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Body Composition Changes among Medical Students Following Matriculation

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Abstract

Purpose: Participation in medical education has been associated with an increased propensity for poor health in other studies. Information regarding the body composition and physical activity patterns of medical students and how they are affected by the rigors of medical school is lacking in the current literature. We sought to assess changes in body composition and physical activity levels of medical students during the first three years of the curriculum.

Methods: Using anthropometric measurements, bioelectrical impedance analysis and a validated physical activity questionnaire, we measured 44 medical students upon matriculation, at the end of the preclinical curriculum (16 months after matriculation) and at the completion of the third year of clinical rotations (40 months after matriculation).

Results: The 44 subjects did not exhibit significant changes in weight, body mass index (BMI), or any measures of the various measures of body composition. However, for the 24 female subjects a negative correlation was found between the first energy expenditure measurement and the percent total body fat ($p= 0.02$, $r= -0.49$). There was also a negative relationship in the females between the second energy expenditure measurement and the percent total body fat ($p= 0.00$, $r= -0.63$). Finally, lower percent TBF was correlated with higher energy expenditure at the third measurement ($p= 0.40$, $r = -0.43$). For male subjects, there was no significant correlation between weight, BMI or percent TBF and energy expenditure.

Conclusion: Our results indicate that medical school may not necessarily be as detrimental to the health and activity profiles of medical students as is popularly believed. These findings are contradictory to most studies of medical student health and address the need for further prospective studies of health in this population. Lower percent TBF in female subjects was consistently correlated with higher self-reported energy expenditure. This finding was expected, as sedentary lifestyles are associated with overweight and obesity.

Key words: medical students, body composition, bioelectrical impedance, weight, body fat.

Background

According to the Centers for Disease Control and Prevention, the prevalence of overweight and obesity has been sharply increasing in the United States for the last 20 years (1). It is estimated that 64% of adults in the United States are overweight or obese as defined by a body mass index (BMI) of 25 kg/m^2 or greater. The factor that contributes most strongly to excess adiposity is the imbalance between an individual's caloric intake and level of physical activity (2). However, for any individual, genetic, metabolic, behavioral, environmental, cultural and socioeconomic factors can all be involved in determining one's anthropometric characteristics (2).

Overweight and obesity are associated with significant morbidity, including: cardiovascular disease, type 2 diabetes mellitus, the metabolic syndrome, cerebrovascular accidents, osteoarthritis, obstructive sleep apnea, reproductive complications, solid tumor carcinomas of the colon, gall bladder, prostate, kidney, breast and endometrium, and psychiatric disorders, such as depression. These complications contribute to 300,000 premature deaths each year in the United States (2).

Healthcare professionals are not immune to the obesity epidemic. In 2005, approximately 40% (142 of 355) of pediatricians surveyed by self-reported height and weight were overweight or obese as assessed by BMI (3). Furthermore, several studies have demonstrated poor health among medical students. In a randomized study of 20 second-year medical students at West Virginia University in 1990, 5 individuals had greater than desirable body fat, 3 had hypertension at rest, 12 had hypertensive responses to exercise, 7 had serum LDL greater the 130 mg/dL, and 3 had LDL cholesterol:HDL cholesterol ratios greater than 3.0 (4). All students in that study reported experiencing average to high levels of stress. In addition, of the 69 students in the study who returned surveys regarding lifestyle habits during medical school, over 50% reported no vigorous physical activity either during the week or on weekends. Forty-eight hour diet records from 22 randomized students showed average meals consisting of 36% fat (polyunsaturated:saturated fats = 0.43), 17% protein, and 47% carbohydrates (4). That study demonstrated that medical students eat an excess of fat in their diets and a higher than desirable proportion of saturated fats.

A study of third-year medical students at the University of Crete in Greece reported that 40% of male medical students and 23% of female medical students had a BMI of 25 kg/m^2 or greater (5). Abdominal obesity, which is associated with greater risk for diabetes mellitus, cardiovascular disease and hepatic steatosis, was found in 33.4% of male students and 21.7% of female students (5). In a 2007 Thai study, VO_2 max (or the maximum volume of oxygen one can transport and utilized during exercise) was significantly decreased in fifth-year medical students when compared to the average Thai population, indicating a decreased capacity for aerobic exercise (6).

Are these data simply a reflection of the obesity epidemic or do they result from the unique lifestyle and work stresses of physicians and medical students? Stress and long work hours beginning in medical school may negatively impact the activity level and diets of physicians. It would be of great interest to know how the lifestyle changes brought on by medical school impact the health of students throughout a typical four-year curriculum. However, we are unaware of any studies that have prospectively assessed changes in medical student health throughout medical school.

We sought to determine if the experience of medical school negatively impacts student health as assessed by body composition. The gold standard assay of body composition is dual energy X-ray absorptiometry (DEXA). However, because of convenience of use, low-cost, and portability, bioelectrical impedance devices are reliable and practical instruments for assessing body fat. Bioelectrical impedance devices measure the resistance and reactance of the body to an applied alternating current (7). In this context, resistance refers to the ability of tissues deficient in water and electrolytes (i.e. fatty tissues) to prevent electrical conduction. The lean tissues of the body, which contain approximately 73% water with electrolytes, offer little resistance to current. Reactance is a measurement of capacitance or the ability of cell membranes to store charge and thus slow down current. The differential conductance of lean and fatty tissues can therefore be used to estimate the percent fat free mass and the percent body fat of subjects (7).

Using bioelectrical impedance analysis, we expected an overall increase in percent body fat through the course of medical school at the University of New Mexico due to time constraints and changes in diet and exercise habits. We anticipated that the body composition of medical students would change only minimally during the basic medical science curriculum, because the schedule of students is fairly constant and more flexibility in schedule is provided for exercise and meal preparation. We predicted that once students entered the clinical phase of the curriculum, lifestyle changes, including longer hours spent on the wards and irregular schedules, would negatively impact activity profiles and dietary habits. In the present study, we investigated the body composition and activity profiles of medical students at three points throughout the curriculum.

Methods

Study Design

From the fall of 2004 through the summer of 2007, students from the University of New Mexico School of Medicine class of 2008 were serially assessed for body composition, age, gender, ethnicity, activity level and anthropometric measurements.

The University of New Mexico School of Medicine is a problem-based learning institution where the curriculum is divided into three phases. Phase I comprises the first 16 months of the curriculum. Students spend approximately half of each day in lecture or tutorial, with the remainder of the day reserved for laboratories, clinics and self-directed learning. Phase II is comprised of required clerkships and Phase III is a combination of mandatory and elective clinical rotations.

Three separate measurements were obtained. Two measurements were obtained during the basic medical science curriculum, once at the outset and once at the completion 16 months later. A third measurement was obtained from the same subjects after they completed one year of clinical rotations 40 months after matriculating. Subjects were identified using a numerical code that was assigned to them at the time the initial measurements were recorded, thereby allowing us to provide results to individual subjects without compromising their confidentiality.

The nature of the study was explained to subjects upon beginning medical school. It was made clear that participation was voluntary. Students who chose to participate provided informed consent. The study was approved by the UNM Health Sciences Center Human Research Review Committee.

Study Population

Fifty-six of the 75 students enrolled in the class of 2008 were initially measured in the fall of 2004. Thirty-two of the 56 subjects were female (57%), while the remaining 24 subjects (43%) were male. However, 12 students were lost to follow-up by the end of the study. Subjects who dropped out of the study were not included in statistical analysis. Reasons for loss to follow-up included remediation of an entire year of coursework (n=6), attrition from medical school (n=3), post-sophomore fellowship (n=1), pursuit of research/PhD (n=1), transfer to another medical school (n=1), and unknown reason (n=1).

Of the remaining 44 subjects, 24 (55%) were female and 20 (45%) were male. This ratio approximated the female to male ratio (57%:43%) of the entire class of 2008. The age range at the outset of the study was 21 to 41 years. The self-identified ethnicity of the research participants was as follows: 64% Caucasian, 21% Hispanic, 2% Asian, 2% Native American and 11% other. Each subject served as his or her own control.

Anthropometric measurements and bioelectrical impedance analysis

Weight was averaged from two measurements taken on identical standard bathroom scales. Subjects' height was then measured using a portable stadiometer in order to calculate body composition and body mass index (BMI) in kg/m^2.

A bioelectric impedance analyzer (RJL, Inc BIA-Quantum Impedance Analyzer) was used to measure a subject's resistance and reactance. This type of analyzer requires that two sets of two electrodes be placed directly on the alcohol-cleansed skin of subjects. One set is placed on the dorsum of the hand with one electrode at the wrist intersecting the ulnar stylus, and the other electrode directly distal to the third metacarpophalangeal joint of the middle finger. The other set is placed on the dorsum of the foot, with one electrode bisecting the ankle at the level of the medial malleolus and the other electrode proximal to the metatarsophalangeal joint of the second and third toes. Both sets of electrodes were placed on the subjects' right extremities. Subjects were instructed to wear loose-fitting clothing and to avoid eating or drinking within two hours of the measurements. Shoes were removed prior to all measurements.

Energy expenditure and activity level

The National Health Interview Survey (8) was administered at each measurement. The survey, which was developed by the National Center for Health Statistics, a division of the Centers for Disease Control and Prevention, evaluated physical activity and exercise habits during the two weeks prior to the BIA measurement. The questionnaire is included in the appendix. Using a standardized scale, self-identified individual activities were classified into metabolic equivalents (METs) which were then converted to energy expenditure values expressed as kilocalories per kilogram per day (9). Activity patterns were classified based upon the subjects calculated energy expenditure: sedentary, 0.1-1.4 kcal/kg/day; moderately active, 1.5 – 2.9 kcal/kg/day; and very active, >3.0 kcal/kg/day (10).

Statistical analysis

Group statistics were described using the Number Cruncher Statistical System for Windows 2000 (NCSS, Kaysville Utah 2000). The mean, standard deviation, and median were calculated for height, weight, and BMI. Changes in body composition were compared to categories of different levels of physical activity as determined by the National Health Interview Survey. Repeated measures of analysis were used to compare changes over the three-year duration of the study. This served to reduce variability between subjects. A p value of 0.05 was considered statistically significant.

Results

A summary of female and male anthropometric characteristics is included in Table 1. Of the 56 subjects measured upon matriculation, 44 subjects were available for all three measurements. Twenty-four subjects were female and 20 subjects were male. No significant changes were found in anthropometric measurements or body composition of male or female subjects throughout the study.

Female Characteristics

Initially, female subjects (n = 24) ranged in age from 22 to 41 years with a mean age of 26.7 years. Initial weight ranged from 43 kg to 74.5 kg with a mean weight of 58.6 kg. Female subjects demonstrated an increase in mean weight of 2.27 kg 16 months into medical school but then decreased 0.82 kg by the end of the third year of medical school. Overall, mean female weight increased by 1.45 kg throughout the study. However, these changes were not significant (p = 0.55).

Body mass index (BMI) of female subjects ranged from 16.7 to 27.2 kg/m^2 with a mean BMI of 21.9 kg/m^2 at entry into the study. Using CDC classifications of BMI, 4.17% of females were underweight (BMI < 18.5 kg/m^2), 83.3% were normal weight (BMI = 18.5 – 24.9 kg/m^2), 12.5% were overweight (BMI = 25 – 29.9 kg/m^2) and none were obese (BMI > 30 kg/m^2) (11). Mean BMI of female subjects increased 0.81 kg/m^2 by the second measurement and then decreased 0.13 kg/m^2 by the third measurement (p = 0.58). Overall, mean BMI increased by 0.68

kg/m^2 throughout the study, however, this finding was not significant (p = 0.58). At the final measurement, 8.33% of females were underweight (BMI < 18.5 kg/m^2), 66.7% were normal weight (BMI = 18.5 – 24.9 kg/m^2), 25.0% were overweight (BMI = 25 – 29.9 kg/m^2) and none were obese (BMI > 30 kg/m^2). From the initial to the last measurement, one female became underweight, three became overweight, and none became obese (see Table 2).

The mean percent total body fat (TBF) for females on initial measurement was 28.0% with a range of 14.9% to 38.3%. Mean percent TBF for female subjects increased 2.05% by the second measurement and decreased 0.68% by the third measurement. This change was not significant (p = 0.59). The mean weight of TBF at the first measurement was 16.7 kg with a range of 6.4 kg to 28.3 kg. Mean weight of TBF increased by 1.99 kg at the second measurement and decreased by 0.71 kg by the third measurement. This change was not significant (p =0.48). Mean phase angle, a measure of quantity, efficiency and overall health of body cells, remained constant and within normal limits through all three measurements, ranging from 6.00 to 6.01 (p = 1.00).

Male Characteristics

Males (n=20) at entry into the study ranged from 21 to 35 years with a mean age of 25.2 years. Their initial weight ranged from 55.5 to 120.0 kg with a mean of 78.5 kg. The mean weight of male subjects (n = 20) decreased 0.69 kg by the second measurement and increased 2.45 kg from measurement two to measurement three. Throughout the study, mean weight increased by 1.76 kg, however, this change was not significant (p = 0.88).

BMI for males at entry into the study ranged from 19.1 to 34.1 kg/m^2 with a mean BMI of 24.7 kg/m^2. None of the male subjects was underweight (BMI <18.5 kg/m^2), 60.0% of males were normal weight (BMI = 18.5 – 24.9 kg/m^2), 35.0% were overweight (BMI = 25 – 29.9 kg/m^2), and 5.00% were obese (BMI > 30 kg/m^2). Mean BMI of male subjects decreased by 0.55 kg/m^2 by the second measurement and then increased 1.0 kg/m^2 by the third measurement. Throughout the study mean BMI increased by 0.45 kg/m^2, however, these changes were not significant (p = 0.73). At the final measurement, none of the males were underweight (BMI < 18.5 kg/m^2), 50.0% were normal weight (BMI = 18.5 – 24.9 kg/m^2), 35% were overweight (BMI = 25 – 29.9 kg/m^2) and 15% were obese (BMI > 30 kg/m^2). From the initial measurement, no male subjects became underweight, none became overweight, and two became obese (see Table 2).

The mean percent TBF for males was 16.5% with a range of 8.1% to 25.1% at the first measurement. The mean percent TBF decreased by 0.12% by the second measurement and increased by 1.75% by the third measurement, however, this change was not significant (p = 0.45). Mean weight TBF for males was initially 13.5 kg with a range of 4.5 kg to 30.1 kg. Weight of TBF decreased by 0.22 kg by the second measurement and increased by 1.87 kg by the third measurement, however, this change was not significant (p = 0.62). Mean phase angle, a measure of quantity, efficiency and overall health of body cells, remained constant and within normal limits through all three measurements, ranging from 7.43-7.46 (p = 0.99).

Energy Expenditure and Activity

The Ainsworth, et. al. Physical Activity Codes scale was used to calculate energy expenditure in the weeks prior to anthropometric measurements in kcal/kg/day based on self-reported activity (9). One female and two male subjects incorrectly filled out their surveys and were excluded from analysis. Across the three study measurements, mean energy expenditure for the female subjects increased from 2.28 to 2.82 to 3.32 kcal/kg/day. However, these changes were not significant (p = 0.47). At the initial measurement, 52.2% of females were sedentary, 26.1% were moderately active, and 21.7% were very active. By the final measurement, 34.8% of females were sedentary, 17.4% were moderately active, and 47.8% were very active (see Table 3). No significant changes in activity level were observed among females throughout the study (p = 0.26).

On the other hand, energy expenditure of male subjects decreased from 3.69 to 3.47 to 3.28 kcal/kg/day over the entire study period. These changes were also not statistically significant (p = 0.28). At the initial measurement, 27.8% of males were sedentary, 27.8% were moderately active, and 44.4% were very active. By the final measurement, 44.4% of males were sedentary, 33.3% were moderately active, and 22.2% were very active (see Table 3). No significant changes in activity level were observed among males throughout the study (p = 0.29).

Correlations

The body composition of female and male subjects (weight, BMI, and percent TBF) was correlated with the reported energy expenditure at each measurement. For the female subjects there was a negative correlation between the first energy expenditure measurement and the percent total body fat (p= 0.02, r= -0.49). There was also a negative relationship in the females between the second energy expenditure measurement and the percent total body fat (P= 0.00, r= -0.63). Finally, lower percent TBF was correlated with higher energy expenditure at the third measurement (p= 0.40, r = -0.43). For male subjects, there was no significant correlation between weight, BMI or percent TBF and energy expenditure.

Discussion

Participation in medical education is intensive and demanding and has been associated with an increased propensity for poor health in other studies (4 – 6). Indicators of poor health have included diets high in saturated fat, high levels of LDL cholesterol, obesity and decreased aerobic capacity when compared to the general population (4-6). However, lacking in the current literature is information regarding the body composition and physical activity patterns of medical students and how they are affected by the rigors of medical school. We predicted we would find an overall increase in percent body fat of both male and female medical students through the course of medical school due to time constraints and changes in diet and exercise habits. We believed that lifestyle changes during the third year of medical school, including longer hours spent on the wards and irregular schedules, would negatively impact activity profiles and dietary habits. However, we found no significant changes in body composition, phase angle, anthropometric measurements or activity profiles in the 44 medical students who were followed through the first three years of medical school. We did demonstrate that lower percent TBF in female subjects was consistently correlated with higher self-reported energy expenditure. This finding was expected, as sedentary lifestyles are associated with overweight and obesity.

Our findings regarding phase angle are of utmost significance in demonstrating that subjects' biophysical profiles were not significantly impacted by medical school. Phase angle indirectly measures the quantity, efficiency and overall health of body cells. Phase angle increases with aerobic capacity and decreases with reduced physical activity and in disease states (12). Average phase angle for a healthy individual is 3 to 10 degrees depending on gender.

Mean phase angle values obtained from our subjects were within this normal range and furthermore, values remained consistent throughout the study, suggesting maintenance of physical activity levels and overall cellular health and efficiency.

Our findings, which are contradictory to most studies of medical student health, address the need for further prospective studies of health in this population. To our knowledge, all studies which showed medical school had a negative impact on health were either retrospective or only assessed subjects at a particular point in time. Of greater interest is how medical students change throughout their education, particularly in comparison to their health status prior to matriculation. We did not assess students' body composition or activity profiles prior to matriculation, but throughout the study, the proportion of overweight and obese individuals was significantly lower than that of the general population (2). It may be true that medical students tend to be more health conscious even prior to matriculation and healthy attitudes and lifestyles may be reinforced by the medical school curriculum. Our findings indicate that medical school may not necessarily be as detrimental to the health and activity profiles of medical students as is popularly believed.

Limitations

The present study had several limitations. First, there was a relatively small sample size (n=44) accounting for 59% of the entering class of 2008. However, this study was larger than several published studies which found negative health outcomes associated with medical school attendance. Initially, the ratio of males to females in the study exactly paralleled that of the class of 2008. However, more females than males were lost to follow-up, slightly skewing this ratio.

Since the study was voluntary, students with interest in activity level and fitness may have been self selected to participate. Likewise, those with worse metabolic and activity profiles and may have opted out of the study for lack of interest or avoidance of “bad news” about their body composition. However, if medical school-induced lifestyle changes truly impacted the well-being of medical students, we would expect to see body composition changes in even some of the more health-conscious individuals. Furthermore, the energy expenditure in the current study was based on subjects self reported activity level during the two weeks prior to body composition measurements. This left the reliability of this measure potentially confounded by confabulation and recall bias. In addition, dietary habits clearly impact body composition and weight but were not assessed in this study.

Although students were advised with regard hydration status, recent exercise, and food intake prior to their measurements, it is difficult to completely control for these variables. Equations used to calculate BIA vary based on a subject’s ethnicity. Since equations are not available for all ethnicities, calculations of BIA for some subjects may not be as precise. However, each subject served as his or her own control and changes would be apparent over time regardless of ethnicity. Finally, the first measurements were taken approximately one month after subjects matriculated into medical school. However, at this point students’ activity profiles and diets may have already been altered as a result of the stress of medical school. It would be beneficial in future studies to obtain a baseline measurement prior to matriculation. Despite this shortcoming, the first measurement was obtained very early in the curriculum and it would have been technically difficult to contact future medical students to participate in a study prior to matriculation.

Conclusion

Although there are clear demands imposed on students during the preclinical and clinical years of medical school, we found that such stressors do not seem to drive medical students to markedly alter their lifestyle or level of physical fitness. Further prospective studies are essential to further delineate whether or not health changes occur in medical students throughout their education. It is unclear if the health problems noted in medical students in previous studies were present throughout medical school or if the pressures and sacrifices of medical education induced these problems. It would also be interesting to: 1) determine if body composition changes are more or less pronounced in students participating in a traditional medical school curriculum as opposed to one that is problem based, and 2) to replicate the study on resident doctors as they progress through their post-graduate training.

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TABLE 1

Mean values for female and male subjects, all characteristics

Females (n = 24)	Measurement # 1 Mean (SD)	Measurement # 2 Mean (SD)	Measurement # 3 Mean (SD)
Age	26.7 (4.72)	28.0 (4.73)	29.3 (4.74)
Weight (kg)	58.6 (6.82)	60.9 (7.76)	60.0 (7.14)
Height (cm)	163 (6.50)	164 (6.78)	163 (6.71)
BMI	21.9 (2.59)	22.7 (2.99)	22.6 (2.92)
TBF (kg)	16.7 (5.17)	18.7 (6.30)	18.0 (5.64)
TBF (%)	28.0 (6.26)	30.1 (7.57)	29.4 (7.13)
FFM (kg)	41.9 (3.75)	42.2 (4.10)	42.1 (3.85)
FFM (%)	72.0 (6.26)	69.9 (7.57)	70.6 (7.13)
EE (kcal/kg/day)	2.28 (2.15)	2.82 (3.18)	3.32 (3.13)
Phase angle (deg)	6.00 (0.50)	6.00 (0.62)	6.01 (0.73)
Males (n = 20)	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Age	25.2 (4.57)	26.5 (4.87)	28.0 (4.66)
Weight (kg)	78.5 (15.7)	77.8 (15.6)	80.2 (16.5)
Height (cm)	178 (7.49)	179 (8.54)	178 (7.85)
BMI	24.7 (3.92)	24.1 (3.74)	25.1 (4.10)
TBF (kg)	13.6 (6.34)	13.3 (6.27)	15.2 (7.02)
TBF (%)	16.5 (4.70)	16.4 (4.88)	18.1 (4.99)
FFM (kg)	64.9 (9.82)	64.4 (9.93)	65.0 (9.90)
FFM (%)	83.5 (4.70)	83.6 (4.88)	81.9 (4.99)
EE (kcal/kg/day)	3.69 (3.48)	3.47 (2.59)	3.28 (2.21)
Phase angle (deg)	7.46 (0.69)	7.43 (0.57)	7.45 (0.85)

SD, Standard Deviation, BMI, Body Mass Index; FFM, Fat Free Mass; TBF, Total Body Fat; BF, Body Fat; EE, Energy Expenditure (in kilocalories per kilogram per day; deg, degrees

TABLE 2

Body Mass Index for Male and Female Subjects, Grouped by CDC Classification

Females (n = 24)	Measurement 1 n (%)	Measurement 2 n (%)	Measurement 3 n (%)
Underweight	1 (4.17)	2 (8.33)	2 (8.33)
Normal weight	20 (83.3)	17 (70.8)	16 (66.7)
Overweight	3 (12.5)	5 (20.8)	6 (25.0)
Obese	0 (0.00)	0 (0.00)	0 (0.00)
Males (n = 20)			
Underweight	0 (0.00)	0 (0.00)	0 (0.00)
Normal weight	12 (60.0)	12 (60.0)	10 (50.0)
Overweight	7 (35.0)	6 (30.0)	7 (35.0)
Obese	1 (5.00)	2 (10.0)	3 (15.0)

Overweight (BMI <18.5 kg/m^2), Normal weight (BMI = 18.5-24.9 kg/m^2), Overweight (BMI = 25-30 kg/m^2), Obese (BMI > 30 kg/m^2)

TABLE 3

Activity Levels of Male and Female Subjects, Grouped by National Health Interview Survey Classification

Females (n = 23)	Measurement 1 n (%)	Measurement 2 n (%)	Measurement 3 n (%)
Sedentary	12 (52.2)	10 (43.5)	8 (34.8)
Moderately active	6 (26.1)	4 (17.4)	4 (17.4)
Very active	5 (21.7)	9 (39.1)	11 (47.8)
Males (n = 18)			
Sedentary	5 (27.8)	5 (27.8)	8 (44.4)
Moderately active	5 (27.8)	5 (27.8)	6 (33.3)
Very active	8 (44.4)	8 (44.4)	4 (22.2)

Sedentary (0.1-1.4 kcal/kg/day), moderately active (1.5 – 2.9 kcal/kg/day), and very active (>3.0 kcal/kg/day).

Appendix

RT 95
3-4

Part E - PHYSICAL ACTIVITY AND FITNESS

These next questions are about physical exercise.

ITEM E1	*Mark from observation or previous information.*	1 ☐ SP is physically handicapped *(Describe in notes, THEN 1)* 8 ☐ Other *(2 on page 57)* [5]
	HAND CALENDAR. **1a. In the past 2 weeks (outlined on that calendar), beginning Monday *(date)* and ending this past Sunday *(date)*, have you done any exercises, sports, or physically active hobbies?**	1 ☐ Yes *(1b)* 2 ☐ No } *(3 on page 58)* 9 ☐ DK } [6]
	b. What were they? *Record in 2a on page 57, THEN 1c.*	
	c. Anything else?	☐ Yes *(Reask 1b and c)* ☐ No *(Mark "No" for all remaining activities in 2a, then go to 2b)*

Notes

FORM HIS-3 (5-1-95)

Part E – PHYSICAL ACTIVITY AND FITNESS – Continued

NOTE: ASK ALL OF 2a BEFORE GOING TO 2b–d.			*NOTE: ASK 2b–d FOR EACH ACTIVITY MARKED "YES" IN 2a.*					
HAND CALENDAR. **2a. In the past 2 weeks (outlined on that calendar), beginning Monday, *(date)*, and ending this past Sunday, *(date)*, have YOU done any of the following exercises, sports, or physically active hobbies —**	YES NO		**b. How many times in the past 2 weeks did you [go/do] *(activity in 2a)*?**		**c. On the average, about how many minutes did you actually spend (doing) *(activity in 2a)* each time?**		**d. [What usually happened to your heart rate or breathing when you [did/went] *(activity in 2a)*?] Did you have a small, moderate, or large increase, or no increase at all in your heart rate or breathing?**	
(1) Walking for exercise?	1 ☐ 2 ☐	7	(1) ____ Times	8-9	____ Minutes	10-12	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	13
(2) Gardening or yard work?	1 ☐ 2 ☐	14	(2) ____ Times	15-16	____ Minutes	17-19	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	20
(3) Stretching exercises?	1 ☐ 2 ☐	21	(3) ____ Times	22-23	____ Minutes *(Next activity)*	24-26		
(4) Weightlifting or other exercises to increase muscle strength?	1 ☐ 2 ☐	27	(4) ____ Times	28-29	____ Minutes	30-32	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	33
(5) Jogging or running?	1 ☐ 2 ☐	34	(5) ____ Times	35-36	____ Minutes	37-39	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	40
(6) Aerobics or aerobic dancing?	1 ☐ 2 ☐	41	(6) ____ Times	42-43	____ Minutes	44-46	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	47
(7) Riding a bicycle or exercise bike?	1 ☐ 2 ☐	48	(7) ____ Times	49-50	____ Minutes	51-53	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	54
(8) Stair climbing for exercise?	1 ☐ 2 ☐	55	(8) ____ Times	56-57	____ Minutes	58-60	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	61
(9) Swimming for exercise?	1 ☐ 2 ☐	62	(9) ____ Times	63-64	____ Minutes	65-67	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	68
(10) Playing tennis?	1 ☐ 2 ☐	69	(10) ____ Times	70-71	____ Minutes	72-74	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	75
(11) Playing golf?	1 ☐ 2 ☐	76	(11) ____ Times *(Next activity)*	77-78				
(12) Bowling?	1 ☐ 2 ☐	79	(12) ____ Times *(Next activity)*	80-81				
(13) Playing baseball or softball?	1 ☐ 2 ☐	82	(13) ____ Times	83-84	____ Minutes	85-87	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	88
(14) Playing handball, racquetball, or squash?	1 ☐ 2 ☐	89	(14) ____ Times	90-91	____ Minutes	92-94	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	95
(15) Skiing? ☐ Yes ↘ ☐ No *(16)*		96						
(a) Downhill?	1 ☐ 2 ☐		(a) ____ Times *(Next activity)*	97-98				
(b) Cross-country?	1 ☐ 2 ☐	99	(b) ____ Times	100-101	____ Minutes	102-104	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	105
(c) Water?	1 ☐ 2 ☐	106	(c) ____ Times *(Next activity)*	107-108				
	YES NO	RT 96 3-4						
(16) Playing basketball?	1 ☐ 2 ☐	5	(16) ____ Times	6-7	____ Minutes	8-10	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	11
(17) Playing volleyball?	1 ☐ 2 ☐	12	(17) ____ Times	13-14	____ Minutes	15-17	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	18
(18) Playing soccer?	1 ☐ 2 ☐	19	(18) ____ Times	20-21	____ Minutes	22-24	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	25
(19) Playing football?	1 ☐ 2 ☐	26	(19) ____ Times	27-28	____ Minutes	29-31	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	32
(20) Have you done any (other) exercises, sports, or physically active hobbies in the past 2 weeks? 1 ☐ Yes – **What were they? Anything else?** 2 ☐ No *If activity listed above, mark "Yes" for it; otherwise, specify* ↘		33						
(a) ______________________		34-35	(20a) ____ Times	36-37	____ Minutes	38-40	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	41
(b) ______________________		42 43-44	(20b) ____ Times	45-46	____ Minutes	47-49	1 ☐ Small 3 ☐ Large 2 ☐ Moderate 0 ☐ No inc. 9 ☐ DK	50

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Part E – PHYSICAL ACTIVITY AND FITNESS – Continued

3. About how long has it been since your last medical check-up? *Mark (X) only one.*	1 ☐ Less than 1 year *(4)* 2 ☐ 1 year, less than 2 years 3 ☐ 2 years, less than 3 years 4 ☐ 3 years, less than 4 years 5 ☐ 4+ years 6 ☐ Never had a check-up 9 ☐ DK *(4)* (2–6: *(END interview)*)	51
4. During your last check-up, did the doctor recommend that you BEGIN or CONTINUE to do any type of exercise or physical activity? *If "Yes", ask:* **Was that begin or continue?**	1 ☐ Yes, to BEGIN 2 ☐ Yes, to CONTINUE 3 ☐ Yes, BOTH 4 ☐ No 9 ☐ DK (1–9: *(END interview)*)	52

Notes