

ASSESSMENTS OF AND INTERRELATIONSHIPS AMONG SELECTED PHYSICAL  
MEASUREMENTS, DIET, PHYSICAL ACTIVITY AND  
PERSONALITY OF COLLEGE JUNIOR MEN

by 632

KEITH WARREN HOOPER .

A. B., Kansas State University, 1966

---

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Foods and Nutrition

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

1970

Approved by:

  
Major Professor

LD  
2668  
T4  
1970  
H65  
C.2

11

## CONTENTS

INTRODUCTION . . . . .	1
REVIEW OF LITERATURE . . . . .	2
Assessment of Body Composition . . . . .	2
Height-Weight tables . . . . .	2
Anthropometric measurements . . . . .	4
Assessment of Dietary Intake . . . . .	6
Assessment of Physical Activity . . . . .	8
Assessment of Personality . . . . .	10
Development of the Adjective Check List . . . . .	10
Interrelationships . . . . .	10
Personality and physique . . . . .	11
Personality and physical activity . . . . .	14
Physical activity and body composition . . . . .	15
Dietary intake and body composition . . . . .	15
Dietary intake and physical activity . . . . .	16
METHODS AND PROCEDURES . . . . .	18
Selection of the Subjects . . . . .	18
Interview Schedule . . . . .	18
Interest and activities checklist . . . . .	18
Dietary intake . . . . .	19
Physical measurements . . . . .	19
Personality evaluation . . . . .	20
RESULTS AND DISCUSSION . . . . .	22
Biographical Data . . . . .	22
Physical Measurements . . . . .	26

Dietary Intake . . . . .	27
Interests . . . . .	33
Physical Activity . . . . .	35
Personality Profile . . . . .	35
Interrelationships . . . . .	35
Body weight, body fat, and personality . . . . .	35
Personality and physical activity . . . . .	37
Physical activity, body weight, and body fat . . . . .	40
Diet and physical activity . . . . .	40
Diet and personality . . . . .	40
Diet, body weight, and body fat . . . . .	41
SUMMARY . . . . .	42
ACKNOWLEDGMENTS . . . . .	44
LITERATURE CITED . . . . .	45
APPENDIX . . . . .	52

## INTRODUCTION

College marks the beginning of a new and different mode of living for those who attend. In order to adjust to the college environment, many changes are requisite.

Two factors that frequently undergo abrupt alteration are food habits and physical activity patterns. College students normally become less physically active but food intake does not decrease proportionately. These factors will initiate a period of special risk for the development of obesity. Emotional adjustment may be aggravated by a sudden gain in weight which, in turn, could have a permanent detrimental effect upon one's personality.

Review of the literature validates the hypothesis that relationships exist among an individual's diet, physical activity pattern, personality, body weight and more specifically, amount of body fat. However, most researchers in this area have reported results based solely on clinical situations, which may well be contradictory to results representative of a random sample of a general population.

This study was designed to assess the diet, physical activity, personality, body weight, and amount of body fat for a random sample of male college juniors and to explore the interrelationships among these factors.

## REVIEW OF LITERATURE

### Assessment of Body Composition

According to the Committee on Nutritional Anthropometry of the Food and Nutrition Board of the National Research Council "the principal aim of the application of body measurements in nutritional research and appraisal is: 1) to arrive at a relative weight of an individual, obtained as the ratio of the actual weight to the standard weight and 2) to appraise the relative fat content of an individual. Thus, weight, height, and a measurement of subcutaneous fat are the irreducible basic data" (1).

Height-Weight Tables. In the United States height-weight tables are frequently used to determine an individual's desirable weight. Metropolitan Life Insurance records of body measurements on large numbers of men and women have been of value as the source of data for the construction of height-weight tables. The original tables represented an average weight, specific for age, sex and height (2). In 1942 the values of earlier tables were adjusted to provide "ideal weight" standards (3). In 1959 a third dimension was introduced to describe body size. The Metropolitan tables were revised, using data from the 1959 Build and Blood Pressure Study, to provide frame-specific values for desirable weight in age-sex-height categories (3). In 1960, Hathaway and Foard (4) presented tables of "suggested weights for heights" which brought together almost a century of height-weight data.

Many researchers have reported the inadequacies of the weight-height tables (5-8). There is some question as to how representative

insurance data are for the general population in the United States. The tables were derived from the population mean and therefore represent values of thousands of measurements but they do not consider individual variations of body size or composition. Also, the tables do not define frame size so the user is unable to characterize frame size as small, medium or large. It has been pointed out that body size has increased from generation to generation (9, 10) and the norms that were previously used to describe body stature and weight are not adequate for use today. Fisher and Swift (5) recommended that the tables should not be used as exact values but rather as a guide.

Despite the inadequacies of the height-weight tables, they have been useful in the study of the relationship of body build to mortality. The data have consistently shown that excess weight is associated with decreased vitality and longevity (2).

Obesity has become one of the more prevalent health problems in the United States (11). A more realistic method of characterizing individual gross body size and composition was needed without using the height-weight tables as norms. Brozek (12) recognized that a leanness-fatness concept should be added to underweight-overweight in the description of body size. He developed a weight-height index which described the ratio of weight to height (13). Sargent (14), using a similar weight-height ratio, classified individuals as normal, slender, stocky, underweight, overweight, and obese. Billewicz et al. (15) examined three formulae relating weight to height in order to develop a better index for estimating adiposity. None of the formulae were found to afford a satisfactory method of assessing relative adiposity because they did not comply with

the bivariate distribution of weight and height (15). The limiting factor of the weight-height index is that it considers only height as the reference point neglecting the vertical and lateral proportions of the body (13).

Pryor (16) and Turner (17) considered lateral dimensions of the skeletal framework and of limb bones in arriving at an estimate of standard weight. The width-weight tables that they developed gave an indication of body build, but in taking lateral dimensions, subcutaneous fat tissue was included thus giving a distorted picture of skeletal framework (17).

Anthropometric Measurements. There have been a number of attempts to derive a functional relationship between lean body weight, body fat and a set of selected anthropometric measurements. In 1921, Matiega (18), a Czech anthropologist, proposed a system for the estimation of certain tissue masses on the basis of body measurements. His proposal was notable because it preceded serious research in this area by some 20 years.

Approximately 50% or more of the total adipose stores in the body are located in the subcutaneous tissue. Numerous investigators (19-22) have reported that measurement of the subcutaneous layer (skinfold thickness) can be a valuable tool in the estimation of body fatness.

Specially designed calipers are used to measure skinfold thickness. A frequently used instrument, the Lange skinfold caliper (Cambridge Scientific Instruments, Cambridge, Maryland), has been standardized to exert a pressure of  $10 \text{ grams/mm}^2$  over a  $40 \text{ mm}^2$  surface area.

Garn (21) found consistently high correlation (0.85-0.88) between

skinfold measurements with the Lange caliper and the measurement of the outer fat shadow by x-ray chest films.

The triceps skinfold has been used as a site for fat measurement (22, 23). Other investigators (24, 25) have found that the subscapular skinfold gives a valid estimate of body fat.

Regression equations, utilizing both skinfold thickness and circumferential measurements, have been developed to quantify body weight and configuration (26, 27). Steinkamp et al. (28, 29) were concerned with developing a simplified anthropometric tool which would distinguish obesity from overweight. The primary objectives of that study were:

1. To develop for healthy adults valid regression equations using clinically applicable anthropometric measurements which estimate total body fat.
2. To compare in the same subjects determinations of lean body mass and total body fat as obtained by the total body water-body density technique and by the measurement of whole-body potassium-40 ( $K^{40}$ ).
3. To relate estimated and measured total body fat to diet, physical activity, and somatotype (28, 29).

Anthropometric measurements, diet and physical activity interviews were performed on 2301 individuals aged 25-44. From the sample five arbitrary categories were defined. They were:

- I. Caucasian males, 25-34 years old
- II. Caucasian males, 35-44 years old
- III. Caucasian females, 25-34 years old
- IV. Caucasian females, 35-44 years old
- V. Negro males, 25-44 years old

From each of the five categories a smaller sample was randomly selected for laboratory measurements to determine total body water, body density, body  $K^{40}$  content, and somatotyping.

Body fat was calculated from the combined results of total body

water and specific gravity by the helium dilution technique. Lean body mass was obtained by the difference between body weight and body fat.

$K^{40}$  content was used to calculate lean body weight.

By a series of mathematical computations, regression equations to estimate body fat were calculated for each of the five race-sex-age categories using 4 anthropometric measurements.

The equation for calculating kilograms body fat in 25-34 years old males was:

$$\begin{aligned} & \text{Iliac crest circumference (cm)} \times 0.372 + \text{arm skinfold (mm)} \\ & \times 0.249 + \text{thigh circumference (cm)} \times 0.449 + \text{thorax skinfold} \\ & \text{(mm)} \times 0.380 - 45.464 \text{ (29)}. \end{aligned}$$

This group had an average of 17.14 kilograms (22.0%) body weight determined as fat. The equation had a correlation coefficient of 0.96 with the predetermined amount of body fat.

#### Assessment of Dietary Intake

Numerous researchers have compared the various methods of collecting dietary intake information (30-34).

Leitch and Aitken (30) pointed out that food intake was underestimated when the dietary recall and the dietary record were compared. However, they concluded that both methods are approximations and in appropriate situations either could be used as a satisfactory basis for classifying diets into broad categories.

Trulson (31) stressed the difficulty in determining the correct method of evaluating food intake for use in clinical work. She suggested that the long-range interview technique of usual food practices which reveals previous as well as present eating patterns should be the method of choice in clinical studies. In some cases, if the long-range interview

were impossible to administer, she felt that the 7-day dietary record could be substituted. She stated that the 24-hour dietary recall provided excessive error for use in the clinical situation (31).

In a later publication, Trulson and McCann (32) compared the adequacy of four dietary survey methods; the food record, weighing of food, the questionnaire, and the diet interview. All four methods were found to possess limitations. They concluded that none of the four methods for evaluating food intake gave a completely reliable pattern of the characteristic intake of the individual (32).

There has been growing concern about the nutritional status and dietary habits of selected large groups of individuals. The amount of time consumed in the administration of the more complete dietary history or the 7-day dietary record makes them impractical when working with a large number of people. Young et al. (33) recommended using the 24-hour dietary recall method when describing the dietary intake of groups of fifty or more and when a maximum error of 10% can be tolerated. Anderson and Sanstead (34) preferred the shorter 1-day dietary record over the 7-day dietary record when evaluating the diets of large numbers of individuals. The general concensus of opinion was that none of the methods described are necessarily typical of an individual's overall dietary pattern (31-34). However, the researcher must select the technique that satisfies his objectives most appropriately.

Not only is the method of assessing dietary intake important, but also a number of other requirements must be met. Young (35) maintained that in order to get reliable dietary data "the who, when, where, and how to produce the why must be clearly defined before the interview is

ever undertaken." In other words, the right interviewer, respondent, time, and circumstances are prerequisites for securing reliable dietary information. Wakefield (36) emphasized the establishment of rapport between the interviewer and the respondent as a vital factor in securing unbiased information.

Church et al. (37) investigated the possibility that differences in dietary information may occur due to the interviewer. Seven interviewers collected dietary survey data on 438 randomly sampled subjects. They reported that the differences rarely exceeded 10%. It was concluded that "interviewers having similar backgrounds and training would be capable of obtaining comparable data."

#### Assessment of Physical Activity

A major component of total energy expenditure for an individual is the kind and amount of physical activity in which he engages. Quantitative and qualitative evaluation of physical activity can be accomplished by a number of methods.

In 1937, Rose (38) compiled a list of numerous activities in which an individual might be engaged during the completion of his daily tasks. Energy expenditure in calories per kilogram of body weight per hour of participation was computed for each activity. A year later, Orr and Leitch (39) published a similar list of activities which was more inclusive than the list of Rose. A more complete list than either of the former was compiled by Passmore and Durnin (40) in 1955.

Johnson et al. (41) devised a method of evaluating physical activity by a system of indices. They developed a list of common activities and the subjects were asked to describe the amount of time devoted daily

or weekly to each activity. Activities were categorized into groups according to the estimation of caloric expenditure described by Rose (38) and Orr and Leitch (39). A daily activity index was calculated for each subject by dividing the total weekly caloric expenditure attributed to physical activity by seven.

A 24-hour recall interview taken for a typical working day was used by Hutson et al. (42) to evaluate physical activity. The interview was designed to summarize the amount of time spent in specific activities. Each activity was grouped into 1 of 5 arbitrary categories, ranging from very light ( $< 2.5$  calories per minute) to strenuous ( $> 7.5$  calories per minute). Daily energy expenditure for each subject was found by totaling the calorie expenditure for the 24-hour period. Hutson et al. (42) cautioned the use of any method other than calorimetry to determine individual caloric expenditure. However, they recognized the difficulties involved in evaluating energy expenditure by calorimetry for large groups of individuals and recommended the evaluation of group physical activity by setting up arbitrary activity categories.

A number of studies have been conducted to explore the differences in personalities between athletes and non-athletes (43-45). Physical activity was not measured quantitatively, but rather, grouped according to participation in specific athletic activities. Bullen et al. (46), in a study comparing obese and non-obese girls, utilized a questionnaire designed to evaluate attitudes toward various types of physical activity.

Physical activity is one of the most difficult factors to evaluate accurately in terms of caloric energy expenditure. Methodology should be dependent upon the purpose and scope of the study (42).

### Assessment of Personality

Development of the Adjective Check List (ACL). Hartshorne and May (47) recognized the value of utilizing functional words as a means of recording descriptive reactions. In 1930 they developed a list of 80 pairs of antonyms that were completed by teachers to evaluate the moral character of their students. Six years later Allport and Odbert (48) published a catalogue of 17,953 descriptive English words which, due to its length, had little experimental value. However in 1946, Cattrell (49) shortened the list and grouped the adjectives so that personality traits could be developed from the list.

The current ACL has been revised three times (50). Numerous studies have contributed to its development (49, 51-53).

The ACL and the Edwards' Personal Preference Schedule were compared to determine the validity of selected scales (54). Ten of the 15 scales compared showed highly significant correlation coefficients ( $P < 0.01$ ). The ACL has also been compared favorably with the Minnesota Multiphasic Personality Inventory and the California Personality Inventory (50).

### Interrelationships

Obesity has become a prevalent health problem in the United States. Wyden (55) cited a study done by a market research company in which a large number of people were asked if they were concerned about their body weight; 9.5 million Americans said they were on diets, 16.4 million indicated that they were weight watchers and 26.1 million expressed concern about their weight.

Young (56) found that among 325 college students at Cornell University, 23% of the males and 36% of the females were more than 10%

overweight using Metropolitan Life Insurance standards. Read and Heald (57) reported that 11% of a sample of 950 teenagers were obese.

The problem of obesity does not have a simple solution, but rather, is a complex enigma involving a number of interrelating factors. A discussion of the interrelationships follows.

Personality and Physique. Attempts to relate bodily and mental traits date back to Aristotle. At the beginning of the 20th century modern techniques made it possible to reevaluate the hypothetical relationship. Publications on this subject are oftentimes contradictory in nature; therefore Humphreys (58) cautioned the acceptance of research relating bodily and mental traits.

Early work by Paterson (59) showed little scientific connection between personality and body build. However, Sheldon (60, 61) demonstrated a relationship between personality and physique. His classic studies on physical and temperamental types have been of major concern among psychologists dealing with this topic.

Sheldon has described three physical types: endomorphs, characterized by the development of the innermost embryonic germ layer from which the internal viscera is formed; the mesomorphs, characterized by the development of the middle embryonic germ layer giving rise to muscle and bone tissue; and the ectomorphs, characterized by the development of the outermost embryonic germ layer giving rise to skin, fingernails, hair, etc. The endomorph would contain an excess amount of soft tissue; the mesomorph, muscle; and the ectomorph, which Sheldon referred to as neutral development would contain little fat or muscle but would have a large surface area (60, 61).

Each of the preceding types was rated on a 7-point scale by use of precise physical measurements on each individual. An individual's type scores were conveniently written as three numbers, each having a theoretical range from one through seven; e.g., 7-1-1, 2-6-3, 4-4-4, etc. In addition to endomorph, mesomorph and ectomorph body types, Sheldon also described three temperament types; visceratonic, somatotonic and cerebrotonic, rated in the same manner as body types. He found high correlations between related types of physique and temperament. Sheldon's proposition that a biological relationship exists between physique and temperament has received extensive experimental support (62-65). However, according to Humphreys (58), there are a number of serious limitations in Sheldon's theory. With respect to his type concept, Humphreys believed that Sheldon defined body types so that they are mutually exclusive. Thus two types could never be represented to a high degree in one individual. Finally, he pointed out that his correlations relating physique and temperament are invalidated because Sheldon was responsible for both sets of ratings (58).

As an alternative to Sheldon's hypothesis that a purely biological relationship exists between physique and temperament, a social learning interpretation of existing body-build correlations has been proposed (65, 66). Walker (65, 66) suggested that the expectations that society places on an individual's physique is an important source of personality-physique correlations. Brodsky (67), in a study done with male college students, found that characteristic personality traits were associated with Sheldon's endomorph, mesomorph and ectomorph body-types, and that there are stereotyped ways of reacting to these three types of male physique.

Lerner (68) developed a list of 30 phrases which describes various kinds of personal and social behavior. He requested a sample of 50 male subjects, utilizing the list of 30 phrases, to describe photographs representing an adult male endomorph, mesomorph, and ectomorph. The results indicated that the mesomorph body-type was generally associated with a socially positive stereotype, whereas the endomorph and ectomorph body-types were associated with socially negative stereotypes. In a similar study, Lerner (69) requested 90 female subjects to describe Sheldon's three body-types using the same list of phrases. Similar results were obtained; the most socially positive traits, being associated with the mesomorph photograph and the most socially negative traits associated with the endomorph and ectomorph photographs (69).

Maddox et al. (70) were not concerned with somatotypes, but rather, with fatness, per se. They suggested that obesity was a social disability and categorized it with loss of limb, blindness, deafness, etc. In a study conducted with groups of normal and obese children, they found that both groups characterized the "fat child" as less likable than children with recognizable physical disabilities. An individual's physique is apparent to everyone within a society. Bruch (71, 72) stressed that body weight for many people is an important factor in total adjustment. She felt that an attempt to change body weight could possibly cause serious emotional disturbances in people who were preoccupied with losing weight. Cappon (73) reported that obese subjects had a tendency to overestimate their body width and thickness to a greater degree than did subjects with normal weight. This would indicate that the obese have a more distorted body image than do individuals of normal weight.

According to Stunkard and Mendelson (74), obese individuals with higher IQ's tend to have more seriously distorted body images than obese people with lower IQ's. In a study by Goldblatt et al. (75), the greatest percentages of obese individuals were found in the lowest social class. Meyer and Tuchelt-Gallwitz (76) noted in Germany that obesity is most acceptable in the lowest social class suggesting that the attitude of the different levels of society toward an individual's physique strongly influences the manner in which one perceives his body image.

Personality and Physical Activity. A general problem pervading work in the area of physical activity and personality is the lack of differentiation between physical activity and athletic participation. The personality factors compelling an individual to belong to and work with a team might well be separate from an individual's psychological need for physical activity. Numerous studies have been conducted correlating scores on personality tests to athletic and motor ability (77-80).

The male individual who engages in strenuous athletic competition when compared to those who do not participate, has been classified as being more outgoing and socially confident (45, 77), more socially aggressive and dominant (44), having higher social adjustment (78), personal adjustment (79), self-confidence (80), and possessing higher masculine interests (43).

Conflicting evidence has also been present in the literature. Ibrahim (81), in a study comparing recreational preference categories with personality scores, concluded that there was not enough statistical evidence to support the hypothesis that the personalities of individuals

who prefer more strenuous activities are different from those who prefer less strenuous activities.

Physical Activity and Body Composition. Jokl (82) investigated the effects of five months' daily physical training upon body composition of adolescent children. He reported that there was a significant decrease of excess fat and a significant increase of active tissue at the end of the period. The mean weight, however, remained constant. Parizkova (83) found evidence at all age levels that the intensity of physical activity on body composition causes an increase in lean body mass at the expense of fat. He pointed out that a substantial reduction in physical activity caused a disproportionate fat accumulation with a slight reduction in lean body mass.

Hutson et al. (42) examined the effect of diet and physical activity upon per cent of body fat for 516 healthy adults, representing a cross-section of all economic and occupational groups. The study revealed that although 85% of the 24-hour periods studied for all subjects were spent in sedentary activity, a direct relationship was found between body fatness and hours spent in very light activity.

Johnson et al. (41) postulated that inactivity was more important in causing obesity than overeating. However, Bullen et al. (46), in an attitudinal study toward diet and physical activity, reported that obese adolescent girls seemed totally unaware of a potential relationship between inactivity and obesity.

Dietary Intake and Body Composition. In a study comparing caloric intake of obese and non-obese adolescent boys in relation to energy

output, Stefanik et al. (84) reported that the obese group ate significantly less than the non-obese group. The findings of a number of researchers indicated a similar inverse relationship between dietary intake and body fat (41, 46, 85).

Taggart (86) obtained extensive dietary, physical activity, and body composition data on one woman for a period of 80 days. She reported that day-to-day fluctuations in weight were due to water loss but overall weight loss was directly proportional to caloric restriction. Grossman and Sloane (87) found a correlation between body weight and caloric intake during a period of caloric restriction and that loss of body weight was significantly correlated with initial body weight but not with initial body fat. Conversely, Miller et al. (88, 89) questioned the hypothesis that increased food intake causes an increase in body fat. They maintained that excess caloric intake of individuals caused an increase in the production of body heat energy.

Dietary Intake and Physical Activity. Energy intake and energy expenditure must be in equilibrium before constant body weight can be maintained. However, the relationship between food intake and energy expenditure is extremely complex and not fully understood (90).

Tepperman (90) pointed out that variance in individuals is an important factor in adding to the complexity of the relationship. He cited body size and differences in muscle tone as two factors that could cause individual variation (90).

Steinkamp et al. (29) found a positive relationship between dietary intake and physical activity. In their study, "blue collar" workers consumed more calories than "white collar" workers. Parizkova (83) reported

that lowered physical activity involved a disproportionate decrease in caloric intake. In a study comparing obese and non-obese girls, Johnson et al. (41) reported that inactivity appeared to play a more important role in the development of obesity than overeating.

Taggart (86) found that caloric intake was not related to physical activity on the same day but that there was a small significant correlation between dietary intake and physical activity on successive days. Edholm et al. (91) also reported that energy expenditure reflected the food intake of two days earlier.

## METHODS AND PROCEDURES

### Selection of the Subjects

The sample consisted of 119 randomly selected male students who were listed as juniors in the Kansas State University (KSU) Student Directory. The subjects were contacted in person or by telephone. An appointment was made if the subject was interested in participating in the study. If the subject did not wish to participate, a preselected alternate was contacted for inclusion. Only 10 out of the 129 individuals contacted did not desire to participate in the study.

### Interview Schedule

The data secured at each personal interview consisted of (1) general biographical information (Form I, appendix), (2) an interest and activities check list adapted from the California Test of Personality (Form II, appendix), (3) a 24-hour dietary recall assessing the fulfillment of the basic four food groups (Form III, appendix), (4) a measurement of body weight and standing body height (Form I, appendix), (5) a series of 4 anthropometric measurements (Form I, appendix) and (6) the administration of the Adjective Check List (ACL) to assess selected personality traits of the subjects (Form V, appendix). With the subjects' permission (Form IV, appendix) the weight and height of each individual upon entering KSU were taken from the medical records at the Lafene Health Center. Per cent of body fat was calculated using the method described by Steinkamp et al. (29).

Interest and Activities Checklist. The checklist consisted of a number of possible activities in which one could either have an interest

or participate. Selected activities were omitted from the original checklist if they were not applicable to male college juniors.

A number of activities of the more strenuous variety were added to the checklist. Each subject had the option of checking whether he liked to participate or actually did participate in the activities listed. For scoring purposes, the activities were arbitrarily categorized into light, moderate, and strenuous, and were weighted accordingly.

Dietary Intake. The 24-hour dietary recall was used to assess dietary intake. A 0-100 point scoring system was used to evaluate the adequacy of the individual diet. The food intake data were categorized into the "Basic Four" food groups and the following maximal scores allotted for each group: milk, 25; meat, 25; fruit-vegetable, 30; and bread-cereal, 20. The maximal score was not to exceed 100 points.

The percentage of the minimum recommended amount of the four food groups fulfilled by each subject was calculated. In this case, there was no maximal score. Finally, a category for food items which did not fit into the "Basic Four" food groups was evaluated for caloric content.

Physical Measurements. 1. Body weight. A Health-O-Meter scale (capacity 300 lb.) accurate to one lb. was used and checked at frequent intervals with a Detecto-Doctor's scale located in the Department of Foods and Nutrition, KSU. Weights were taken with the subjects wearing only street pants and socks.

2. Height. Heights were measured to the nearest 1/2 inch with a Lufkin tape measure. The subject stood without shoes, with heels, buttocks, and back pressed firmly against a wall. The subject was instructed to look

straight ahead while a leveler was placed on the head and the measurement recorded.

3. Per cent of calculated body fat. A series of 4 anthropometric measurements as described by Steinkamp (29) was used to determine the calculated per cent of body fat. Two measurements were made with Lange skinfold calipers (Cambridge Scientific Instruments, Cambridge, Maryland) in accordance with techniques described by the Interdepartmental Committee on Nutrition for National Defense (92). They were:

- a) Arm skinfold. With the subject standing, right arm relaxed and flexed 90° at the elbow, the calipers were applied adjacent to the fingers grasping a fold of skin and subcutaneous tissue over the triceps at mid-arm level (92).
- b) Thorax skinfold. With the subject supine, breathing quietly and knees raised to relax the abdominal muscles, the skin and subcutaneous tissue over the right 10th rib was grasped parallel to the rib in the anterior axillary line and the calipers applied adjacent to the grasping fingers (92).

The final two measurements were taken with a Lufkin steel tape closely fitted to the nude body surface but not so tight as to indent the skin (28). These measurements were rounded to the nearest centimeter. The measurements were:

- a) Thigh circumference. The tape was applied to encircle the right thigh at the mid-point of the thigh length (28).
- b) Iliac crest circumference. The tape was applied to encircle the body at the iliac crests and was maintained parallel to the floor while the subject stood (28).

The equation used to estimate kg body fat was:

$$\begin{aligned} & \text{iliac crest circumference (cm)} \times 0.372 + \text{arm skinfold (mm)} \\ & \times 0.249 + \text{thigh circumference (cm)} \times 0.449 + \text{thorax skinfold} \\ & \text{(mm)} \times 0.380 - 45.464 \text{ (29).} \end{aligned}$$

Personality Evaluation. The ACL was utilized to assess selected personality traits. The list consisted of 300 adjectives commonly used

to describe the attributes of a person. It was administered to each subject as a means of self-evaluation. The tests were scored by the NCR computer scoring service, Minneapolis, Minnesota. A personality profile containing 24 experimental scales was obtained for each subject (Form VI, appendix). In addition, selected adjectives indicative of an individual's body image were analyzed.

## RESULTS AND DISCUSSION

One hundred and nineteen randomly selected men who belonged to the junior class at KSU, Manhattan, Kansas, were interviewed between February 5 and March 27, 1970. Interviews were conducted on Tuesday through Friday to minimize bias. Information concerning general biographical data, weight, height, body fat, diet, interest, physical activity, and personality were obtained for each subject.

Biographical Data

The average age for the sample was 21.0 years. The age distribution is listed in table 1.

TABLE 1  
Age distribution of subjects

Age	Number	Percentage
20	55	46.2
21	35	29.4
22	19	16.0
23	4	3.4
24	1	0.8
26	4	3.4
29	<u>1</u>	<u>0.8</u>
	119	100.0

The age difference was to be expected since the only requirement was that the subjects be enrolled in the junior class. It was anticipated that most of the sample would have spent the traditional three years at KSU to achieve junior status. In the actual sample, however, it became obvious that although the majority of the subjects listed as juniors had spent three years in the university, a large number had either spent more or less than three years to achieve junior status (table 2).

TABLE 2

Number of years since enrollment at Kansas State University

Years at KSU	Number	Percentage
1	18 <sup>1</sup>	15.2
2	16 <sup>1</sup>	13.4
3	62	52.1
4	18	15.2
5	3 <sup>2</sup>	2.5
6	1 <sup>3</sup>	0.8
12	<u>1</u> <sup>4</sup>	<u>0.8</u>
	119	100.0

<sup>1</sup>Transferred to Kansas State University.

<sup>2</sup>Changed curricula.

<sup>3</sup>Spent time in the Armed Forces.

<sup>4</sup>Worked for nine years before returning to college.

Nineteen men (16%) were married and 100 men (84%) were single. Marital status did not affect the manner in which the measurements for the study were taken.

Living arrangements were divided into three categories: dormitories, fraternities, and apartments. Twenty men (16.8%) lived in dormitories and 32 men (26.9%) lived in fraternities or scholarship houses. In both categories, all meals except Sunday evening dinner were provided. Sixty-seven men (56.3%) lived in apartments, trailer houses, or apartment-like housing. In this category, meals were either prepared and eaten at home, or eaten in restaurants, cafeterias, or drive-ins.

When asked about meal skipping, twenty-five men (21%) stated that they never skipped meals. The other 94 men (79%) skipped an average of 3.3 breakfasts per week, 0.8 lunches per week, and 0.2 dinners per week. Twenty-eight men (23.5%) stated that they never ate breakfast. Meal skipping was found to be significantly related ( $P < 0.05$ ) to per cent body fat (fig. 1), and smoking behavior ( $P < 0.05$ ). Sixty-three per cent of the smokers stated that they skipped meals regularly while 85% of the non-smokers skipped meals on a regular basis.

No relationship was noted between meal skipping and a) body weight, b) living arrangements, c) interests and activities, and d) diet score.

When answering the question pertaining to smoking behavior, 89 men (75%) stated that they were non-smokers. Thirty men reported that they smoked one pack of cigarettes or more per week. The smokers averaged 5 packs of cigarettes per week. A significant relationship ( $P < 0.05$ ) was found between smoking behavior and per cent body fat (fig. 1).

When asked about dating frequency, 13 out of the 100 unmarried men

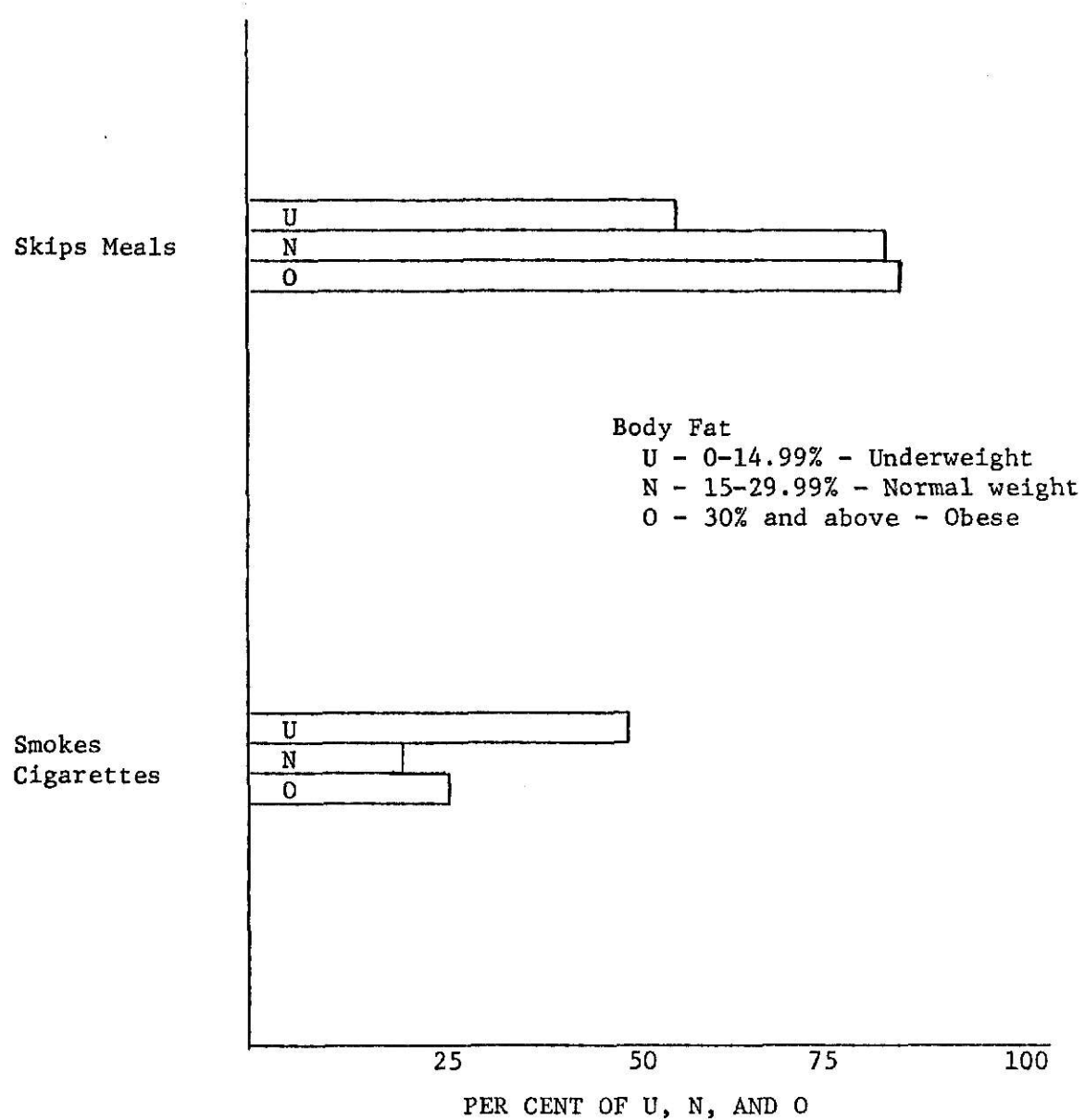


Fig. 1. Relationship between per cent body fat and a) meal skipping and b) smoking behavior.

reported that they never dated. The mean heterosexuality score taken from the ACL personality profile for the 13 men was 43 while the mean score for the other 109 men was 51.6 (standard mean score was 50.0). For a number of possible reasons, the men who had never dated were not as attracted to the opposite sex as those who were accustomed to dating.

### Physical Measurements

Data on body weight, height, body fat and average annual weight change since entering college are shown in table 3.

TABLE 3

Data on body weight, height, body fat, and weight change

Measurement	Mean	Maximum	Minimum
Weight (lb)	172.2	251.0	119.0
Height (in)	70.2	76.0	62.0
Body Fat (kg)	18.0	49.8	5.1
Body Fat (%)	22.2	43.7	8.5
Weight Change (lb)	+2.8	+20.0	-20.0

By comparing the heights and weights of the subjects with the Height-Weight table prepared by Hathaway and Foard (4), it was found that 12 men (10.1%) were underweight, 64 men (53.8%) were normal weight, and 43 men (36.1%) were overweight.

When using per cent of body fat as the criteria for determining the degree of obesity for each individual, it was found that 16.8% of the sample were underweight (had less than 15% body fat), 66.4% were of normal weight (had 15% - 30% body fat), and 16.8% were obese (had more

than 30% body fat).

As could be expected, there was a very highly significant ( $P < 0.001$ ) positive correlation ( $r = 0.76$ ) between body weight and body fat. The participants' weight change since entering college showed a highly significant correlation ( $P < 0.01$ ) with body weight ( $r = 0.35$ ), and with body fat ( $r = 0.44$ ). However, it should be noted that weight change showed a higher correlation with body fat than with body weight, i.e., the weight shifted from lean mass to fat.

#### Dietary Intake

The results of the 24-hour dietary recall demonstrated that 39 participants (32.8%) had diet scores of less than 67 points, which was arbitrarily determined as the cutoff point for an adequate diet. Eighty subjects (67.2%) consumed adequate diets.

The mean diet score was 73.5: the maximum score, 100; and the minimum score, 40. However, only one subject received the maximum diet score of 100, indicating total fulfillment of the "Basic Four" food groups.

When comparing the diet scores of the married and unmarried men, no statistical difference was noted. Surprisingly, however, 42.1% of the married men had inadequate diets compared to only 31.0% of the single men.

Living arrangements did tend to affect diet score. A significant difference ( $P < 0.05$ ) was found between type of housing and diet score. In figs. 2-5 the percentage relationship between diet score and living arrangements is shown.

Each participant's diet score was divided into the four elements that make up the "Basic Four" food groups; milk, meat, fruits and

vegetables, and the bread cereal group. The food group headed fruits and vegetables was further subdivided into citrus fruit, dark green and yellow vegetables, and any other fruits and vegetables. If the participants fulfilled the minimum recommended amount prescribed by the basic four in any one food group or subgroup, he received a score of 100% for that food group. Dietary intake above or below the recommended amount was given proportionate percentage scores.

The percentage of fulfillment for the respective groups was compared to the diet scores in order to ascertain the degree that the individual food group affected the diet score.

As should be expected, a strong relation was noted between diet score and a) per cent of milk intake ( $P < 0.01$ ), b) per cent of citrus intake ( $P < 0.05$ ), c) per cent of dark green and yellow vegetable intake ( $P < 0.01$ ), d) per cent of other fruits and vegetables intake ( $P < 0.05$ ), and e) per cent of bread-cereal intake ( $P < 0.01$ ), indicating strong dependence between diet score and the respective variables. However, no such relationship existed between diet score and per cent of meat intake suggesting little or no dependence of the percentage fulfillment of the meat requirement upon an individual diet score.

The relationship between the participants' type of living arrangements at KSU and the fulfillment of the basic four food groups was also explored. Statistical analysis revealed no significant relationships between types of living arrangements and fulfillment of the respective food groups. In other words, when the intake of a specific food group was low for the subjects in one type of housing, it tended to be low for those in all housing groups and vice-versa (figs. 2-5).

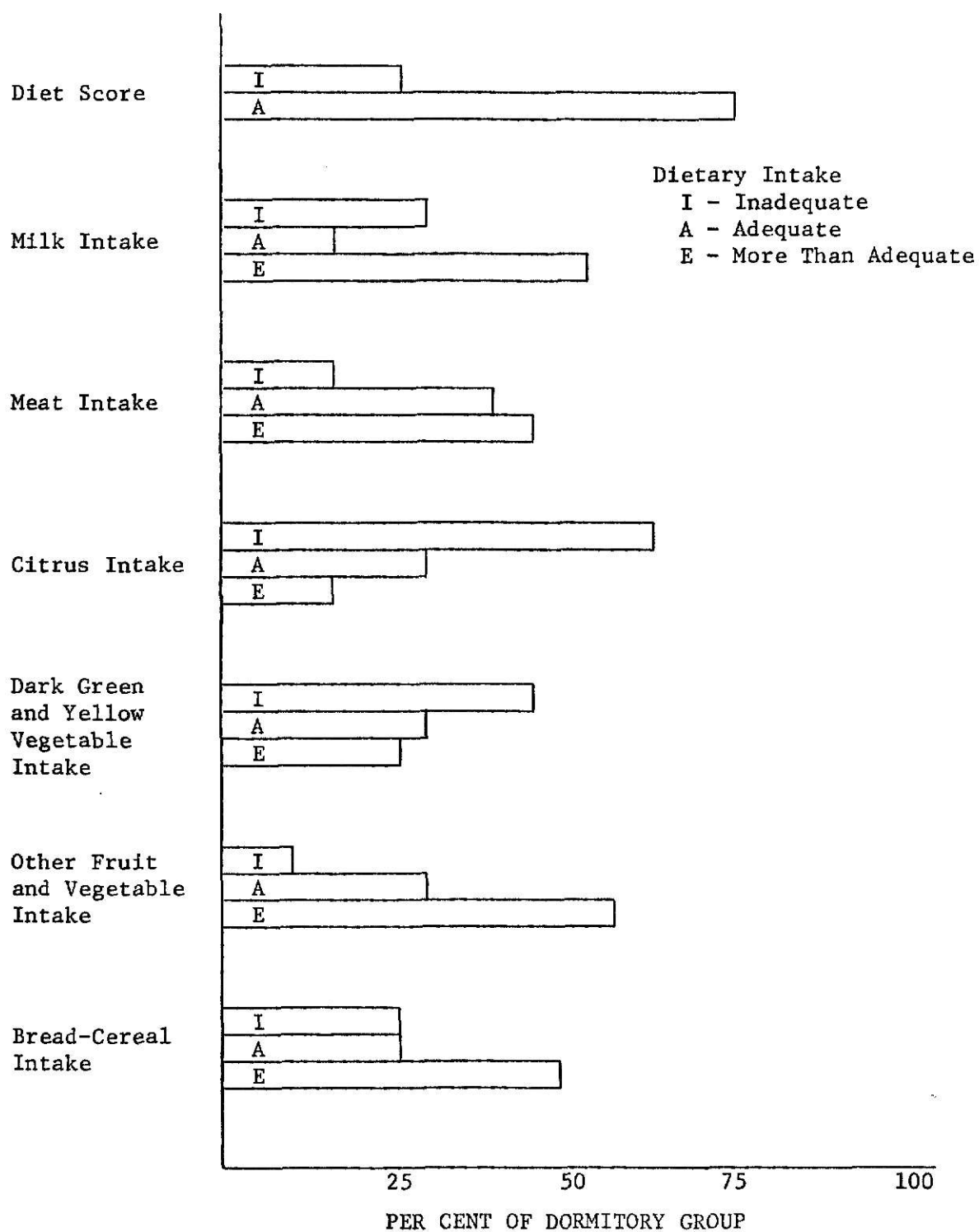


Fig. 2. Dietary intake evaluation of dormitory subjects.

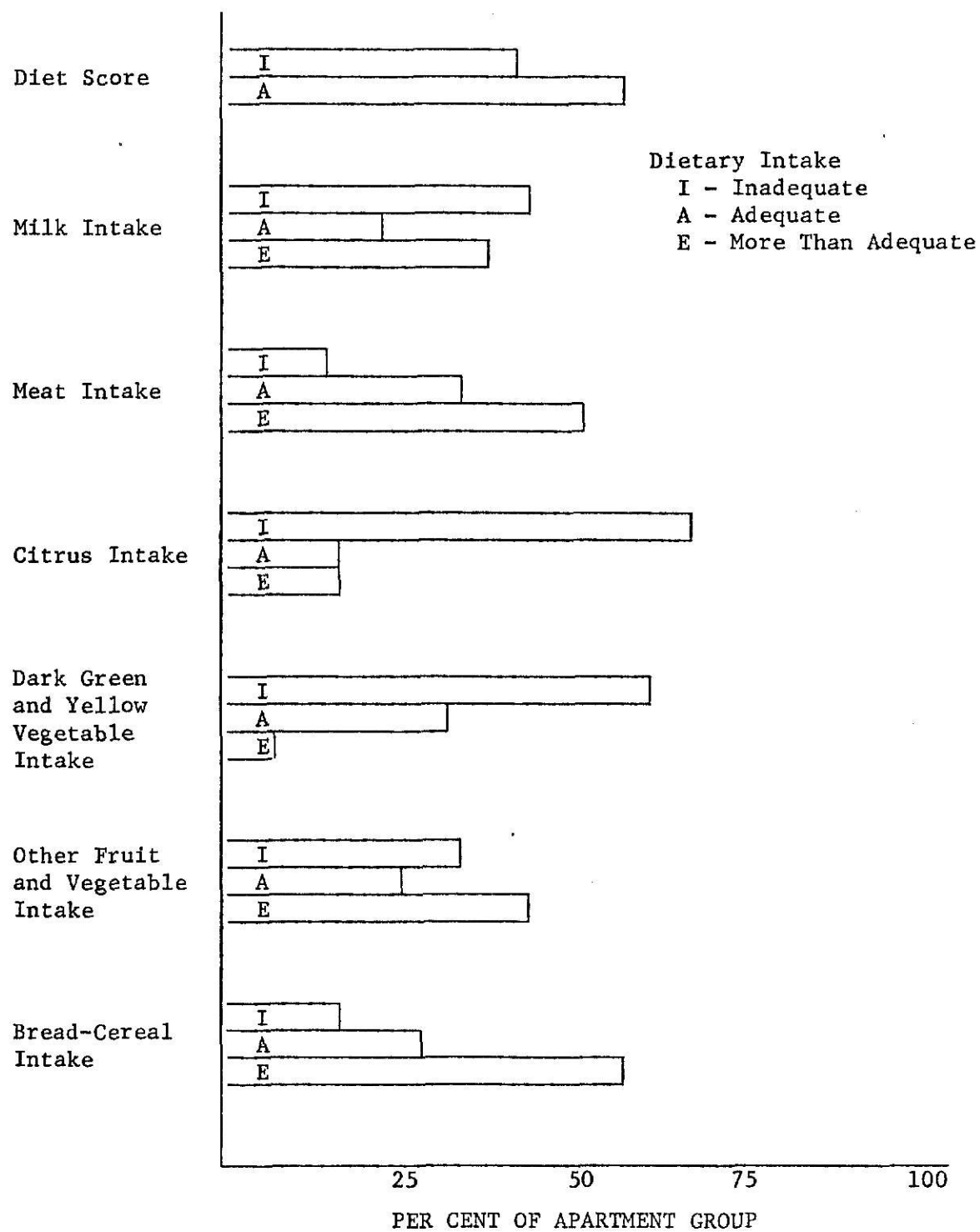


Fig. 3. Dietary intake evaluation of subjects living in apartments.

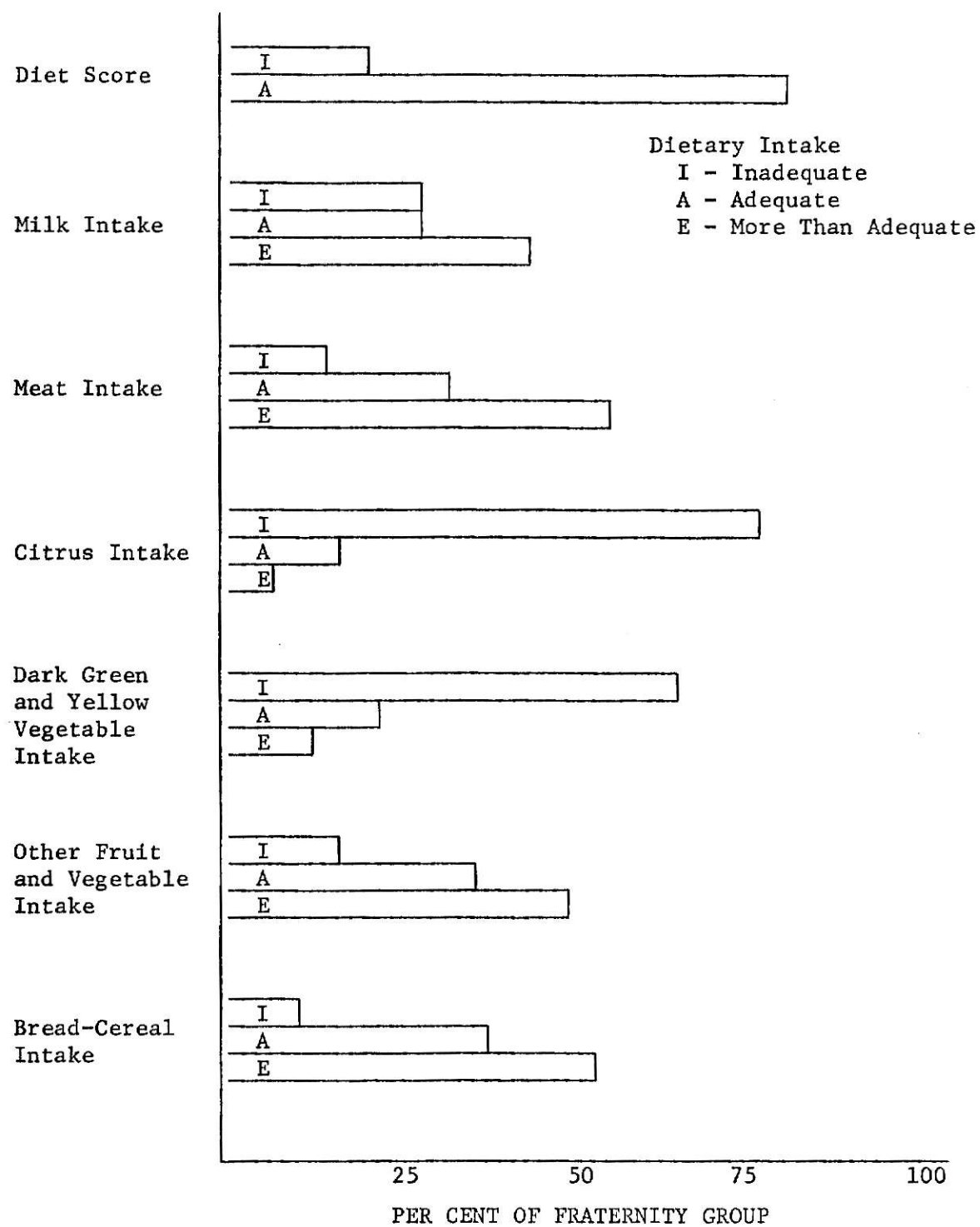


Fig. 4. Dietary intake evaluation of subjects living in fraternities.

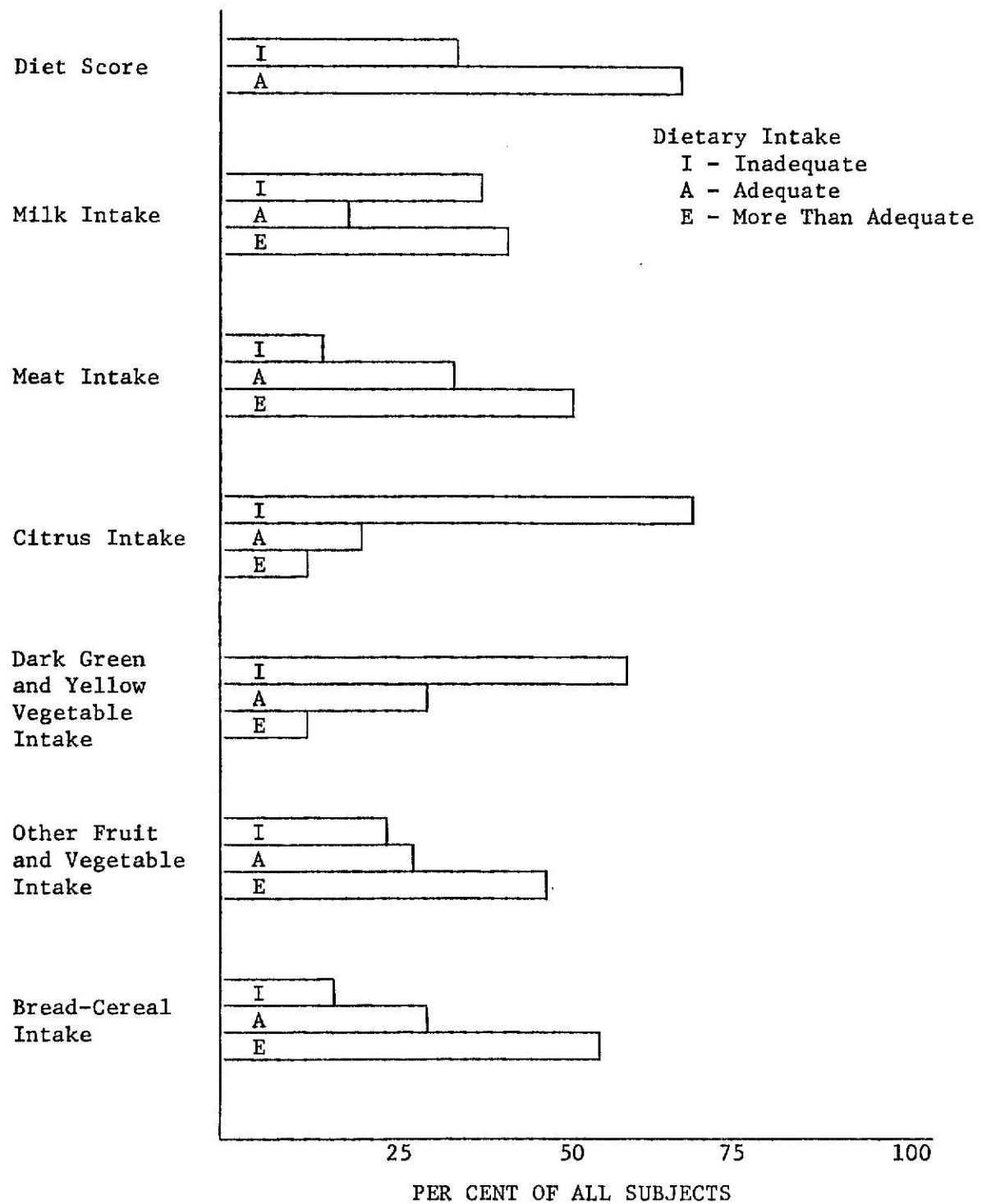


Fig. 5. Dietary intake evaluation of all subjects.

A category for food items not included in the "Basic Four" was utilized. Items that contributed primarily caloric value to the diet, such as soft drinks, candy, butter, salad dressing, sugar, certain types of desserts, etc., were included in this category. Caloric value of these items was compiled using USDA Handbook No. 8 (93). Although many of the food items in this category may be considered complimentary to the foods in the "Basic Four," they will be discussed as nonessential calorie containing foods. The purpose of separately categorizing extra calories was to determine their effect, if any, upon an individual's diet score and body weight. It was also postulated that living arrangements could have an effect upon extra caloric intake.

The mean value for extra caloric intake was 885.3; the maximum, 2293.0; and the minimum, 20.0. Chi-square analysis revealed a strong relationship ( $P < 0.01$ ) between living arrangements and extra caloric intake (fig. 6). Low nonsignificant correlation coefficients were found between extra caloric intake and a) diet score, and b) per cent body fat.

### Interests

The interest and activities checklist contained 56 different types of activities in which a participant could show an interest. The range of interests in the listed activities was from 12 to 50; the mean interest score being 31.

The difference between interest in the listed activities and actual participation was noted. The participants indicated an interest in an average of 6 more activities than they actually participated in. However, 20 subjects indicated that they participated in more activities

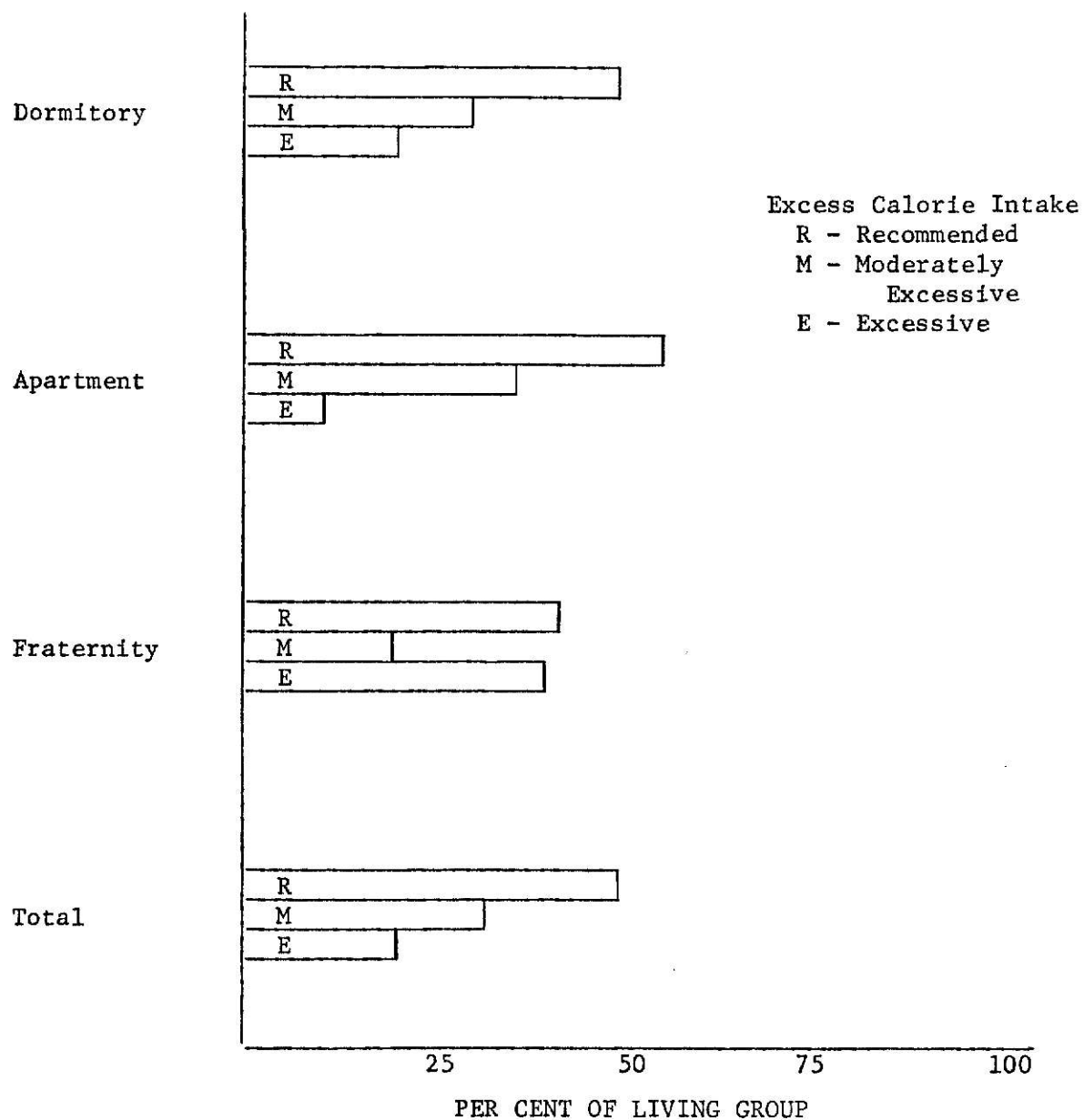


Fig. 6. Percentage relationship between students' living arrangements and excess calorie intake.

than they were actually interested in.

### Physical Activity

If a subject indicated that he participated in all of the activities on the checklist, he could have received a total of 140 points for a physical activity score. In actuality, however, the highest score received by any individual was 90 and the lowest score was 7. The mean activity score was 51. It was felt that the mean score would be indicative of a moderately active person; therefore three physical activity categories were set up using the mean score of 51 as the reference point. The categories were as follows: slightly active, 0-39; moderately active, 40-59; and extremely active, 60-99.

Of the 119 participants, 35 (29.4%) were categorized as slightly active, 44 (44.0%) as moderately active, and 40 (33.6%) as extremely active.

### Personality Profile

The results from the ACL demonstrated that as a group, the participants in the study showed only slight deviation from the established norms of the test (table 4).

### Interrelationships

Body Weight, Body Fat, and Personality. An individual's body weight and more specifically, his per cent body fat have been reported in the literature as having an effect upon one's personality (72, 76). In this study relatively low but nonetheless, significant correlations were found between body weight and a) lability ( $r = 0.16$ ,  $P < 0.1$ ), b) endurance ( $r = -0.17$ ,  $P < 0.1$ ), c) heterosexuality ( $r = 0.19$ ,  $P < 0.05$ ),

TABLE 4

Mean, minimum, and maximum personality profile scores

Personality trait <sup>1</sup>	Profile scores		
	Mean <sup>2</sup>	Maximum	Minimum
Total number adjectives checked	47.8	69.0	30.0
Defensiveness	49.8	66.0	28.0
Number favorable adjectives checked	46.3	65.0	24.0
Number unfavorable adjectives checked	51.4	87.0	40.0
Self-confidence	48.4	76.0	28.0
Self-control	46.4	70.0	10.0
Lability	51.5	75.0	31.0
Personal adjustment	47.0	64.0	16.0
Achievement	51.0	69.0	27.0
Dominance	52.3	72.0	27.0
Endurance	50.9	72.0	21.0
Order	50.4	75.0	24.0
Intracception	49.3	69.0	13.0
Nurturance	49.1	67.0	22.0
Affiliation	49.3	64.0	29.0
Heterosexuality	50.7	77.0	16.0
Exhibition	50.8	79.0	26.0
Autonomy	51.6	83.0	30.0
Aggression	51.6	81.0	34.0
Change	48.7	83.0	20.0
Succorance	47.1	71.0	26.0
Abasement	47.1	72.0	26.0
Deference	46.9	68.0	20.0
Counseling readiness	49.9	80.0	28.0

<sup>1</sup>Personality traits are explained in appendix VI.<sup>2</sup>Standard mean score is 50.0.

d) exhibition ( $r = 0.15$ ,  $P < 0.1$ ), e) change ( $r = 0.18$ ,  $P < 0.05$ ), f) counseling readiness ( $r = -0.19$ ,  $P < 0.05$ ), and between per cent body fat and a) endurance ( $r = -0.15$ ,  $P < 0.1$ ), and b) heterosexuality ( $r = 0.15$ ,  $P < 0.1$ ).

Data comparing per cent body fat and the 24 personality scales were also analyzed by means of the chi-square test. The only significant results were found between per cent body fat and self-confidence ( $P < 0.05$ ), and body fat and succorance ( $P < 0.1$ ). It is worth noting that the group having more than 30% body fat tended to have lower self-confidence scores than the two groups with lesser amounts of body fat.

In this study, body weight and per cent body fat appeared to have some influence on an individual's personality. As body weight and per cent of body fat increased, the personalities of the participants could be described as being more excitable and high-strung. They tended to be more impatient, changeable and quite self-centered, almost to the point of being narcissic. They lacked self-confidence but possessed the desirable qualities of being interested in the opposite sex and of taking a genuine interest in life.

Personality and Physical Activity. Correlation coefficients were determined between scores for the 24 personality traits and the physical activity scores. A number of significant correlations were found (table 5).

According to the ACL Manual, "the greatest value of the list may accrue from noting, pondering, or analyzing those specific words which an individual or group of individuals has checked as self-descriptive" (50). The chi-square test was used to analyze the relationship between

TABLE 5

Significant correlation coefficients between personality  
traits and physical activity scores

Variable	Coefficient of correlation (r)
Unfavorable adjectives checked	-0.24**
Self-confidence	0.25**
Lability	0.20*
Personal adjustment	0.22*
Achievement	0.28**
Dominance	0.29**
Nurturance	0.26**
Affiliation	0.39**
Heterosexuality	0.38**
Change	0.25**
Succorance	-0.35**
Abasement	-0.21*
Counseling readiness	-0.27**

\* Significant at the 0.05% level.

\*\* Significant at the 0.01% level.

a group of adjectives indicative of body image and the three physical activity categories, slight, moderate and extreme. The results indicated that there was a significant difference between physical activity and whether a person saw himself as a) masculine ( $P < 0.01$ ), b) energetic ( $P < 0.01$ ), c) active ( $P < 0.01$ ), d) mature ( $P < 0.05$ ), e) strong ( $P < 0.05$ ), f) healthy ( $P < 0.05$ ) and g) courageous ( $P < 0.05$ ). The tabulated percentages are listed in table 6.

TABLE 6

Percentage relationship between physical activity categories and selected self-descriptive adjectives.

Self-descriptive adjectives	Slightly active <sup>1</sup>	Moderately active <sup>2</sup>	Extremely active <sup>3</sup>
1. Masculine	31.4%	65.9%	75.0%
2. Energetic	28.6%	70.4%	67.5%
3. Active	45.7%	88.6%	82.5%
4. Mature	45.7%	70.5%	77.5%
5. Strong	20.0%	47.7%	47.5%
6. Healthy	62.8%	81.8%	85.0%
7. Courageous	14.3%	20.5%	37.5%
8. Good-looking	31.4%	40.9%	45.0%

<sup>1</sup>35 subjects in group.

<sup>2</sup>44 subjects in group.

<sup>3</sup>40 subjects in group.

The individual who was more physically active would appear to be outgoing and socially confident. He would be adaptable and would take pleasure in change and variety. He would have attained a high level of personal adjustment, being affiliative but independent and forceful but tactful. He would have a high interest in the opposite sex and enjoy life to the fullest.

The results of the present study are in agreement with previous studies (43-45, 76-79), concerning physical activity patterns and personality traits.

Physical Activity, Body Weight, and Body Fat. There were no significant differences found when comparing a) physical activity scores and body weight or b) physical activity and per cent body fat.

Diet and Physical Activity. The overall diet score did not tend to be affected by the amount of physical activity in which an individual engaged, as evidenced by an extremely low correlation coefficient between the two factors ( $r = 0.05$ ). However, a significant relationship ( $P < 0.05$ ) was found between bread-cereal intake and physical activity. The tabulated percentages are listed in table 7.

There was no significant relationship noted between the other components of the "Basic Four" food groups and physical activity.

Diet and Personality. Correlation coefficients were computed between diet scores and the 24 personality scales covered by the ACL. A significant ( $P < 0.05$ ) negative correlation ( $r = -0.18$ ) was found between diet score and the Order scale. Diet score was also found to be significantly correlated ( $r = 0.16$ ,  $P < 0.1$ ) with the Change scale.

TABLE 7  
Percentage relationship between bread-cereal intake  
and physical activity

Bread-cereal intake	Slightly active <sup>1</sup>	Moderately active <sup>2</sup>	Extremely active <sup>3</sup>
Inadequate	28.6%	4.5%	17.5%
Adequate	22.8%	40.9%	22.5%
More than adequate	48.6%	54.6%	60.0%

<sup>1</sup>35 subjects in group.

<sup>2</sup>44 subjects in group.

<sup>3</sup>40 subjects in group.

From this study one could characterize an individual having a high diet score as one who seeks new experiences and variety, avoiding the routine aspects of everyday life. The variety of food that one selects might well be influenced by this personality trait.

Diet, Body Weight, and Body Fat. There were no significant relationships found between diet score and body weight or between diet score and per cent of body fat. However, a positive correlation ( $r = 0.13$ ) was noted for the former. It should be emphasized that the primary purpose of the diet score was to evaluate the quality of the individual's diet. It was not within the scope of this study to make a quantitative evaluation of nutrient intake. A category for caloric content of foods not included in the "Basic Four" food groups was added, however, so that trends in food habits could be noted. There were no significant correlations between this category and body weight or per cent of body fat.

## SUMMARY

The subjects, as a whole, reflected the normalcy of the population from which they were selected. However, individual differences were noted in the study among body weight, per cent of body fat, dietary intake, physical activity, and personality.

A discrepancy of values was noted between the Height-Weight table and anthropometry in determining the degree of relative fatness. Height-Weight standards demonstrated that 10.1% of the participants were underweight, 53.8% were of normal weight, and 36.1% were overweight. However, when measurement of body fat was calculated anthropometrically, 16.8% of the subjects were underweight, 66.4% were of normal weight, and only 16.8% were categorized as obese. Yearly weight change demonstrated a higher correlation with an increase in body fat than with an increase in body weight. Significant but low correlations were noted between body composition and portions of the personality profile. Individuals with more than 30% body fat tended to lack self-confidence and were more concerned about their own needs than the needs of others. Interrelationships were also found between per cent of body fat, meal skipping frequency, and smoking frequency.

Results of the 24-hour dietary recall indicated that 32.8% of the participants consumed inadequate diets. Approximately two-thirds of the subjects had inadequate intake of dark green and yellow vegetables and citrus fruit. Roughly one-half of the subjects consumed more meat and bread-cereal products than was recommended in the "Basic Four" food groups. Significant relationships were found between diet score and type of student's living arrangements and bread-cereal intake and

physical activity. When asked about meal skipping, 79% of the sample stated that they skipped meals. Breakfast was the meal most commonly skipped.

The strongest relationship was noted between personality and physical activity. Thirteen of the 24 personality scales were significantly correlated with physical activity at the 5% and 1% levels of confidence. The individual who scored high on the physical activity evaluation saw himself as masculine, mature, energetic, active, strong, healthy, and courageous. The subjects who were more active had achieved a high degree of personal adjustment and were extremely adaptable to change. They demonstrated a need to belong to a group but possessed the ability to emerge as leader.

## ACKNOWLEDGMENTS

Appreciation is expressed to Dr. Lucille M. Wakefield for advice and support in the accomplishment of this research. The author wishes to acknowledge Miss Gwendolyn Tinklin and Dr. Wayne Rohrer for editorial assistance in preparing this manuscript and for serving on the author's advisory committee.

The assistance of Dr. Holly C. Fryer and Norberto T. Ison with the statistical design and analysis of data for this study was greatly appreciated.

The author is indebted to those who served as subjects for their cooperation and participation in the study. Special appreciation is expressed to my wife, Paterna, for her encouragement and understanding.

## LITERATURE CITED

1. Committee on Nutritional Anthropometry of the Food and Nutrition Board of the National Research Council 1956 Recommendations concerning body measurements for the characterization of nutritional status. Hum. Biol., 28:111.
2. Marks, Herbert H. 1956 Body weight: facts from life insurance records. Hum. Biol., 28:217.
3. Anonymous 1960 Overweight: Its Prevention and Significance. A series of articles reprinted from Statistical Bulletin. Metropolitan Life Insurance Company.
4. Hathaway, M. L. and E. D. Foard 1960 Heights and weights of adults in the United States. Home Econ. Res. Rep. No. 10. Agriculture Research Service, U.S. Department of Agriculture, Washington, D.C.
5. Fisher, K. H. and R. W. Swift 1959 Calories and body weight. Food, the Yearbook of Agriculture, U.S. Department of Agriculture, Washington, D.C.
6. Seltser, C. C. and J. Mayer 1965 A simple criterion of obesity. Postgrad. Med., 38:A-101.
7. Garn, S. M. 1962 Anthropometry in clinical appraisal of nutritional status. Amer. J. Clin. Nutr., 11:418.
8. Massler, Maury 1945 Calculation of normal weight. Child Develop., 16:111.
9. Elbel, E. R. and R. I. Canuteson 1962 Heights and weights of college students. In: Kans. Studies in Educ., 12:1.
10. Davenport, Charles B. 1923 Body build and its inheritance. Carnegie Institute of Washington, Washington, D.C.
11. Sanders, B. S. 1964 Measuring community health levels. Amer. J. Pub. Health, 54:1062.
12. Brozek, J. 1956 Bony dimensions and the estimation of men's reference weight. Science, 124:685.
13. Brozek, J. 1956 Physique and nutritional status of adult men. Hum. Biol., 28:124.
14. Sargent, D. W. 1963 Weight-height relationship of young men and women. Amer. J. Clin. Nutr., 13:318.

15. Billewicz, W. Z., W. F. Kemsley and A. M. Thompson 1962 Indices of adiposity. *Brit. J. Prev. Soc. Med.*, 16:183.
16. Pryor, Helen B. 1940 *Width-Weight Tables*. Stanford Univ. Press, Stanford.
17. Turner, Abby H. 1943 Body weight optimal for young adult women. *Res. Quart.*, 14:255.
18. Matiegka, J. 1921 The testing of physical efficiency. *Amer. J. Phys. Anthropol.*, 4:223.
19. Keys, A. and J. Brozek 1953 Body fat in adult man. *Physiol. Rev.*, 33:245.
20. Young, C. M. 1962 Predicting body fatness of young women on the basis of skinfolds. *N. Y. State J. Med.*, 62:1671.
21. Garn, S. M. 1956 Comparison of pinch caliper and x-ray measurements of skin plus subcutaneous fat. *Science*, 124:178.
22. Seltzer, C. C., R. F. Goldman and J. Mayer 1965 The triceps skinfold as a predictive measure of body density and body fat in obese adolescent girls. *Pediatrics*, 36:212.
23. Brozek, J., J. K. Kihlberg, H. L. Taylor and A. Keys 1963 Skinfold distribution in middle-aged American men: A contribution to norms of leanness-fatness. *Ann. N. Y. Acad. Sci.*, 110:492.
24. Crook, Guy H. 1966 Evaluation of skinfold measurements and weight charts to measure body fat. *J.A.M.A.*, 198:157.
25. Pascale, L. R., M. I. Grossman, H. S. Sloane and T. Frankel 1956 Correlations between thickness of skinfolds and body density in 88 soldiers. *Hum. Biol.*, 28:165.
26. Hechter, H. 1959 The relationship between weight and some anthropometric measurements in adult males. *Hum. Biol.*, 31:235.
27. Behnke, A. R., O. E. Guttentag, C. Brodsky 1959 Quantification of body weight and configuration from anthropometric measurements. *Hum. Biol.*, 31:213.
28. Steinkamp, R. C., N. L. Cohen, W. E. Siri, T. W. Sargent and H. E. Walsh 1965 Measures of body fat and related factors in normal adults--I. Introduction and methodology. *J. Chron. Dis.*, 18:1279.
29. Steinkamp, R. C., N. L. Cohen, W. R. Gaffey, T. McKey, G. Bron, W. E. Siri, T. W. Sargent and E. Issacs 1965 Measures of body fat and related factors in normal adults--II. A simple clinical method to estimate body fat and lean body mass. *J. Chron. Dis.*, 18:1291.

30. Leitch, I. and I. C. Aitken 1950 Technique and interpretation of dietary surveys. *Nutr. Abstr. and Rev.*, 19:507.
31. Trulson, M. F. 1954 Assessment of dietary study methods. I. Comparison for obtaining data for clinical work. *J. Amer. Diet. Ass.*, 30:991.
32. Trulson, M. F. and M. B. McCann 1959 Comparison of dietary survey methods. *J. Amer. Diet. Ass.*, 35:672.
33. Young, C. M., G. C. Hogan, R. E. Tucker and D. Foster 1952 A comparison of dietary study methods. II. Dietary history versus seven-day records versus 24-hour recall. *J. Amer. Diet. Ass.*, 28:218.
34. Anderson, R. K. and H. R. Sandstead 1947 Nutritional appraisal and demonstration program of the U.S. Public Health Service. *J. Amer. Diet. Ass.*, 23:101.
35. Young, C. M. 1959 The interview itself. *J. Amer. Diet. Ass.*, 35:677.
36. Wakefield, Lucille M. 1966 The interview technique in research: Source of bias. *J. Home Econ.*, 58:640.
37. Church, H. N., M. M. Clayton, C. M. Young and W. D. Foster 1954 Can different interviewers obtain comparable dietary survey data? *J. Amer. Diet. Ass.*, 30:777.
38. Rose, M. R. 1937 *Laboratory Handbook for Dietetics*. Macmillan Co., New York.
39. Orr, J. B. and I. Leitch 1938 The determination of the caloric requirements of man. *Nutr. Abstr. and Rev.*, 7:509.
40. Passmore, R. and J. V. G. A. Durnin 1955 Human energy expenditure. *Physiol. Rev.*, 35:807.
41. Johnson, M. L., B. S. Burke and J. Mayer 1956 Relative importance of inactivity and overeating in the energy balance of obese high school girls. *Amer. J. Clin. Nutr.*, 4:37.
42. Hutson, E. J., N. L. Cohen, N. D. Kunkel, R. C. Steinkamp, M. H. Rourke and H. E. Walsh 1965 Measures of body fat and related factors in normal adults. III. Diets and physical activity. *J. Amer. Diet. Ass.*, 47:179.
43. Henry, F. 1941 Personality differences in athletes in physical education and aviation students. *Psychol. Bull.*, 38:745.

44. Kroll, W. and K. H. Petersen 1965 Personality factor profiles of collegiate football teams. Res. Quart., 36:433.
45. Behrman, R. M. 1967 Personality differences between swimmers and nonswimmers. Res. Quart., 38:163.
46. Bullen, B. A., L. F. Monello, H. Cohen and J. Mayer 1963 Attitudes toward physical activity, food and family in obese and nonobese adolescent girls. Amer. J. Clin. Nutr., 7:55.
47. Hartshorne, H. and M. A. May 1930 Studies in the Nature of Character. III. Studies in the Organization of Character. Macmillan and Co., New York.
48. Allport, G. W. and H. Odbert 1936 Trait names: A psycho-lexical study. Psychol. Monogr., 47:1.
49. Cattell, R. B. 1943 The description of personality. 2. Basic traits resolved into clusters. J. Abnorm. Soc. Psychol., 38:467.
50. Gough, H. G. and A. B. Heilbrun 1965 The Adjective Check List Manual. Consulting Psychologists Press, Palo Alto, California.
51. Mueller, K. H. 1935 The affective character of the major and minor modes in music. Amer. J. Psychol., 47:103.
52. Mueller, K. H. 1937 The affective value of sound in poetry. Amer. J. Psychol., 49:621.
53. Black, J. D. 1956 Adjectives associated with various MMPI codes. In: Welsh, G. S. and W. G. Dalstrom, Eds. Basic Readings on the MMPI in Psychology and Medicine. University of Minnesota Press, Minneapolis.
54. Heilbrun, A. B. 1958 Relationships between the Adjective Check List, Personal Preference Schedule and desirability factors under varying defensiveness conditions. J. Clin. Psychol., 14:283.
55. Wyden, P. 1965 The Overweight Society. William Morrow and Co., New York.
56. Young, C. M., E. Day and H. H. Williams 1954 Nutritional Status Studies of Students. Cornell University, Ithaca, New York.
57. Read, M. S. and F. P. Heald 1965 Adolescent obesity: A summary of a symposium. J. Amer. Diet. Ass., 47:411.
58. Humphreys, L. G. 1957 Characteristics of type concepts with special reference to Sheldon's typology. Psychol. Bull., 54:218.

59. Paterson, D. G. 1930 Personality and Physique. In: Measurements of Man, Harris, J. A., C. M. Jackson, D. G. Paterson and R. E. Scammon. University of Minnesota, Minneapolis.
60. Sheldon, W. H. 1940 The Varieties of Human Physique. Harper, New York.
61. Sheldon, W. H. 1942 The Varieties of Temperament: A Psychology of Constitutional Differences. Harper, New York.
62. Child, I. L. 1950 The relationship of somatotype to self-rating of Sheldon's temperamental traits. Journal of Personality, 18:40.
63. Glueck, S. and E. Glueck 1956 Physique and Delinquency. Harper, New York.
64. Parnell, R. W. 1958 Behavior and Physique. Arnold, London.
65. Walker, R. N. 1962 Body build and behavior in young children. I. Body build and nursery school teacher's ratings. Monographs of the Society for Research in Child Development, 27:3, Serial No. 84.
66. Walker, R. N. 1963 Body build and behavior in young children. II. Body build and parents' ratings. Child Develop., 34:1.
67. Brodsky, C. M. 1954 A study of norms for body form-behavior relationships. Catholic University of America Press, Washington, D.C.
68. Lerner, Richard M. 1969 The development of stereotyped expectancies of body build behavior relations. Child Develop., 40:137.
69. Lerner, Richard M. 1969 Some female stereotypes of male body build-behavior relations. Percept. Motor Skills, 28:363.
70. Maddox, George L., K. W. Back and V. L. Lederman 1968 Overweight as social deviance and disability. J. of Health and Soc. Behav., 9:287.
71. Bruch, Hilde 1957 The Importance of Overweight. Norton, New York.
72. Bruch, Hilde 1957 The emotional significance of the preferred weight. Amer. J. Clin. Nutr., 5:192.
73. Cappon, D. 1966 Distorted body perception in obesity. J. Nerv. Ment. Dis., 146:465.
74. Stunkard, A. and M. Mendelson 1967 Obesity and body image. Amer. J. Psychiat., 123:134.

75. Goldblatt, P. B., M. E. Moore and A. J. Stunkard 1965 Social factors in obesity. J.A.M.A., 192:1039.
76. Meyer, J. E. and A. Tuchelt-Gallwitz 1968 A study on social image and the problem of psychogenetic factors in obesity. J. Compr. Psychiatry, 9:148.
77. Biddulph, L. G. 1954 Athletic achievement and the personal and social adjustment of high school boys. Res. Quart., 25:1.
78. Merriman, J. B. 1960 Relationship of personality traits to motor ability. Res. Quart., 31:163.
79. Cavanaugh, J. O. 1942 Recreation in relation to personality adjustment. J. Soc. Psychol., 15:63.
80. Sperling, A. P. 1942 The relationship between personality adjustment and achievement in physical education activities. Res. Quart., 13:351.
81. Ibrahim, Hilmi 1969 Recreational preference and personality. Res. Quart., 40:76.
82. Jokl, Ernst 1963 Physical activity and body composition: fitness and fatness. Ann. N. Y. Acad. Sci., 110:779.
83. Parizkova, Jana 1963 Impact of age, diet, and exercise on man's body composition. Ann. N. Y. Acad. Sci., 110:661.
84. Stefanik, P. A., F. P. Heald and J. Mayer 1959 Caloric intake in relation to energy output of obese and nonobese adolescent boys. Amer. J. Clin. Nutr., 7:55.
85. Peckos, P. S. 1953 Caloric intake in relation to physique in children. Science, 117:631.
86. Taggart, N. 1962 Diet, activity and body weight. A study of variations in a woman. Brit. J. Nutr., 16:223.
87. Grossman, M. I. and H. S. Sloane 1955 Some relations between body weight, body fat and caloric intake. Amer. J. Clin. Nutr., 3:403.
88. Miller, D. S. and P. Mumford 1967 Gluttony 1. An experimental study of overeating low or high protein diets. Amer. J. Clin. Nutr., 20:121.
89. Miller, D. S., P. Mumford and M. J. Stock 1967 Gluttony 2. Thermogenesis in overeating man. Amer. J. Clin. Nutr., 20:1223.
90. Tepperman, J. 1962 Metabolic and Endocrine Physiology. Year Book of Medical Publishers, Chicago, Ill.

91. Edholm, O. G., J. G. Fletcher, E. M. Widdowson and R. A. McCance  
1955 The energy expenditure and food intake of individual men.  
Brit. J. Nutr., 9:286.
92. Interdepartmental Committee on Nutrition for National Defense  
1963 Manual for Nutrition Surveys. U.S. Govt. Printing Office,  
Washington, D.C.
93. Watt, B. K. and A. L. Merrill 1963 Composition of Foods--Raw,  
Processed, Prepared. USDA Agric. Handbook No. 8.

## APPENDIX

## Form I: GENERAL INFORMATION

NAME: \_\_\_\_\_

DATE OF BIRTH: \_\_\_\_\_

HOMETOWN: \_\_\_\_\_

NUMBER OF BROTHERS: \_\_\_\_\_ SISTERS: \_\_\_\_\_

NUMBER OF BROTHERS AND SISTERS OLDER THAN YOU: \_\_\_\_\_

ARE YOU MARRIED? \_\_\_\_\_ NUMBER OF CHILDREN \_\_\_\_\_

LIVING ARRANGEMENTS AT KSU

1. DORMITORY
2. APARTMENT
3. FRATERNITY
4. ROOM
5. OTHER \_\_\_\_\_

NUMBER OF ROOMMATES \_\_\_\_\_

DO YOU COOK YOUR OWN MEALS? \_\_\_\_\_

DO YOU EVER SKIP MEALS? \_\_\_\_\_

TIMES PER WEEK

1. BREAKFAST \_\_\_\_\_
2. LUNCH \_\_\_\_\_
3. DINNER \_\_\_\_\_

DO YOU SMOKE? \_\_\_\_\_ FREQUENCY \_\_\_\_\_ PACKS/WEEK

DO YOU DATE? \_\_\_\_\_ FREQUENCY \_\_\_\_\_ TIMES/WEEK

(If unmarried)

(Do not write below dotted line)

.....

PHYSICAL MEASUREMENTS

ACTUAL HEIGHT \_\_\_\_\_ in.

WEIGHT \_\_\_\_\_ lb.

% BODY FAT: Iliac Crest Circumference \_\_\_\_\_ cm.

Arm Skinfold \_\_\_\_\_ mm.

Thigh Circumference \_\_\_\_\_ cm.

Thorax Skinfold \_\_\_\_\_ mm.

% OF CALCULATED BODY FAT \_\_\_\_\_ %

## Form II: INTERESTS AND ACTIVITIES\*

Directions: Read each item carefully. If the item is something that you like to do place a check in the LIKE column. If the item is something that you actually do place a check in the DO column. Sometimes you may mark both the LIKE and DO columns, and sometimes, neither of them.

<u>LIKE</u>	<u>DO</u>		<u>LIKE</u>	<u>DO</u>	
_____	_____	1. Listen to the radio	_____	_____	21. Collect coins
_____	_____	2. Read short stories	_____	_____	22. Collect pictures
_____	_____	3. Read novels	_____	_____	23. Use a camera
_____	_____	4. Go to movies	_____	_____	24. Repair things
_____	_____	5. Read the front page of a newspaper	_____	_____	25. Work with tools
_____	_____	6. Read the sports page of a newspaper	_____	_____	26. Drive a car
_____	_____	7. Read the comics sec- tion of a newspaper	_____	_____	27. Play with animals
_____	_____	8. Do cross-word puzzles	_____	_____	28. Raise animals
_____	_____	9. Draw or paint	_____	_____	29. Go fishing
_____	_____	10. Work in a laboratory	_____	_____	30. Hike
_____	_____	11. Model or design	_____	_____	31. Jog
_____	_____	12. Do housework	_____	_____	32. Ride a bicycle
_____	_____	13. Sing	_____	_____	33. Ride a motorcycle
_____	_____	14. Play the piano	_____	_____	34. Ride a horse
_____	_____	15. Listen to records	_____	_____	35. Play cards
_____	_____	16. Write creatively	_____	_____	36. Play checkers
_____	_____	17. Give speeches	_____	_____	37. Play chess
_____	_____	18. Play an instrument	_____	_____	38. Go to church
_____	_____	19. Visit museums	_____	_____	39. Belong to a club
_____	_____	20. Collect stamps	_____	_____	40. Go to parks

## Form II (cont'd.)

<u>LIKE</u>	<u>DO</u>	
_____	_____	41. Swim
_____	_____	42. Water ski
_____	_____	43. Play football
_____	_____	44. Play basketball
_____	_____	45. Watch television
_____	_____	46. Sing in a chorus
_____	_____	47. Play ping pong
_____	_____	48. Watch football games
_____	_____	49. Play softball
_____	_____	50. Play in a band
_____	_____	51. Go camping
_____	_____	52. Watch basketball games
_____	_____	53. Go to dances
_____	_____	54. Go to parties
_____	_____	55. Play tennis
_____	_____	56. Go hunting

\* Adapted from the California Test of Personality.

## Form III: SUMMARY AND SCORE CARD OF FOOD INTAKE

Name \_\_\_\_\_

Basic 4 Food Grp.	Amount Recommended	Credits	Actual Daily Servings	Credit	% of Min Amt. Rec
Milk	2 glasses or more	2 glasses	25		
		1 glass	15		
		1/2 glass	10		
		Maximal	25		
Meat	2 servings or more	2 servings including 1 of meat, fish or poultry	25		
		1 serving of any of the above	15		
		1 serving of another food in meat group	10		
		Maximal	25		
Vegetable Fruit	4 servings or more	1 serving citrus fruit	10		
		1 serving of dark green or yellow vegetable	10		
		2 servings of any fruit or vegetable	10		
		Maximal	30		
Bread- Cereal	4 servings or more	4 servings	20		
		3 servings	15		
		2 servings	10		
		1 serving	5		
		Maximal	20		
TOTALS			100		

Miscellaneous--No credit

List items that would be considered  
 "unnecessary extras" in the diet  
 i.e. candy bars, soft drinks, beer, etc.

## Form IV: RELEASE FOR MEDICAL RECORDS

I, hereby, request and authorize the Student Health Center, Kansas State University, Manhattan, Kansas, to furnish to Keith Hooper information from my medical record concerning my body height and body weight.

---

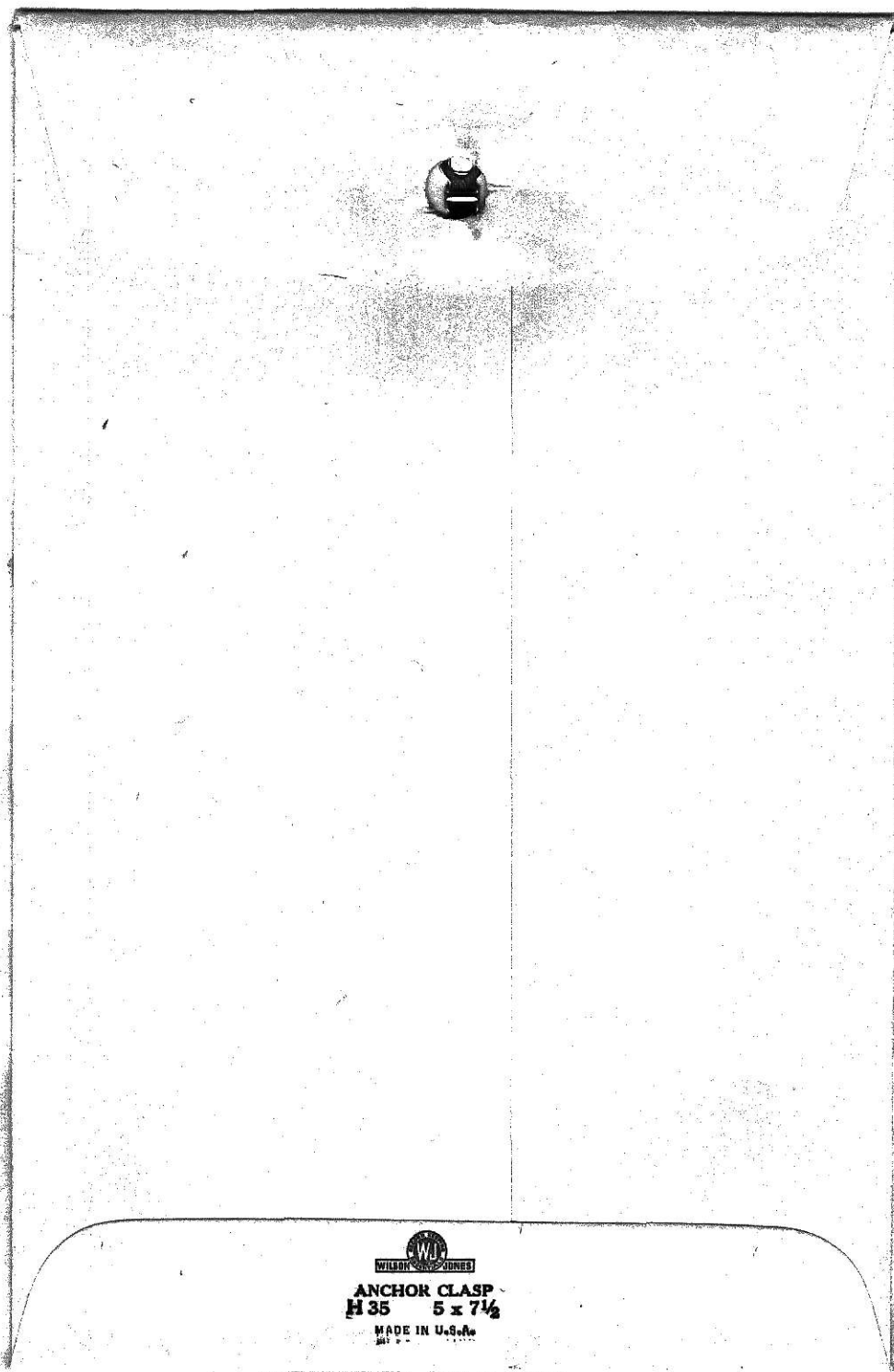
Signature

---

Date

Form V: NCS ANSWER SHEET FOR THE ADJECTIVE CHECK LIST

Form VI: NCS PROFILE SHEET FOR THE ADJECTIVE CHECK LIST



**WILSON JONES**  
**ANCHOR CLASP**  
**#135 5 x 7 1/2**  
**MADE IN U.S.A.**

NAME (see directions below)

[illegible]

**DIRECTIONS FOR USING NAME GRID:** In the boxes above, print your last name first. Skip a box, then print as much of your first name as possible. Below each box blacken the circle that is lettered the same as the letter in the box. Blacken the blank circle for spaces.

**I. D. NO./SPECIAL CODES**  
(use only as directed)

[illegible]

FOR NCS  
USE ONLY

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

**AGE**

DATE \_\_\_\_\_

SCHOOL

NCS ANSWER SHEET FOR  
THE ADJECTIVE CHECK LIST  
BY HARRISON G. GOUGH

Copyright 1952 by Harrison G. Gough, Ph.D.  
University of California, Berkeley  
Published by Consulting Psychologists Press  
577 College Ave., Palo Alto, Calif.

### DIRECTIONS FOR USING NCS ANSWER SHEET

This answer sheet contains a list of 300 adjectives. Please read them quickly and blacken in the circle beside each one you would consider to be self-descriptive. Do not worry about duplications, contradictions, and so forth. Work quickly and do not spend too much time on any one adjective. Try to be frank, and fill the circles for the adjectives which describe you as you really are, not as you would like to be. **BE SURE TO TURN THE PAGE OVER** and continue through adjective No. 300 on the reverse side.

● Use No. 2½ or softer pencil ● Fill circles heavily ● Erase any errors or stray marks completely ● Do not use ball point or ink ● Example: ●

- |  |   |  |  |  |
|--|---|--|--|--|
| 1 <input type="radio"/> absent-minded  | 31 <input type="radio"/> cheerful       | 61 <input type="radio"/> dependent     | 91 <input type="radio"/> foresighted   | 121 <input type="radio"/> impulsive        |
| 2 <input type="radio"/> active         | 32 <input type="radio"/> civilized      | 62 <input type="radio"/> despondent    | 92 <input type="radio"/> forgetful     | 122 <input type="radio"/> independent      |
| 3 <input type="radio"/> adaptable      | 33 <input type="radio"/> clear-thinking | 63 <input type="radio"/> determined    | 93 <input type="radio"/> forgiving     | 123 <input type="radio"/> indifferent      |
| 4 <input type="radio"/> adventurous    | 34 <input type="radio"/> clever         | 64 <input type="radio"/> dignified     | 94 <input type="radio"/> formal        | 124 <input type="radio"/> individualistic  |
| 5 <input type="radio"/> affected       | 35 <input type="radio"/> coarse         | 65 <input type="radio"/> discreet      | 95 <input type="radio"/> frank         | 125 <input type="radio"/> industrious      |
| 6 <input type="radio"/> affectionate   | 36 <input type="radio"/> cold           | 66 <input type="radio"/> disorderly    | 96 <input type="radio"/> friendly      | 126 <input type="radio"/> infantile        |
| 7 <input type="radio"/> aggressive     | 37 <input type="radio"/> commonplace    | 67 <input type="radio"/> dissatisfied  | 97 <input type="radio"/> frivolous     | 127 <input type="radio"/> informal         |
| 8 <input type="radio"/> alert          | 38 <input type="radio"/> complaining    | 68 <input type="radio"/> distractible  | 98 <input type="radio"/> fussy         | 128 <input type="radio"/> ingenious        |
| 9 <input type="radio"/> aloof          | 39 <input type="radio"/> complicated    | 69 <input type="radio"/> distrustful   | 99 <input type="radio"/> generous      | 129 <input type="radio"/> inhibited        |
| 10 <input type="radio"/> ambitious     | 40 <input type="radio"/> conceited      | 70 <input type="radio"/> dominant      | 100 <input type="radio"/> gentle       | 130 <input type="radio"/> initiative       |
| 11 <input type="radio"/> anxious       | 41 <input type="radio"/> confident      | 71 <input type="radio"/> dreamy        | 101 <input type="radio"/> gloomy       | 131 <input type="radio"/> insightful       |
| 12 <input type="radio"/> apathetic     | 42 <input type="radio"/> confused       | 72 <input type="radio"/> dull          | 102 <input type="radio"/> good-looking | 132 <input type="radio"/> intelligent      |
| 13 <input type="radio"/> appreciative  | 43 <input type="radio"/> conscientious  | 73 <input type="radio"/> easy-going    | 103 <input type="radio"/> good-natured | 133 <input type="radio"/> interests narrow |
| 14 <input type="radio"/> argumentative | 44 <input type="radio"/> conservative   | 74 <input type="radio"/> effeminate    | 104 <input type="radio"/> greedy       | 134 <input type="radio"/> interests wide   |
| 15 <input type="radio"/> arrogant      | 45 <input type="radio"/> considerate    | 75 <input type="radio"/> efficient     | 105 <input type="radio"/> handsome     | 135 <input type="radio"/> intolerant       |
| 16 <input type="radio"/> artistic      | 46 <input type="radio"/> contented      | 76 <input type="radio"/> egotistical   | 106 <input type="radio"/> hard-headed  | 136 <input type="radio"/> inventive        |
| 17 <input type="radio"/> assertive     | 47 <input type="radio"/> conventional   | 77 <input type="radio"/> emotional     | 107 <input type="radio"/> hard-hearted | 137 <input type="radio"/> irresponsible    |
| 18 <input type="radio"/> attractive    | 48 <input type="radio"/> cool           | 78 <input type="radio"/> energetic     | 108 <input type="radio"/> hasty        | 138 <input type="radio"/> irritable        |
| 19 <input type="radio"/> autocratic    | 49 <input type="radio"/> cooperative    | 79 <input type="radio"/> enterprising  | 109 <input type="radio"/> headstrong   | 139 <input type="radio"/> jolly            |
| 20 <input type="radio"/> awkward       | 50 <input type="radio"/> courageous     | 80 <input type="radio"/> enthusiastic  | 110 <input type="radio"/> healthy      | 140 <input type="radio"/> kind             |
| 21 <input type="radio"/> bitter        | 51 <input type="radio"/> cowardly       | 81 <input type="radio"/> evasive       | 111 <input type="radio"/> helpful      | 141 <input type="radio"/> lazy             |
| 22 <input type="radio"/> blustery      | 52 <input type="radio"/> cruel          | 82 <input type="radio"/> excitable     | 112 <input type="radio"/> high-strung  | 142 <input type="radio"/> leisurely        |
| 23 <input type="radio"/> boastful      | 53 <input type="radio"/> curious        | 83 <input type="radio"/> fair-minded   | 113 <input type="radio"/> honest       | 143 <input type="radio"/> logical          |
| 24 <input type="radio"/> bossy         | 54 <input type="radio"/> cynical        | 84 <input type="radio"/> fault-finding | 114 <input type="radio"/> hostile      | 144 <input type="radio"/> loud             |
| 25 <input type="radio"/> calm          | 55 <input type="radio"/> daring         | 85 <input type="radio"/> fearful       | 115 <input type="radio"/> humorous     | 145 <input type="radio"/> loyal            |
| 26 <input type="radio"/> capable       | 56 <input type="radio"/> deceitful      | 86 <input type="radio"/> feminine      | 116 <input type="radio"/> hurried      | 146 <input type="radio"/> mannerly         |
| 27 <input type="radio"/> careless      | 57 <input type="radio"/> defensive      | 87 <input type="radio"/> fickle        | 117 <input type="radio"/> idealistic   | 147 <input type="radio"/> masculine        |
| 28 <input type="radio"/> cautious      | 58 <input type="radio"/> deliberate     | 88 <input type="radio"/> flirtatious   | 118 <input type="radio"/> imaginative  | 148 <input type="radio"/> mature           |
| 29 <input type="radio"/> changeable    | 59 <input type="radio"/> demanding      | 89 <input type="radio"/> foolish       | 119 <input type="radio"/> immature     | 149 <input type="radio"/> meek             |
| 30 <input type="radio"/> charming      | 60 <input type="radio"/> dependable     | 90 <input type="radio"/> forceful      | 120 <input type="radio"/> impatient    | 150 <input type="radio"/> methodical       |

Scored by NATIONAL COMPUTER SYSTEMS,  
1015 So. 6th Street, Minneapolis, Minn. 55415

CONTINUE ON REVERSE SIDE

# DO NOT WRITE IN SHADED AREA

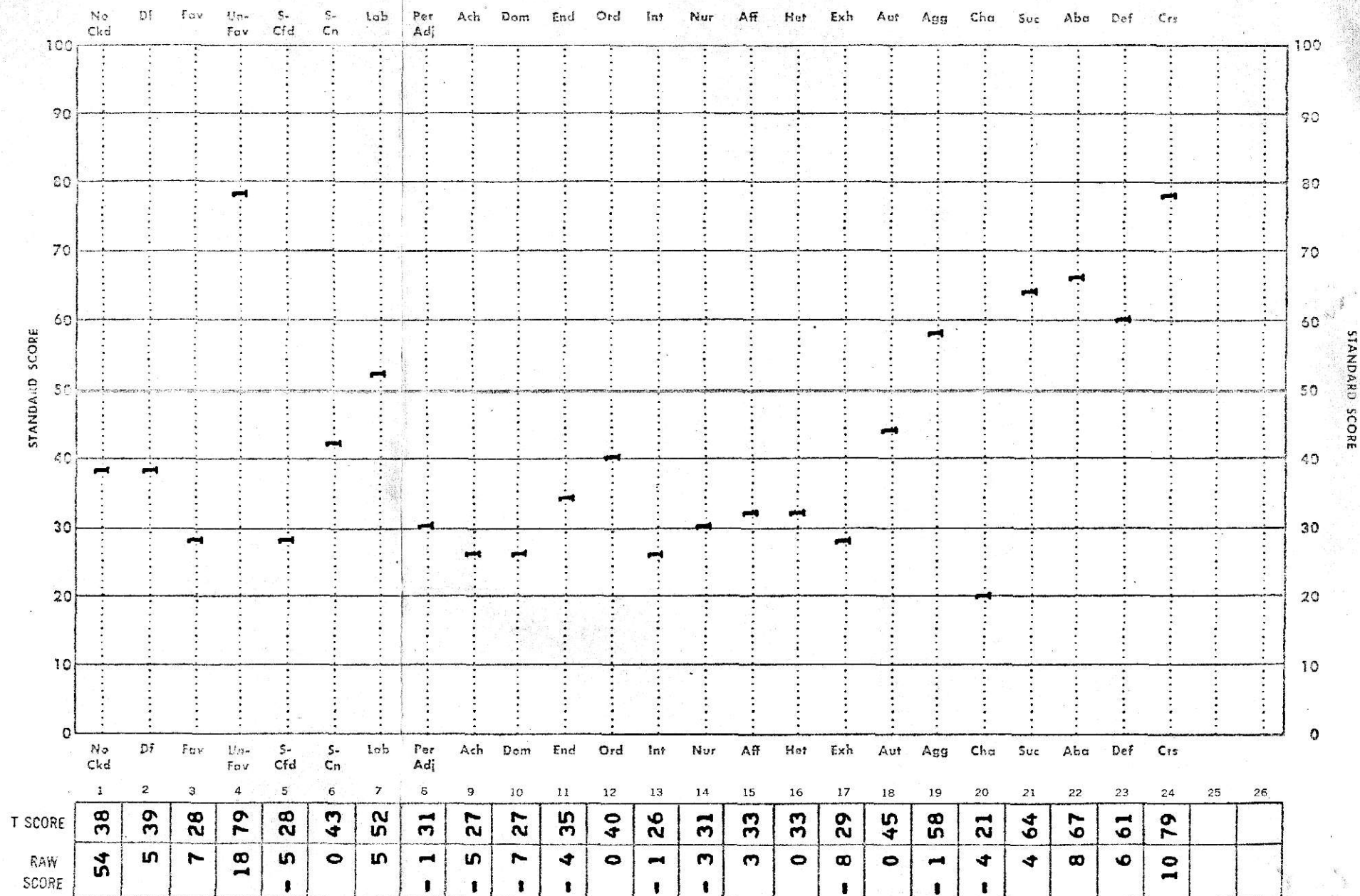
● Use No. 2½ or softer pencil ● Fill circles heavily ● Erase any errors or stray marks completely ● Do not use ball point or ink

- |                        |                     |                       |                     |                      |
|------------------------|---------------------|-----------------------|---------------------|----------------------|
| 151 ○ mild             | 181 ○ practical     | 211 ○ sarcastic       | 241 ○ sophisticated | 271 ○ tough          |
| 152 ○ mischievous      | 182 ○ praising      | 212 ○ self-centered   | 242 ○ spendthrift   | 272 ○ trusting       |
| 153 ○ moderate         | 183 ○ precise       | 213 ○ self-confident  | 243 ○ spineless     | 273 ○ unaffected     |
| 154 ○ modest           | 184 ○ prejudiced    | 214 ○ self-controlled | 244 ○ spontaneous   | 274 ○ unambitious    |
| 155 ○ moody            | 185 ○ preoccupied   | 215 ○ self-denying    | 245 ○ spunky        | 275 ○ unassuming     |
| 156 ○ nagging          | 186 ○ progressive   | 216 ○ self-pitying    | 246 ○ stable        | 276 ○ unconventional |
| 157 ○ natural          | 187 ○ prudish       | 217 ○ self-punishing  | 247 ○ steady        | 277 ○ undependable   |
| 158 ○ nervous          | 188 ○ quarrelsome   | 218 ○ self-seeking    | 248 ○ stern         | 278 ○ understanding  |
| 159 ○ noisy            | 189 ○ queer         | 219 ○ selfish         | 249 ○ stingy        | 279 ○ unemotional    |
| 160 ○ obliging         | 190 ○ quick         | 220 ○ sensitive       | 250 ○ stolid        | 280 ○ unexcitable    |
| 161 ○ obnoxious        | 191 ○ quiet         | 221 ○ sentimental     | 251 ○ strong        | 281 ○ unfriendly     |
| 162 ○ opinionated      | 192 ○ quitting      | 222 ○ serious         | 252 ○ stubborn      | 282 ○ uninhibited    |
| 163 ○ opportunistic    | 193 ○ rational      | 223 ○ severe          | 253 ○ submissive    | 283 ○ unintelligent  |
| 164 ○ optimistic       | 194 ○ rattlebrained | 224 ○ sexy            | 254 ○ suggestible   | 284 ○ unkind         |
| 165 ○ organized        | 195 ○ realistic     | 225 ○ shallow         | 255 ○ sulky         | 285 ○ unrealistic    |
| 166 ○ original         | 196 ○ reasonable    | 226 ○ sharp-witted    | 256 ○ superstitious | 286 ○ unscrupulous   |
| 167 ○ outgoing         | 197 ○ rebellious    | 227 ○ shiftless       | 257 ○ suspicious    | 287 ○ unselfish      |
| 168 ○ outspoken        | 198 ○ reckless      | 228 ○ show-off        | 258 ○ sympathetic   | 288 ○ unstable       |
| 169 ○ painstaking      | 199 ○ reflective    | 229 ○ shrewd          | 259 ○ tactful       | 289 ○ vindictive     |
| 170 ○ patient          | 200 ○ relaxed       | 230 ○ shy             | 260 ○ tactless      | 290 ○ versatile      |
| 171 ○ peaceable        | 201 ○ reliable      | 231 ○ silent          | 261 ○ talkative     | 291 ○ warm           |
| 172 ○ peculiar         | 202 ○ resentful     | 232 ○ simple          | 262 ○ temperamental | 292 ○ wary           |
| 173 ○ persevering      | 203 ○ reserved      | 233 ○ sincere         | 263 ○ tense         | 293 ○ weak           |
| 174 ○ persistent       | 204 ○ resourceful   | 234 ○ slipshod        | 264 ○ thankless     | 294 ○ whiny          |
| 175 ○ pessimistic      | 205 ○ responsible   | 235 ○ slow            | 265 ○ thorough      | 295 ○ wholesome      |
| 176 ○ planful          | 206 ○ restless      | 236 ○ sly             | 266 ○ thoughtful    | 296 ○ wise           |
| 177 ○ pleasant         | 207 ○ retiring      | 237 ○ smug            | 267 ○ thrifty       | 297 ○ withdrawn      |
| 178 ○ pleasure-seeking | 208 ○ rigid         | 238 ○ snobbish        | 268 ○ timid         | 298 ○ witty          |
| 179 ○ poised           | 209 ○ robust        | 239 ○ sociable        | 269 ○ tolerant      | 299 ○ worrying       |
| 180 ○ polished         | 210 ○ rude          | 240 ○ soft-hearted    | 270 ○ touchy        | 300 ○ zany           |

# **ILLEGIBLE DOCUMENT**

**THE FOLLOWING  
DOCUMENT(S) IS OF  
POOR LEGIBILITY IN  
THE ORIGINAL**

**THIS IS THE BEST  
COPY AVAILABLE**



# NCS PROFILE SHEET FOR THE ADJECTIVE CHECK LIST

Reproduced from the Manual for the Adjective Check List, by Harrison G. Gough, Ph.D. and Alfred B. Heilbrun, Jr., Ph.D.

Copyright 1962 by Consulting Psychologists Press, Inc. Palo Alto, California. All rights reserved.

## Appendix VII: DESCRIPTION OF THE TWENTY-FOUR PERSONALITY SCALES

## 1. Total number of adjectives checked.

The tendency to check more or fewer adjectives obviously reflects certain personological dispositions. Checking many adjectives seems to reflect surgency and drive, and a relative absence of repressive tendencies. Correlation with intelligence is slightly negative, so that the exuberance in behavior may possibly spring more from shallowness and inattention to ambiguities than from a deep level of involvement. The individual high on this variable tends to be described as emotional, adventurous, wholesome, conservative, enthusiastic, unintelligent, frank, and helpful. He is active, apparently means well, but tends to blunder. The man with low scores tends more often to be quiet and reserved, more tentative and cautious in his approach to problems, and perhaps taciturn and aloof. He is more apt to think originally and inventively, but is perhaps less effective in getting things done.

## 2. Defensiveness.

The high scoring person is apt to be self-controlled and resolute in both attitude and behavior, and insistent and even stubborn in seeking his objectives. His persistence is more admirable than attractive. The low-scoring subject tends to be anxious and apprehensive, critical of himself and others and given to complaints about his circumstances. He not only has more problems than his peers, but tends to dwell on them and put them at the center of his attention.

## 3. Number of favorable adjectives checked.

The individual who checks many of the favorable words in the list

appears to be motivated by a strong desire to do well and to impress others, but always by virtue of hard work and conventional endeavor. The reaction of others is to see him as dependable, steady, conscientious, mannerly, and serious. The low-scoring subject is much more of an individualist--more often seen as clever, sharp-witted, head-strong, pleasure-seeking, and original in thought and behavior. His emotions being more accessible, he also experiences anxiety, self-doubts, and perplexities.

#### 4. Number of unfavorable adjectives checked.

The individual who checks a large number of unfavorable adjectives strikes others as rebellious, arrogant, careless, conceited, and cynical. He tends to be a disbeliever, a skeptic, and a threat to the complacent beliefs and attitudes of his peers. The low-scorer is more placid, more obliging, more mannerly, more tactful, and probably less intelligent.

#### 5. Self-confidence.

Interpretation of the self-confidence scale stresses a sense of dominance, clearly one of the major elements in the syndrome defined by the scale. The high-scorer is assertive, affiliative, outgoing, persistent, an actionist. He wants to get things done, and is impatient with people or things standing in his way. He is concerned about creating a good impression, and is not above cutting a few corners to achieve his objective. He makes a distinct impression on others, who see him as forceful, self-confident, determined, ambitious, and opportunistic.

The low-scoring person is a much less effective person in the everyday sense of the word--he has difficulty in mobilizing himself and taking

action, preferring inaction and contemplation. Others see him as unassuming, forgetful, mild, preoccupied, reserved, and retiring.

#### 6. Self-control.

Several oppositional factors stand out in this scale. High scorers tend to be serious, sober individuals, interested in and responsive to their obligations. They are seen as diligent, practical, and loyal workers. At the same time there may be an element of over-control, too much emphasis on the proper means for attaining the ends of social living. At the other end of the scale one seems to find the inadequately socialized person, headstrong, irresponsible, complaining, and impulsive.

#### 7. Lability.

The high-scoring subject is seen favorably as spontaneous, but unfavorably as excitable, temperamental, restless, nervous, and high-strung. The low-scorer is more phlegmatic, routinized, planful, and conventional. He reports stricter opinions on right and wrong practices, and a greater need for order and regularity.

#### 8. Personal adjustment.

This scale seems to depict a positive attitude toward life more than an absence of problems and worries. The attitudinal set is one of optimism, cheerfulness, interest in others, and a readiness to adapt. The high-scoring subject is seen as dependable, peaceable, trusting, friendly, practical, loyal, and wholesome. He fits in well, asks for little, treats others with courtesy, and works enterprisingly toward his own goals.

The subject low on the personal adjustment scale sees himself as at

odds with other people and as moody and dissatisfied. This view is reciprocated by observers, who describe the low scorer as aloof, defensive, anxious, inhibited, and unfriendly.

#### 9. Achievement

Definition: to strive to be outstanding in pursuits of socially recognized significance.

The high-scoring subject is usually seen as intelligent and hard-working. He is determined to do well and usually succeeds. The low-scoring subject is more skeptical, more dubious about the rewards which might come from effort and involvement and uncertain about risking his labors. He tends to be somewhat withdrawn and dissatisfied with his current status.

#### 10. Dominance.

Definition: to seek and sustain leadership roles in groups or to be influential and controlling in individual relationships.

The high-scorer on this scale is a forceful, strong-willed, and persevering individual. He is confident of his ability to do what he wishes and is direct and forthright in his behavior. The low-scorer is unsure of himself, and indifferent to both the demands and the challenge of interpersonal life. He stays out of the limelight, and avoids situations calling for choice and decision-making.

#### 11. Endurance.

Definition: to persist in any task undertaken.

The subject on the endurance scale is typically self-controlled and responsible, but also idealistic and concerned about truth and justice.

The low-scorer on the other hand, is erratic and impatient, intolerant of prolonged effort or attention, and apt to change in an abrupt and quixotic manner.

## 12. Order.

Definition: to place special emphasis on neatness, organization, and planning in one's activities.

High-scorers on Order are usually sincere and dependable, but at the cost of individuality and spontaneity. These self-denying and inhibitory trends may actually interfere with the attainment of the harmony and psychic order which they seek. Low-scorers are quicker in temperament and reaction and might often be called impulsive. They prefer complexity and variety, and dislike delay, caution, and deliberation.

## 13. Intraception.

Definition: to engage in attempts to understand one's own behavior or the behavior of others.

The high-scorer is reflective and serious, as would be expected; he is also capable, conscientious, and knowledgeable. His intellectual talents are excellent and he derives pleasure from their exercise. The low-scorer may also have talent, but he tends toward profligacy and intemperateness in its use. He is aggressive in manner, and quickly becomes bored or impatient with any situation where direct action is not possible. He is a doer, not a thinker.

## 14. Nurturance.

Definition: to engage in behaviors which extend material or

emotional benefits to others.

The subject high on this scale is of a helpful, nurturant disposition, but sometimes too bland and self-disciplined. His dependability and benevolence are worthy qualities, but he may nonetheless be too conventional and solicitous of the other person. The subject scoring low on Nurturance is the opposite: skeptical, clever, and acute, but too self-centered and too little attentive to the feelings and wishes of others.

#### 15. Affiliation.

Definition: to seek and sustain numerous personal friendships.

The high-scorer is adaptable and anxious to please. He is ambitious and concerned with position, and may tend to exploit others and his relationships with them in order to gain his ends. The low-scorer is more individualistic and strong-willed, though perhaps not out of inner resourcefulness and independence. He tends to be less trusting, more pessimistic about life, and restless in any situation which intensifies or prolongs his contacts with others.

#### 16. Heterosexuality.

Definition: to seek the company of and derive emotional satisfactions from interactions with opposite-sexed peers.

The high-scorer is interested in the opposite sex as he is interested in life, experience, and most things around him in a healthy, direct, and outgoing manner. He may even be a bit naive in the friendly ingenuousness in which he approaches others. The low-scorer thinks too much, as it were, and dampens his vitality; he tends to be dispirited, inhibited,

shrewd and calculating in his interpersonal relationships.

17. Exhibition.

Definition: to behave in such a way as to elicit the immediate attention of others.

Persons who are high on this scale tend to be self-centered and even narcissistic. They are poised, self-assured and able to meet situations with aplomb, but at the same time they are quick tempered and irritable. In their dealings with others they are apt to be opportunistic and manipulative. Persons who score low tend toward apathy, self-doubt, and undue inhibition of impulse. They lack confidence in themselves and shrink from any encounter in which they will be visible or "on stage."

18. Autonomy.

Definition: to act independently of others or of social values and expectations.

The high-scorer is independent and autonomous, but also assertive and self-willed. He tends to be indifferent to the feelings of others and heedless of their preferences when he himself wishes to act. The low-scorer is of a moderate and even subdued disposition. He hesitates to take the initiative, preferring to wait and follow the dictates of others.

19. Aggression.

Definition: to engage in behaviors which attack or hurt others.

The individual high on this scale is both competitive and aggressive. He seeks to win, to vanquish, and views others as rivals. His

impulses are strong, and often undercontrolled. The individual who is low on the Aggression scale is much more of a conformist, but not necessarily lacking in courage or tenacity. He tends to be patiently diligent and sincere in his relationships with others.

## 20. Change.

Definition: to seek novelty of experience and avoid routine.

High-scoring persons are typically perceptive, alert, and spontaneous individuals who comprehend problems and situations rapidly and incisively and who take pleasure in change and variety. They have confidence in themselves and welcome the challenges to be found in disorder and complexity. The low-scorer seeks stability and continuity in his environment, and is apprehensive of ill-defined and risk-involving situations. In temperament he is patient and obliging, concerned about others, but lacking in verve and energy.

## 21. Succorance.

Definition: to solicit sympathy, affection, or emotional support from others.

Succorance appears to depict, at its high end, a personality which is trusting, guileless, and even naive in its faith in the integrity and benevolence of others. The high-scorer is dependent on others, seeks support, and expects to find it. The low-scorer is independent, resourceful, and self-sufficient, but at the same time prudent and circumspect. He has a sort of quiet confidence in his own worth and capability.

## 22. Abasement.

Definition: to express feelings of inferiority through self-criticism, guilt, or social impotence.

The high-scorer is not only submissive and self-effacing, but also appears to have problems of self-acceptance. They see themselves as weak and undeserving, and face the world with anxiety and foreboding. The low-scorer is optimistic, poised, productive, and decisive. Not fearing others, he is alert and responsive to them. His tempo is brisk, his manner confident, and his behavior effective.

## 23. Deference.

Definition: to seek and sustain subordinate roles in relationship with others.

The individual scoring high on Deference is typically conscientious, dependable, and persevering. He is self-denying not so much out of any fear of others or inferiority to them as out of a preference for anonymity and freedom from stress and external demands. The low-scorer is more energetic, spontaneous, and independent; he likes attention, likes to supervise and direct others, and to express his will. He is also ambitious, and is not above taking advantage of others and coercing them if he can attain a goal in so doing.

## 24. Counseling readiness.

The high-scorer is predominantly worried about himself and ambivalent about his status. He feels left out of things, unable to enjoy life to the fullest, and unduly anxious. He tends to be preoccupied with his problems and pessimistic about his ability to resolve them

constructively. The low-scorer is more or less free of these concerns. He is self-confident, poised, sure of himself and outgoing. He seeks the company of others, likes activity, and enjoys life in an uncomplicated way.

ASSESSMENTS OF AND INTERRELATIONSHIPS AMONG SELECTED PHYSICAL  
MEASUREMENTS, DIET, PHYSICAL ACTIVITY AND  
PERSONALITY OF COLLEGE JUNIOR MEN

by

KEITH WARREN HOOPER

A. B., Kansas State University, 1966

---

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Foods and Nutrition

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

1970

One hundred and nineteen college junior men selected randomly from Kansas State University, Manhattan, Kansas, were interviewed between February 5 and March 27, 1970. Information concerning biographical data, weight, height, body fat, diet, interests, physical activity and personality was obtained for each subject.

The subjects, as a whole, reflected the normalcy of the population from which they were selected. However, individual differences were noted in the study among body weight, per cent of body fat, dietary intake, physical activity, and personality.

A discrepancy of values was noted between the Height-Weight table and anthropometry in determining the degree of relative fatness. Height-Weight standards demonstrated that 10.1% of the participants were underweight, 53.8% were of normal weight, and 36.1% were overweight. However, when measurement of body fat was calculated anthropometrically, 16.8% of the subjects were underweight, 66.4% were of normal weight, and only 16.8% were categorized as obese. Yearly weight change since the subjects entered college demonstrated a higher correlation with an increase in body fat than with an increase in body weight. Significant but low correlations were noted between body composition and portions of the personality profile. Individuals with more than 30% body fat tended to lack self-confidence and were more concerned about their own needs than the needs of others. Interrelationships were also found among per cent of body fat, meal skipping frequency and smoking frequency.

Results of the 24-hour dietary recall indicated that 32.8% of the participants consumed inadequate diets. Approximately two-thirds of the subjects had inadequate intake of dark green and yellow vegetables and

citrus fruit. Roughly one-half of the subjects consumed more meat and bread-cereal products than was recommended by the "Basic Four" food groups. Significant relationships were found between diet score and type of student's living arrangements and bread-cereal intake and physical activity. When asked about meal skipping, 79% of the sample stated that they skipped meals. Breakfast was the meal most commonly skipped.

The strongest relationship was noted between personality and physical activity. Thirteen of the 24 personality scales were significantly correlated with physical activity at the 5% and 1% levels of confidence. The individual who scored high on the physical activity evaluation saw himself as masculine, mature, energetic, active, strong, healthy and courageous. The subjects who were more active had achieved a high degree of personal adjustment and were extremely adaptable to change. They demonstrated a need to belong to a group but possessed the ability to emerge as leader.