the subjects who scored lowest on the aerobic test gained the least psychologically but the most physically.

Young and Ismail (1976) conducted a study on personality differences of high and low fit individuals of different age groups, and the effect of a four-month fitness program on personality characteristics. Personality was assessed by the Cattell 16PF Questionnaire, the Eysenck Personality Inventory (Introversion/Extraversion, Neuroticism/Stability), and the anxiety scale of the Multiple Affect Adjective Check List. Young and Ismail found that the young group was more out-going and extraverted than the old group; this however may be the effect of aging on the central nervous system. The high-fit group scored higher on Factor Q_2 (indicating self-sufficiency) on the post test than at the pretest. The subjects scored higher on Factor Q_3 (indicating controlled, persistent, and socially precise) at the post test than at the pretest. Significant differences for age groups were found, the high-fit young scored higher on Factor E (indicating dominance and aggressiveness) than the high-fit old, and

the low-fit young scored higher on Factor G (indicating superego strength) than the low-fit old--this was especially true at the end of the program. Ranked by fitness it was found that the high-fit group was more unconventional, composed (Phlegmatic), secure, easygoing, emotionally stable, adventurous, and intellectually inclined (Factors M, Q₄, O, I, C, H, and B, respectively). While personality differences are quite distinct between fitness groups, to make personality changes in low-fit individuals during a four-month fitness program is less clear.

Tharp and Schlegelmilch (1977) examined the difference in personality characteristics of trained and non-trained individuals. They also examined the effect of a ten-week exercise program on changing personality characteristics. Using the 16PF Questionnaire to assess personality characteristics, analysis of the data showed significant differences in five traits between trained and non-trained individuals. Trained individuals scored different on Factor B, indicating they were brighter. In this study it could have measured concrete vs. abstract thinking, Factor C, indicating they were more stable emotionally; Factor G, indicating more conscientiousness; Factor O, indicating more confidence or self-assurance; and Factor Q₄, indicating more composure or a higher state of relaxation. It cannot be claimed that exercise alone produced these personality differences, since at least three of these factors change with age (Factors G, O, and

Q₄). It therefore appears that age is a more important difference in the personality traits of trained and non-trained individuals than exercise. There was no significant differences between individuals' personality traits after the ten-week training program.

Young and Ismail (1977) compared selected personality and physiological measures of regular and nonregular adult exercisers over a four-year period. The personality variables were measured by the Cattell 16PF Questionnaire. The data of the pre- and post tests were analyzed by the ANOVA technique. Three groups were used in this study: (a) those who were regularly active before and after 1971; (b) those who were inactive before 1971, took one semester of the program, and then became inactive again; and (c) those who were inactive before 1971, took the program, and continued to be active the remainder of the four years. At both tests the regularly active group scored significantly lower on Factor O, indicating confidence and emotional stability. In 1971 the regularly active group differed significantly on Factor Q₁, dealing with liberalism, from the group that was inactive but would become regularly active. This convert group was more conservative of temperament while the regularly active tended toward liberalism. In 1975 the regularly active group scored significantly higher than the other two groups on Factor O, indicating that there is a relationship between physical fitness and emotional stability. However,

there were no significant differences at this time between the three groups on Factor Q_1 . It may be argued that physical fitness may modify certain personality measures, however these personality traits are less likely to have a biochemical basis

McNamara (1978) compared over a ten-week period the effects of three conditioning programs--(a) the Army's Physical Readiness Training program, (b) the Calisthenics program, and (c) the Weight Training program-- to selected psychological and physical variables on male and female college students. The psychological variables included self-concept, assertiveness, anxiety, and locus of control. According to the data there were positive effects as a result of the training program (irrespective of the type of training program) on both the psychological and physical variables. The trainees had a better self-concept, were more assertive, and less anxious after the training program than before. While there was some significant difference in the effect the type of training program had on physical variables, there was none on the effect of the type of training program to psychological variables.

Conclusions of the Review of Literature

While most of the studies showed little or no significant differences between physical fitness and personality traits (Weber, 1952; Wilson, 1967; Bowles, 1968; Calandra, 1971), there were some studies that showed

significant differences between those in high fitness or active groups and those in low fitness or inactive groups in some of their personality traits (Hartung & Farge, 1977; Renfrow & Bolton, 1979; Collingwood, 1972; Young & Ismail, 1976).

Hartung and Farge (1977) found runners and joggers to be significantly different in the following personality traits: (a) they were higher in intelligence and fast thinking, (b) more sober or serious, (c) more reserved or aloof, (d) more shy or withdrawn, (e) more forthright and genuine but socially clumsy, (f) more self-sufficient, and (g) more strength of imagination from the overall population.

Renfrow and Bolton (1979) found the active group more reserved, expedient, forthright, suspicious, liberal, and self-sufficient than the inactive group. Also four secondary patterns were found, the active group was found to be less discreet, lower in superego strength, more alert, and more independent.

Collingwood (1972) found that an experimental group, which had participated in a four-week physical training program, showed greater significant changes over the matched group in positive self-attitude, self-acceptance, and emotional-interpersonal behaviors.

Young and Ismail (1976) found the high-fit group to be more unconventional, composed (phlegmatic), secure,

easygoing, emotionally stable, adventurous, and intellectually inclined.

Since the studies cited above show some differences between a subject's physical-fitness category and certain personality traits, it would appear plausible that there are some differences between a subject's temperament and the amount of physical activity he or she would perform. Since the major portion of variance between the personality traits can be broken down into introversion/extroversion and high/low neuroticism, therefore the following null hypothesis is presented:

The sex of an individual and the four temperaments as measured by the "Temperament Inventory" are not significantly correlated with the AMI (Activity Metabolic Index).

CHAPTER III

RESEARCH DESIGN

This chapter sets forth the research design used in determining the relationship of temperament to leisure-time physical activity. An ex post facto research design was used to determine the relationship. The study attempted to determine the patterns which arise between each of the temperament types and leisure-time physical activity, as based on the total classification of the AMI.

Null Hypothesis

This study has examined the following null hypothesis:

The sex of an individual and the four temperaments as measured by the "Temperament Inventory" are not significantly correlated with the AMI (Activity Metabolic Index).

Population and Sample

This study was concerned only with college students. A sample of two hundred subjects was randomly selected from Andrews University, during the 1979-1980 school year, and of this sample 193 responded to the questionnaire.

Andrews University has a large number of international students. The university is also operated by the Seventh-day Adventist church, and therefore holds conservative Christian beliefs. Because of these two factors some of the leisure-time physical activities may show patterns different from those which might be found if the study were conducted elsewhere.

Research Tools

Temperament Inventory. The Temperament Inventory was used to determine a person's score on each of the four temperament types. The score for each temperament type lay somewhere between 0 and 100 percent. A percentile score tells a subject where he or she lies within the sample population. For example, a score of 50 percent would tell the subject that half of the population is below him or her in that characteristic, while the other half of the sample population lies above him or her in that characteristic.

The Temperament Inventory contains eighty yes-no questions and takes approximately twenty minutes to complete. A definition of each of the four Greek temperament types is given in chapter 1. The test has a reliability of .86 for phlegmatics, .98 for sanguines, .95 for choleric, and .83 for melancholies (Cruise, Blitchington, & Fatcher, forthcoming).

The Temperament Inventory was chosen because it

gives a specific percentile score for each of the temperament types, and because of its ease of administration. A copy of the Temperament Inventory is in appendix A.

Minnesota Leisure Time Activity Questionnaire.

The Minnesota LTA was used to determine the intensity of physical activity broken down into four categories: Total, heavy, moderate, and light. Because of the use of stepwise multiple regression only the AMI total category was used. The test consists of a structured interview, with a trained interviewer, and it takes approximately twenty minutes to complete. A copy of both the questionnaire and a short overview of the interview is given in appendix B.

With the Minnesota LTA questionnaire comes a step-by-step procedure for administering the interview in a standardized manner. While the intensity codes and physical activities used in this questionnaire are based predominantly on middle-aged, middle class American men, the format can be useful in other populations, except those of young children and the elderly (Taylor et al., 1978).

The questionnaire has been partially validated by several studies. It should be noted that the questionnaire was developed to test

. . . the hypothesis that exercise sufficient to produce a conditioning effect on the cardiovascular system is a mechanism of protection against coronary heart disease, either directly or through alteration of other risk factors (Taylor et al., 1978).

This inventory was chosen because of the large number of leisure-time physical activities it contains, and the intensity codes and measurements it provides.

Procedures

A copy of the Temperament Inventory and the Minnesota LTA was distributed to each of two hundred subjects, of which 193 participated. Each subject was required to do two things: (1) complete a copy of the Temperament Inventory and (2) have an interview with the researcher during which time it would be determined how much leisure-time physical activities they had performed during the last year, based on the Minnesota LTA questionnaire.

During the interview the Minnesota LTA was filled out by the interviewer. When the data was all received it was statistically analyzed by stepwise multiple regression to determine the relationship between temperament type and physical activity, as determined by total AMI.

Statistical Analysis

This study was statistically analyzed in the following manner:

To test the null hypotheses stepwise multiple regression was used, with the four Temperament Inventory variables and sex as the independent variables and total AMI as the dependent variable.

CHAPTER IV

ANALYSIS OF THE DATA

The purpose of this chapter is to present the data and statistical analysis of the sex and temperament scores of the subjects in their relationship to leisure-time physical activities. In this study the leisure-time physical activities are represented by total AMI (Activity Metabolic Index) obtained on the Minnesota Leisure Time Activities questionnaire. This test yields four scores; however, only the total score which is a combination of the first three scores was used. All leisure-time physical activities, regardless of the amount of time participated in that year, were combined to make up the total score.

The Temperament Inventory was used to determine a subject's temperament. This inventory is divided into four major divisions: Phlegmatic, sanguine, choleric, and melancholy. Each division has a percentile score, indicating the percentage of the sample population that subject scored above.

The stepwise multiple regression procedure was used to obtain the correlation coefficients between the independent variables of sex and temperament and the dependent variable of total AMI.

Analysis of the Statistically Significant Data

Table 1 is a presentation of the summary of the stepwise multiple regression program. The results indicate that only the sex of an individual and the temperament "sanguine" were statistically significant at the .01 level. Table 1 shows only the independent variables of sex and "sanguine" because an F-level for deletion was set at 1,000. After sex and "sanguine" were entered into the stepwise multiple regression procedure, "choleric", with the next highest F to enter, was only 1.6910, which made the F-level or tolerance insufficient for further computation.

TABLE I

SUMMARY OF STEPWISE REGRESSION PROGRAM
WITH THREE VARIABLES DELETED

Step Number	Variable Entered	F Ratio	Multiple Correlation Coefficient	Proportion of Variance Explained
1	Sex	9.087	0.213	0.045**
2	Sanguine	5.878	.241	.013**

** Significant at the .01 level

Table 1 shows that only the independent variables of sex and "sanguine" were entered. The R squared between sex and AMI score was .0454. This means that approximately 4.5 percent of the variance in AMI is due to the sex of the individual. By looking at the correlation matrix

shown in table 2 it will be noticed that there is a negative correlation between sex and AMI, therefore this indicates that a male will have a higher AMI predicted score, based on the regression equation (in this study male - 1, female - 2; X2 equals "sanguine" score).

$$Y' = 154601.46 - 43424.57X_1 - 453.29X_2$$

Step number 2 shows the entering of the temperament sanguine. This brings the combined R squared up to .0583, which means that sex and "sanguine" explain approximately 6 percent of the variance in the AMI score. However in the "Proportion of Variance Explained" column, when the variable sex is controlled, "sanguine" explains only a little over 1 percent of the variance. While both sex and the sanguine temperament were found statistically significant in this study, it is of little practical value in explaining the variance of the AMI scores, approximately 6 percent.

TABLE 2

CORRELATION MATRIX FOR THE SIX VARIABLES

Variable	A	B	C	D	E	F
A - Sex	1.000	-.159	.021	.046	-.013	-.213
B - Phlegmatic	-.159	1.000	.152	.154	-.665	.066
C - Sanguine	.021	.152	1.000	.117	-.318	.109
D - Choleric	.046	.154	.117	1.000	-.237	.094
E - Melancholy	-.013	-.665	-.318	-.237	1.000	-.039
F - Total AMI	-.213	.066	.109	.094	-.039	1.000

Analysis of the Correlation Matrix

While those variables which were significant were analyzed in the beginning of this chapter, there is a trend which can be noticed and applied only to this sample. There is a higher correlation between the extroverted temperaments, sanguine and choleric, to AMI than there is between the introverted temperaments, phlegmatic and melancholy, to the AMI in this sample. However this was not statistically significant and should not be inferred to other samples.

Summary of the Findings

The null hypothesis tested was:

The sex of an individual and the four temperaments as measured by the "Temperament Inventory" are not significantly correlated with the AMI (Activity Metabolic Index).

The null hypothesis was rejected at the .01 level, and found only to be statistically significant for sex and for the sanguine temperament. Sex accounted for approximately 4.5 percent of the variance, and "sanguine" accounted for a little over 1 percent of the variance; together they explained approximately 6 percent of the variance.

CHAPTER V

CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

Conclusions and Discussion

The purpose of this study as stated in chapter 1 was to determine if there is a relationship between a temperament and the amount of leisure-time physical activity performed. Sex was also used as an independent variable.

The data analyzed in chapter 4 indicates there is a significant relationship between an individual's sex and the temperament sanguine, and the amount of leisure-time physical activity performed; with the use of stepwise multiple regression it was determined that when the variable sex was entered it was statistically significant, $p < .01$; this accounted for about 4.5 percent of the variance. When the variable "sanguine" was entered, sanguine temperament and sex were statistically significant, $p < .01$; together they accounted for approximately 6 percent of the variance.

While two of the independent variables were statistically significant, it cannot be inferred that they are of great practical benefit in determining the dependent variable, AMI. In this case together they only accounted for approximately 6 percent of the variance. This

probably will not be of much practical use in determining the predisposing factors of why some people do participate in regular exercise programs and others do not.

The significance of the variable sex is of interest. This indicates that males are more physically active in their leisure time than females. This could be due to differences in physical growth and development.

Other data indicate that, except in hands and forearms, girls and boys are similar in strength for a given body size and shape until puberty begins.

After adolescence, however, boys are much stronger, chiefly by virtue of having larger muscles, and partly, probably, by being able to develop more force per gram of muscle tissue. They also develop larger hearts and lungs relative to their size, a higher systolic blood pressure, a lower resting heart rate, a greater capacity for carrying oxygen in the blood, and a greater power for neutralizing the chemical products of muscular exercise such as lactic acid (Tanner, 1970).

As a result of these changes the athletic ability of boys increases adolescence. Girls lack the increase in hemoglobin and red cells, which is a result of action of the hormone testosterone (Tanner, 1970).

Therefore as a result of these anatomical and physiological changes at adolescence, one would speculate that males of college age do more physical activity in their leisure time than females. This hypothesis has been verified by this study.

Another possible reason for these sex differences could be the influence of culture. It has been more

accepted in this country for males to engage in physical activities, such as sports, than females. If this is the only factor, then the amount of variance sex explains should be expected to change as the view of society changes about accepting women in greater physical activity.

The significance of the F-ratio with the variables of sex and "sanguine" is also of interest. It should be remembered that sanguine temperaments are on the extroverted scale. This combined with their trait of becoming buoyant when placed in a group should help explain part of the reason. It would seem likely that through the avenue of sports and other physical activities they could obtain the stimulation they desire.

Recommendations

It is recommended that after the results of this research and that of other researchers (see chapter 2, "Review of the Literature") that the factors of personality and temperament should not be viewed as major predisposing factors as to why some individuals participate and others do not in a regular exercise program. The results of this avenue of research should have at least a general trend by now, and it appears that these factors are not as relevant as would be supposed.

It is recommended that further research be made to discover the predisposing factors of participation in regular exercise programs. It is recommended that other

possible predisposing factors could be activity levels of the subject's family and activity levels of his or her friends. It is possible that one or both of these factors may correlate significantly with the activity level of the individual.

APPENDIX A
TEMPERAMENT INVENTORY

Put your answers to this page in Column 1.

1. I succeed when some people fail, not because my plans are better, but because I keep pushing when they get discouraged and quit.
2. My calm, tranquil nature usually keeps me from getting upset in the face of external turmoil or stress.
3. I seem to be able to diagnose fairly accurately the obstacles and dangers of projects I am planning.
4. I'm annoyed by the enthusiasm of some people, and I guess I kind of needle them sometimes.
5. I usually allow other people to meet me, rather than pushing forward to meet them.
6. My leadership ability is more the result of drive and persistence than charisma.
7. I am not able to converse easily with other people, but I'm pretty good at sizing them up and analyzing them.
8. I frequently find myself arriving late for engagements and forgetting resolutions.
9. I am more the kind of person who is deeply loyal to the few friends I have than the kind of person who has a lot of friends.
10. I tend to be motivated by the crowd (or situation). If they are busy I get busy, if they aren't I'm not.
11. I am self-motivated. If something is there to be done, I can't be satisfied until I've completed it.
12. I usually prefer solitary activities, such as reading, to activities which involve other people.
13. I go over and over decisions after I make them, asking myself if I chose right.
14. I sometimes only halfheartedly help others because deep down inside I think I have a better plan and an easier way.
15. I tend to remember when people have insulted me and to think about it every now and then.
16. I really enjoy myself, and my attitude seems to be contagious to those around me.
17. In my introspection I tend to relive over and over again the events of the past.
18. I have a fairly keen mind and can usually plan worthwhile long-range projects.
19. I'd probably be more sociable if I weren't afraid people would reject me.
20. I like to be where there is something going on all the time.
21. It makes me gloomy when other people ignore or avoid me.
22. Some people say that I am a born leader because of my tendency to "take over."
23. I know where I want to go and I usually discipline myself to get there.
24. I have a tendency to hold grudges against people who are rude to me.
25. I tend to be emotional. Things arouse or upset me pretty easily.
26. It usually takes something drastic to get me excited or upset.
27. I have a rather even-tempered emotional response to things.

Go on to the next page.

Put your answers to this page in Column 2.

- 28. Sometimes when I see two people laughing, I wonder if they're laughing at me.
- 29. I have a pretty even disposition, not too many ups and downs.
- 30. My friends would describe me as relaxed and even-tempered.
- 31. I should have more self-confidence; I tend to under-estimate my abilities.
- 32. If a job needs to be done I do it regardless of how unpleasant it is.
- 33. I tend to reflect a good deal on my dreams, hopes, and aspirations.
- 34. I can put up with frustration without becoming depressed or angry.
- 35. I make new friends so easily that I tend to forget old friends.
- 36. I wouldn't mind belonging to several clubs at the same time.
- 37. I have a tendency to think gloomy, pessimistic thoughts.
- 38. I often have trouble finishing things that I've started.
- 39. In social situations, I am talkative and spontaneous.
- 40. I am usually uncomfortable in a group of people.
- 41. I enjoy people and just like to be around them.
- 42. I should probably be less moody and sensitive.
- 43. I have a somewhat defensive, touchy nature.
- 44. Sometimes I think about getting revenge for old wrongs.
- 45. Adversity just stimulates me to push a little harder.
- 46. I am somewhat serious and very deeply emotional.
- 47. I like to spend time planning things way ahead of time.
- 48. I have a warm spirit. I am lively and enjoy living.
- 49. By nature I seem to be a pretty good "peacemaker."
- 50. My friends consider me to be a tactful person.
- 51. I tend to be pretty tolerant of other people.
- 52. I am usually very well organized in my work.
- 53. When things go wrong I knuckle down and try harder.
- 54. I have a pretty good ability to get things done.

Go on to the next page.

Put your answers to this page in Column 3.

- 55. I am calm and relaxed, and rather unemotional.
- 56. I tend to get my feelings hurt fairly easily.
- 57. I see myself as a cheerful, sociable person.
- 58. I have a tendency to feel sorry for myself.
- 59. Socially, I am a pretty outgoing person.
- 60. A strong will is one of my best assets.
- 61. I usually have a good time at parties.
- 62. I usually make new friends easily.
- 63. My life is fast-paced and active.
- 64. I need to learn to worry less.
- 65. I tend to move and speak slowly and calmly.
- 66. I have a tendency to brood about things.
- 67. I tend to be a pretty easygoing person.
- 68. I usually finish whatever I begin.
- 69. I don't get upset very often.
- 70. I'm rarely at a loss for something to say.
- 71. I usually get a lot of fun out of life.
- 72. My friends would call me an extrovert.
- 73. I tend to analyze myself frequently.
- 74. Unfinished tasks really bother me.
- 75. I don't get ruffled easily.
- 76. I tend to be a hard, persistent worker.
- 77. I tend to resent people who oppose me.
- 78. I seldom get angry or overemotional.
- 79. I don't make friends very easily.
- 80. I should probably be less lazy.

APPENDIX B

MINNESOTA LEISURE TIME ACTIVITY QUESTIONNAIRE

APPENDIX
Notes for Interviewers Using
the Leisure Time Physical Activity Questionnaire

Interview technique

The administration of the physical activity questionnaire requires that special attention be paid to interviewing technique to limit bias in the data and to prevent the interview from becoming ponderous and irritating for both the participant and the interviewer. It is difficult for most people to remember what they did the previous year especially when it comes to an activity such as walking. Some participants tend to give up and do not try to make an estimate. Other participants take the task very seriously and try too hard dragging out the interview unnecessarily.

As an interviewer you should establish rapport during the introduction, perhaps exchanging a few pleasantries. Stressing the importance of the data can be achieved by emphasizing keywords. Instructions should be given in a slow, clear manner. From this point on you should take the initiative and set and maintain the pace in a very matter of fact way. Extraneous talk should be avoided. Though a participant should not be hurried, if he is spending undue time trying to recall detail, you should interrupt with 'Remember we're interested in an average or an estimate not an exact time' or 'In general what would you say?'

If a participant rambles you should politely cut in and remind him that you are interested in months and average times.

For any participant, challenge anything that seems exaggerated.

Example: A participant states that he swims one hour a week at the YMCA. Make sure that hour does not include changing time and socializing. In fact, the actual swimming time may be only 20 min.

If a participant states that he performs an activity more than 8 times a month (which would average twice a week) translate it into weeks to verify it.

Example: Participant states he plays softball 16 times a month. The interviewer should state 'on the average you play softball 4 times a week'.

If a participant says he does something during the summer months, do not assume which months he means. Probe 'Which months are you referring to?'

It is known that people tend to overestimate time spent at a particular activity. If a participant says '2 or 3 hours', record 2. If the range given is large, '5 to 10 times', ask that he try to be more specific.

If an activity is performed very frequently, 'number of times/month' may be a difficult time reference. Suggest that the participant think in terms of number of times/week.

If an outdoor activity is performed every month, probe 'Is your activity the same in summer as in winter?'

Expect that an average interview will last 10-20 min. Your goal is to get estimates as accurate as possible while maintaining a moderate to brisk, interesting pace. The more experience you get interviewing, the easier these techniques will be. Hearing tapes of your own interviews would be extremely helpful in developing style. Plan to interview and record at least six respondents (staff members are fine) as practice. Evaluate your style and how situations might have been handled differently—perhaps more information needed, an unchallenged questionable response, or a little faster pace, etc.

Sample introduction

Science does not yet have all the answers regarding the relationship between physical activity and coronary heart disease. It is *very important* that we collect physical activity data for each participant. We use this form and will ask you to make the *best estimate* you can in answering the questions.

Sample instruction

In this column we have listed different kinds of physical activities (*point*). In this column you checked whether you did or did not perform an activity in the last year. Is that right? So these activities with a check in the 'Yes' column (*point*) are activities which you performed sometime between now and last June (appropriate month). For each of these activities, I'd like you to tell me in which months you performed them (*point*), then I'd like the average number of times per month (*point*) and lastly the average time you spent at the activity each time you performed it.

Optional

For example, suppose you had checked backpacking. First you would give the months. Let's say July and August. Then you would tell me the average *number* of times per month. If it was once in July and 3 times in August, you would tell me twice. Then you would tell me the average *time* you spent at the activity *each time* you backpacked.

This may sound confusing but once we start a routine, it will be quite easy. (A positive attitude and manner here is very important!)

For the first one or two activities checked, you will have to go through the steps verbatim.

Example: 'You've checked that you've done backpacking. In which months did you backpack? What was the average number of times each month?', etc.

After this you should strive for word economy and just use words or phrases rather than entire sentences. Pointing with a pen helps.

Example: Sailing. Months? Average times per month? Time per occasion? Once the routine is well established, after starting the activity, a nod of the head and pointing with a pen should elicit a response.

Activities

Several activities will require special probing or clarifying comments for *each* participant, no matter how the first column has been checked. A definition has been written for each of the activities. You should be familiar with all of these. With the exception of the categories mentioned below, you need not define activities unless a participant has a question.

Four situations in which walking is done from point to point requiring *continuous* walking for 10 min or more are requested as separate items. Note that time of walking during working hours is not wanted except for long breaks such as lunch.

For using stairs instead of elevator, state 'For this *one* activity we will consider your choice of stairs over an elevator at any time, even during your work day'. Then probe in the routine manner.

If a participant has checked home exercise or health club, ask what the specific activities are and record data per instructions in the Definitions of Activities section.

Under home repair activities, state to *each* participant, 'Because of space limitations, we couldn't list all possible home activities. Can you think of any other major repair or maintenance job which you did last year?' (Note: under the definitions section are procedures for coding the home repair category.)

The lawn-mowing categories require some clarification. If a participant checks *walking behind a power mower*, state 'By this we mean a power mower which has to be pushed or a self-propelled mower'. If *pushing a hand mower* is checked, state 'By this we mean a mower which has no power.'

The following activities have constraints (see Definitions). If any of these activities are checked, probe to be sure the constraint has been met:

- Swimming
- Cross-country hiking
- Backpacking
- Bicycling
- Sailing

Standardized times for activities

To insure uniformity we will consider:

- 4 weeks in a month
- 48 work weeks per year
- 240 work days per year
- 22 work days per month
- 100 weekend days per year

Standard times have been established for the following activities:

- 1 flight stairs = $\frac{1}{2}$ min (round up to the nearest minute)
- 1 water ski ride = 5 min
- 1 bowling game or line = 10 min
- tennis single set = 20 min
- tennis doubles set = 30 min
- softball, 7 innings:
 - Pitcher or catcher = 20 min
 - Other players = 10 min
- softball, 9 innings:
 - Pitcher or catcher = 25 min
 - Other players = 15 min
- nine holes of golf = 1 hr, 30 min

For these activities the questioning format will change, i.e. do not ask how many minutes you spend on the stairs, ask the number of flights and translate into minutes using standard of $\frac{1}{2}$ min per flight, or how many holes of golf, etc.

Miscellaneous

If the participant has filled out the entire questionnaire, checking months, etc., it will be necessary to validate each activity by reading back to him the information he has put down. Question anything which looks out of the ordinary.

Definitions and comments on activities

Code	Title and comment
<i>Walking</i>	
010	<i>Walking for pleasure.</i> Since this is the most frequently reported activity, each man should be asked specifically about it.
015	<i>Walking to and from work.</i> Walking from the bus to work, or the parking lot, etc., may be included in this category if the walking is continuous for 10 or more minutes. Such walking may be repeated in the evening.
020	<i>Walking during work breaks.</i> Include only walking which is not connected with work, such as walks during lunch hour. Walking which is associated with customary performance of the occupation is not included.

- 030 *Voluntarily using stairs when elevator or escalator is available.* Ask specifically for the number of trips upstairs. Do not count walking downstairs; count $\frac{1}{2}$ min for each flight (a flight = one story).
- 040 *Cross-country hiking.* Walking continuously on flat or in hilly terrains without backpack for at least 2 hr. Ask for elapsed time and frequency and duration of rest periods and stops for eating. Finally estimate total time spent walking per occasion.
- 050 *Backpacking.* Defined as walking and carrying a pack weighing 20 lb or more containing for instance, gear and supplies for overnight camping. If the activity does not qualify, record time, etc., under 040. Discount stops for rest and eating, etc.
- 060 *Mountain climbing.* Walking trips in which the purpose is to reach a 'high point' which takes several hours or days to accomplish qualify as mountain climbing. No distinction between rock climbing or hill climbing is made. Ask subject to distinguish between actual climbing and rest stops, eating, sleeping, etc. Total time to include both up and down time.
- 115 *Bicycling.* To work and/or for pleasure. No distinction is made regarding the type of bicycle or the terrain. Ask for actual riding time. The rare individual who engages in medium and long distance racing should be reported under Other Activities under the title of *Competitive Bicycling*. Obtain data on practice sessions, include races as practice sessions.
- 125 *Dancing.* Ballroom and/or square dancing. Ask for time spent on dance floor.

Conditioning exercises

Setting up exercises, special routines for increasing flexibility or strength, running in place for roughly 3 min, carried out at home or in the health club should be reported under 'Home exercise' or 'Health club'.

On the other hand, if a participant concentrates his activities in one area such as jog-walk, jogging, running, weight lifting, do not report this under 'Home exercise' or 'Health club', but under the activity (180, 200, 210). If a participant goes to a YMCA for the sole purpose for playing a game of squash or other games listed in the section headed *Sports*, please list this activity under the specific game rather than under activities at 'Health club'.

If the company which employs the participant offers physical conditioning facilities and exercise routines on company time, these should be reported under 'Health club' or the particular activities listed above.

- 150 *Home exercise.* Ask what kind of exercise is done. Do not include items listed under other codes. Ask for time spent actually exercising.
- 160 *Health club.* Ask what kind of exercise is done at the club. Distinguish between visits for exercise classes and visits to engage in a single specific game (such as volleyball) or specific activity (such as swimming). Report specific activities below. Ask for total time spent in locker room, steam room, etc.
- 180 *Jogging-walking.* Ask for time spent in jogging and walking (most participants who do this will have a good estimate of the time).
- 200 *Running.* Ask for time spent running. 'Running' is defined as continuous running for at least 10 min, using full length strides. Shorter continuous activity is to be reported under jog-walk.
- 210 *Weight lifting.* Ask for time spent in the weight-lifting area. The type of weight lifting is not important for the purposes of this question.

Water activities

- 220 *Water skiing.* To obtain time per occasion ask for the total number of 'rides' per occasion. Multiply the number of rides or trips by 5 and record this as the total minutes of activity.
- 235 *Sailing.* Only those individuals who sail in racing competition are to be recorded here. Record the number of hours per occasion the participant is either racing or practising.
- 250 *Canoeing or rowing for pleasure.* Record the hours per occasion. Be sure the participant distinguishes riding in row boat from rowing.
- 260 *Canoeing or rowing in competition.* Ask for the number of months of training. Number of training sessions per month. Average time per training session.
- 270 *Canoeing on a camping trip.* Include the time paddling, whether bow or stern. Also included is associated activities such as portage, setting up camp, and maintaining camp.
- 280 *Swimming (at a pool).* Distinguish between time spent sitting in the sun by the side of the motel pool (drinking beer or bloody Marys?), time spent 'cooling off', and time spent actually swimming. Was the pool large enough to swim in? Athletic clubs and YMCAs have pools 50-75 ft in length. Verify.
- 295 *Swimming at the beach or lake.* Time spent in sitting on the beach or playing with waterball in 18 in of water is not wanted. Ask if participant swam out into deep water and how long was he swimming in water over his head? Do not include time spent snorkeling.
- 310 *Scuba diving.* Swimming under water while breathing oxygen from a tank strapped to back. Ask for time actually swimming under water.
- 320 *Snorkeling.* Swimming with a face mask and breathing tube. Ask for time in water with snorkel gear in place.

Winter activities

- 340 *Snow skiing downhill.* Ask for time spent actually skiing downhill. It may help to ask the participant to estimate the number of runs per occasion and roughly how long each run actually

took. Competitive downhill racing should be reported under 'Other activities' with the title Downhill Ski Racing.

- 350 *Cross-country skiing.* Ask the subject for the average amount of time spent cross-country skiing. If a respondent reports Snow Shoeing, that can also be recorded in this section of the form.
- 360 *Ice or roller skating.* Total time spent at rink, minus rest periods and socializing.
- 370 *Sledging or tobogganing.* Ask for time on the slope. Then how much time is spent walking uphill. Report time walking uphill. If mechanical transportation is provided for going back up the hill, do not report activity.

Sports

- 390 *Bowling.* Ask the participant 'How many games or lines do you bowl on an average night or occasion?' Multiply the number of games times 10. The answer is time per occasion in minutes.
- 400 *Volleyball.* Ask for and record time spent on court.
- 410 *Table tennis.* Ask for and record total time playing.
- 420 *Tennis singles.* Ask for number of sets. Multiply the number of sets by 20 min. The answer is playing time in minutes. For lessons and volleying, record court time.
- 430 *Tennis doubles.* Ask for number of sets. Multiply the number of sets by 15 min. Record the answer which is playing time in minutes.
- 440 *Softball.* Record the number of games. Ask for innings per game. 7 inning games are considered to last 1 hr. 30 min, 9 inning games 2 hr.
- 450 *Badminton.* Record court time. Report tournament play in Section I under the heading of Competitive Badminton activities.
- 460 *Paddleball.* Record court time.
- 470 *Racketball.* Record court time.
- 480 *Basketball.* Record court time.
- 490 *Basketball game play.* Record court time.
- 500 *Basketball officiating.* Record court time.
- 510 *Touch football.* Record time of game.
- 520 *Handball.* Record court time.
- 530 *Squash.* Record court time.
- 540 *Soccer.* Record total playing time.

Golf

Identify the method of carrying clubs. Players who employ a caddy can be reported under code 80. Ask for the number of holes played. Count $1\frac{1}{2}$ hr for every nine holes played.

- 070 Riding a power cart.
- 080 Walking, pulling clubs in cart.
- 090 Walking and carrying clubs.

Lawn and Garden Activities

- 550 *Mowing lawn. Riding a power mower.* Ask for average time to cut lawn. Inquire regarding coffee, coke (or beer?), or rest breaks. Adjust time accordingly.
- 560 *Mowing lawn. Walking behind a power mower.* This classification includes mowers with power applied to cutting blades only and also includes mowers with power applied to wheels and cutting blades. Record time to cut lawn with due regard to rest time.
- 570 *Mowing lawn. Pushing hand mower.* Record time with due regard to rest time.
- 580 *Weeding and cultivation of garden.* This item includes all activities needed to maintain an already planted garden. It can be done several times over the gardening season. Ask the subject to estimate the amount of time it takes with due regard for rest breaks.
- 590 *Spading, digging, filling in garden.* This item refers to the activities needed to prepare a garden for planting. It is usually done only in the spring, and so should not be checked for consecutive months. Ask the subject to estimate the time needed with due regard for rest time.
- 600 *Raking lawn.* Record the time spent raking with due regard for rest time.
- 610 *Snow shoveling by hand.* By checking with the local office of the National Weather Bureau, the Minnesota Center established a snow shoveling rate of 4-6 times per month (for the winter of 1976-7). The criteria used for snow that required shoveling, was at least 1 in snowfall within 48 hr. If the subject gives an estimate beyond the 6 times a month limit, he is questioned further to make sure that estimate is valid. It is suggested that each center where snow shoveling would be reported check with their branch of the Weather Bureau and determine a standard to be used.

Home repair activities

This section uses a limited number of specified activities to cover a large cluster of related activities. In the definition of activities given below, various other home repair activities are listed in addition to the principal heading. A good many home repair projects require from a half to several days of work.

Such activities may be confined to a relatively short portion of the year. To simplify recording it is proposed that all such activities be recorded in one month, usually the vacation period. Days to complete the task should be cumulated, using 8 hr for one day. For example, Mr. Jones rebuilt a porch during his vacation (August) in 8 half-days of work and then built a brick wall spending 3-5 hr on Saturdays for 10 weekends (September-November). To compute number of days in these activities, assume 4 hr per occasion in building the brick wall. There are then 18 half-days which may be recorded under code 640 as nine occasions in August with 8 hr per occasion.

- 620 *Carpentry in work shop.* Construction of furniture or comparable objects using hand held or power tools or repair of storm windows or screens or minor repairs inside the house can be included under this code. Record cumulative time spent in shop or doing minor repairs.
- 630 *Painting inside of house or wallpaper hanging.* Waxing floors, laying tile, installing or repairing plumbing, installing or repairing interior electric lines may be included under this code. Record time spent performing the task.
- 640 *Carpentry outside of house.* Building porches, garages, car ports, fences, etc., laying brick on walls or patios may be included under this code. Report cumulative time necessary to finish the job or jobs.
- 650 *Painting outside of house.* Painting outside of house, jobs which require ladders, changing storm windows and screens, washing windows, mixing and pouring cement, laying cement blocks and digging trenches for foundations may be included under this code. Report cumulative time necessary to complete one or more tasks.

Fishing and Hunting

- 660 *Fishing from river bank.* Record time (hours) spent on river bank.
- 670 *Fishing in stream with wading boots.* Record time (hours) spent actually fishing.
- 680 *Hunting pheasants or grouse.* Ask for time (hours) walking through cornfields (for pheasants) or through the woods (for grouse); pool time for both activities.
- 690 *Hunting rabbits, prairie chickens, squirrels and raccoon.* Ask for time (hours) spent in the field looking for game.
- 710 *Hunting large game—deer, elk, bear.* Record days spent in the field.

Other Activities

There will be the occasional individual who has spent a large amount of time on an activity that is not referred to here. If this time adds up to 8 hr during the year, record under other activities, asking the participant to give a name describing this activity.

BIBLIOGRAPHY

- Bowles, Robert W. "The Relationship between Physical Fitness and Social Adjustment of Male College Students." M.S. thesis, North Carolina College, 1968.
- Buccola, Victor A., and Stone, William J. "Effects of Jogging and Cycling Programs on Physiological and Personality Variables in Aged Men." The Research Quarterly 45, no. 2 (1975):134-139.
- Bucher, Charles A. Foundations of Physical Education. 7th ed. Saint Louis: C. V. Mosby Company, 1975.
- Buss, Arnold H., and Plomin, Robert. A Temperament Theory of Personality Development. New York: John Wiley & Sons, 1975.
- Calandra, Gerald N. "Relationships among Selected Traits of Cardiovascular Fitness and Selected Traits of Personality." Dissertation Abstracts International 32(7-A) (January 1972):3777.
- Collingwood, Thomas R. "The Effects of Physical Training upon Behavior and Self Attitudes." Journal of Clinical Psychology 28 (October 1972):583-585.
- Cruise, Robert J., and Blitchington, Peter. Understanding Your Temperament. Berrien Springs, Michigan: Andrews University Press, 1979.
- Cruise, Robert J.; Blitchington, Peter.; and Futcher, W. G. A. "Temperament Inventory an Instrument to Empirically Verify the Four-Factor Hypothesis." forthcoming.
- Hammer, W. M., and Wilmore, Jack H. "An exploratory Investigation in Personality Measures and Physiological Alterations during a 10-week Jogging Program." Journal of Sports Medicine 13 (1973)·238 347.
- Harris, Dorothy V. "A Comparison of Physical Performance and Psychological Traits of College Women with High and Low Fitness Indices." M.Ed. thesis, University of North Carolina, 1957.

- Harris, Dorothy V. "An Investigation of Psychological Characteristics of University Women with High and Low Fitness Indices." Ph.D. Dissertation, State University of Iowa, 1965.
- Hartung, G. Harley, and Farge, Emile J. "Personality and Physiological Traits in Middle-Aged Runners and Joggers." Journal of Gerontology 32, no. 5 (1977): 541-548.
- Hart, Elizabeth K. "A Comparative Study of Personality Traits Related to Attitudes toward Physical Activity as Expressed by University Women." Dissertation Abstracts International 35 (8-A) February 1975):5097-5098P.
- McClenney, Byron N. "A Comparison of Personality Characteristics, Self-Concepts, and Academic Aptitude of Selected College Men Classified according to Performance on a Test of Physical Fitness." Ed.D dissertation, The University of Texas at Austin, 1969.
- McNamara, Michael J. "The Effects of Three Conditioning Programs on Selected Physical and Psychological Parameters of College Students." Dissertation Abstracts International 38(12-A) (June 1978: 7212.
- Mayo, Frances M. "The Effects of Aerobic Conditioning Exercises on Selected Personality Characteristics of Seventh- and Eighth-Grade Girls." Dissertation Abstracts International 35 (7-A) (January 1975): 4162.
- Renfrow, Nolan E., and Bolton, Brian. "Personality Characteristics Associated with Aerobic Exercise in Adult Males." Journal of Personality Assessment 43 (1979): 261-266.
- "Runner's World Exclusive." Runner's World 51 No. 2 (February 1980):26-32.
- Sevier, Vernon A. "Physical Fitness and the Integrated Personality." The Journal of Physical Education 71 (May/June 1974):145,148-50.
- Sharp, Micheal W., and Reilley, Robert R. "The Relationship of Aerobic Physical Fitness to Selected Personality Traits." Journal of Clinical Psychology 31 (July 1975):429-430.

- Tanner, J.M., "Physical Growth" in Carmichael's Manual of Child Psychology. ed. Paul H. Mussen, 3rd ed. New York: John Wiley & Sons, 1970.
- Taylor, Henry L.; Jacobs, David R. Jr.; Schucker, Beth; Knudsen, Joan; Leon, Arthur S.; and Debacker, Guy. "A Questionnaire for the Assessment of Leisure Time Physical Activities." Journal of Chronic Disease 31 (1978):741-755.
- Tharp, Gerald D., and Schlegelmilch, Ron. "Personality Characteristics of Trained vs. Non-Trained Individuals." Paper presented at the Annual Meeting of the American College of Sports Medicine, Chicago, 26 May 1977.
- Tillman, Kenneth. "Relationship between Physical Fitness and Selected Personality Traits." The Research Quarterly 36, No. 4 (1965):483-489.
- Weber, Robert J. "A Study of the Relationship of Physical Fitness to Success in School and to Personality." Ph.D. Dissertation, State University of Iowa, 1952.
- Wilson, Peter G. "Personality Traits, Academic Achievement, and Health Status of University Freshman Men with Low and High Physical Fitness Scores." M.S. thesis, University of Oregon, 1967.
- Young, R. John, and Ismail, A. H. "Personality Differences of Adult Men Before and After a Physical Fitness Program." The Research Quarterly 47, no. 3 (1976): 513-519.
- Young, R. John, and Ismail, A. H. "Comparison of Selected Physiological and Personality Variables in Regular and Nonregular Adult Male Exercisers." The Research Quarterly 48, no. 3 (1977):617-622.