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Putting the Athletic Back in the Trainer

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Athletic Training Students are taught about the benefits of physical activity and how to create specific exercise programs to maintain overall wellness. Although athletic training students have knowledge about the positive effects of physical activity, they continually score lower on activity level scales when compared with the average college student. A rigorous course schedule and long clinical hours seem to be a common factor that play into the poor health habits of the athletic training student. Therefore, the purpose of this study is to determine the variables that negatively affect the exercise habits of undergraduate athletic training students.

Students from the College of Health Sciences were tested in this study. The Baecke Questionnaire will be used to assess factors that affect student's wellness habits. Bod Pod measurements will be used to assess body composition. Vertical jump performance and hand grip dynamometer performance will be recorded also. Data will be analyzed utilizing ANOVAs for significant differences between each of the groups.

Keywords and Phrases: health habits, athletic trainer, students, honors thesis

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Introduction

Background

Despite many knowing who an Athletic Trainer (AT) is, many do not understand what exactly an AT does. ATs are highly qualified, multi-skilled (allied) health care professionals who collaborate with physicians to provide preventative services, emergency care, clinical diagnosis, therapeutic intervention and rehabilitation of injuries and medical conditions (NATA.ORG). Through the CAATE accredited AT education programs, AT students are taught about the benefits of physical activity and how to create specific exercise programs in order to maintain overall wellness. Although they have this knowledge about the positive effects of physical activity, the AT student continually scores lower on activity level scales when compared to the average college student. Many factors could play into this such as a rigorous class schedule and long clinical hours.

The trend of scoring lower than their peers does not end with AT students. Many certified ATs work long hours, usually more than 40 and often more than 60 a week. By not having control of their schedules due to games and practices, many continue to have poor health habits and 25% of them are even considered to be sedentary (Groth, 2008).

The lack of poor physical activity levels also applies to other students in health fields such as nursing. These students are also under the influence of clinical hours and a demanding class schedule that often “does not leave time” for engaging in regular

physical activity. It is common to see less than 20% (17.4%) of nursing students who regularly participate in physical activity (Stanek, 2015).

The American College of Sports Medicine (ACSM) has made a set of recommended guidelines that adults need to follow in order to have a healthy lifestyle. These guidelines include 3-5 days of moderate exercise for 30-60 minutes a week, working each major muscle group 2-3 times a week and 2-3 days a week of stationary stretching. Although these guidelines are taught to many health science students while they are earning their degree, many do not take what they know and apply it to themselves. If these students are going to be role models to encourage their patients once they are out in the work force, they need to choose positive health and fitness behaviors beginning in their college years.

Problem Statement

When looking through literature, there is a noticeable lack of information on the student in Health Science related majors in the same study in order to serve as a comparison. The existing literature focuses on specific majors such as nursing or athletic training, college students as a whole, or those who are working professionals. Due to the lack of research done that focuses on comparing health science majors, there is not an answer to how the demands placed on students could be affecting their health even though their education specifically teaches them how to maintain healthy lifestyles. This study seeks to understand and determine the perceived demands of

College of Health Science students and how those demands affect their health in order to fill the void of such information in the literature.

Statement of Purpose

The purpose of this study was to understand the demands placed on the students in the college of health sciences and how those demands may be affecting their health habits. This study looked to obtain a quantitative perception through the measurements of body fat percentage and fat mass as well as tests of athletic ability. The qualitative portion looked to find a perspective on the demands that are placed on the students both in and out of the classroom.

Research Objectives

a. Determine the factors that negatively affect the health habits of undergraduate athletic training students and other College of Health Science students at Eastern Kentucky University
b. Determine the fat mass and percent of body fat in students in the college of health sciences at Eastern Kentucky University.

Thesis Statement

Among the students from the college of health sciences studied, students in majors that require clinical hours (i.e. nursing and athletic training) and “other outside the classroom” activities would participate in less leisure physical activity than majors

who do not have other educational requirements placed on them. This could be due to the “lack of time” or “rigorous class schedule”.

Literature Review

The intention of this literature review is to give the necessary information that is needed on the guidelines for health wellness and overall wellbeing. The first portion of this chapter will discuss health habit guidelines put forward by the American College of Sports Medicine and how body composition is affected by these health habits. The way that body composition can be reliably measured will also be discussed. The later portion will look then more specifically at college students as a whole, while also looking at nursing and athletic training students specifically.

American College of Sports Medicine Guidelines

Per the American College of Sports Medicine (ACSM) guidelines created by Carol Ewing Garber, Bryan Blissmer, Michael R Deschenes, Barry A. Franklin, Michael J. Lamonte, I-Min Lee, David C. Nieman, and David P. Swain, titled, “Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory, Musculoskeletal, and Neuromotor Fitness in Apparently Healthy Adults: Guidance for Prescribing Exercise” (2011) the daily activity levels for cardiorespiratory exercise, resistance exercise, flexibility exercise, and neuromotor exercise training should be as follows.

Cardiorespiratory "aerobic" exercise

Table 1: Evidence Based Recommendations for Cardiorespiratory Exercise for the Healthy Adult

Frequency	5 days a week of moderate exercise 3 days of vigorous exercise 3-5 days of a combined moderate and vigorous exercise regimen
Intensity	Moderate and/or Vigorous intensity is recommended for most adults
Time	30-60 minutes of moderate exercise 20-60 minutes of vigorous exercise

Resistance Exercise

Table 2: Evidence Based Recommendations for Resistance Training for the Healthy Adult

Frequency	Each major muscle group should be trained 2-3 days a week
Intensity (R Rep Max)	To improve strength: 60%–70% of the 1RM (moderate to hard intensity) for novice to intermediate exercisers to improve strength. Q80% of the 1RM (hard to very hard intensity) for experienced strength trainers to improve strength. 40%–50% of the 1RM (very light to light intensity) for older persons beginning exercise to improve strength. For beginners: 40%–50% of the 1RM (very light to light intensity) might be advantageous for improving strength in sedentary persons beginning a resistance training program. To improve muscle endurance and power: G50% of the 1RM (light to moderate intensity) to improve muscular endurance. 20%–50% of the 1RM in older adults to improve power.
Time	No specific time has been identified for success

Flexibility Exercise

Table 3: Evidence Based Recommendations for Flexibility Training for the Healthy Adult

Frequency	2-3 days a week but greatest gains occur during daily exercise
Intensity	Stretch to the point of tightness feel or slight discomfort
Time	Hold a static (stationary stretch) for 10-30 seconds Holding a stretch for 30-60 seconds may be more beneficial for older adults

Neuromotor Exercise Training

Table 4: Evidence Based Recommendations for Neuromotor Exercise Training for the Healthy Adult

Frequency	2-3 days a week
Intensity	Intensity of neuromotor exercise has not been determined
Time	20-30 minutes a day may be needed depending on the individual

Body Composition Testing

When it comes to the measurement of body composition, there are several different techniques that are consistently reliable and accurate. Air displacement plethysmography (ADP), used in equipment such as the BodPod, is among the most accurate methods. Many researchers have looked into the reproducibility and reliability of the BodPod when compared with other methods of body composition measuring. Pamela von Hurst et. al in “Validity and reliability of bioelectrical impedance analysis to estimate body fat percentage against air displacement plethysmography and dual energy X-ray absorptiometry” (2016) were hoping to assess the validity of bioelectrical impedance analysis (BIA) machines with ADP as well as dual energy x-ray

absorptiometry (Dexa). Overall, their study showed that BIA measurements were significantly lower than both ADP and DXA measurements.

All three measures though had excellent reliability with repeat measurements.

This is conclusive across many studies like the one completed by Hillier et. al, in “A comparison of body composition measurement” (2014) that showed both BIA and ADP to be reproducible within days, and between days. Through the participation of 41 healthy participants, it was concluded that ADP was an overall better assessment though because it was more accurate over a range of body sizes. Marie Fosbol and Bo Zaerahn in “Contemporary methods of body composition measurement” also added that ADP is accurate for body density measurements because of the low bias and small individual air that machines like the BodPod have. Unfortunately, though, ADP is limited to full body composition, so if a more specific reading by body region is wanted, the DXA scan would be the better option if available.

Many have also determined the reliability of the BodPod across different samples of people. Jordan Moon et. al, did this by assessing the composition of 30 Caucasian women in their study titled “Percent body fat estimations I college women using field and laboratory methods: a three-compartment model approach” (2007). The 30 women in this study underwent 8 different body fat measurements that included but weren’t limited to the BodPod and BIA assessments. The purpose was to compare the different methods like the BodPod to the 3C model which is believed to be the most effective but isn’t conducive to testing larger populations and it hasn’t been investigated extensively. They were able to conclude that the BodPod is an acceptable measure of body density

for their people groups. Moon was also able to show that BIA was adequate when laboratory methods, such as the BodPod, weren't available. Eric Noreen and Peter Lemon used a much larger heterogeneous sample of 980 people in their study titled "Reliability of Air Displacement Plethysmography in a Large, Heterogeneous Sample" (2006) to determine the reliability of the BodPod assessment. For this study, the participants completed a complete BodPod assessment and then immediately repeated the test for a total of two assessments. The data was then assessed for comparison. Between the two assessments there was a significant correlation found shows the good test-retest reliability of the BodPod machine.

College Students as an entirety

The college years are unfortunately characterized by poor food choices, meal skipping, snacking, and frequent consumption of fast foods. This is usually closely related with the amount of physical activity which, for many, may be limited to their walk to class. Multiple studies have been conducted on the overall health and wellbeing of college students.

The findings of Pribis et. al in their study "Trends in Body Fat, Body Mass Index and Physical Fitness Among Male and Female College Students" (2010) which sought to describe the changes in the levels of physical fitness of college students over a 13-year span, found that the trend for body mass index (BMI) was not linear. They compared the students BMI to The Dietary Guidelines for Americans and concluded that a small and declining minority of college students are physically active and are in shape.

“Although both sexes have declined in their physical fitness levels, the results from our study show that there is a more pronounced and deeper decline in the males then females.” The authors called for strategies to be implemented in the University setting to offset the present trend and help college students and other young people improve their physical fitness.

The same was found through both Lowry et. al and Carpenter et.al ‘s studies titled, “Physical Activity, Food Choice, and Weight Management Goals and Practices Among U.S. College Students” (2000) and “Body Fat and Body-Mass Index among a Multiethnic Sample of College Age Men and Women” (2013) respectively. Lowry’s study focused on the associations with physical activity and food choice along with weight management goals and practices of nearly 4700 undergraduate students from both two and four year universities. The study showed that female students were less likely than male students to participate in vigorous physical activity and muscles strengthening exercises but were more likely to eat more than two servings of high fat foods a day. Therefore, the focus should not only be placed on the amount of exercise that a college student gets, but the how the college student eats as well.

Carpenter’s study looked at the difference between male and female while looking at the relationships between body fat and body mass index of a sample of multiethnic people. Using a bioelectrical impedance analysis (BIA) machine they were able to see any significant similarities or differences across both race and gender. Almost all of the anthropometric measurements that were taken showed significant differences according to both race and gender. Hispanics and men of other ethnicities

had the highest BMI, while Hispanic females and other females had the highest percent of body fat. Carpenter this used a multiple linear regression analysis to show that approximately 52% of the variability in the percent body fat measurements could be explained through BMI, ethnicity, and sex. A high body fat percentage but a low BMI was found over many ethnicities. This is important to address due to the problem where people can accumulate unhealthy amounts of adipose tissue without a significant weight change if they are just using their BMI reading. This could lead to the development of major health threats that are posed through the presence of excess adiposity as well as false conclusions about the body composition of these young adults and the status of their future health.

So, if there seems to be a recurring consensus that college students are continuing to practice worse and worse health habits, what is influencing the mindset and the overall decline? In the study, “College Students Motivation for Physical Activity: Differentiating Men’s and Women’s Motives for Sport Participation and Exercise” (2005) completed by Marcus Kilpatrick et. al, the purpose was to expand on this question by comparing sport participation and exercise motivation but also the impact of gender on the motivation for exercise and sport participation. Through the participation of 233 students who were enrolled in undergraduate health and kinesiology courses at a university in the southeast United States, Kilpatrick concluded that sport participation was mainly due to intrinsic motives such as competition, affiliation, enjoyment and challenge while exercise participation was more focused on extrinsic motives such as overall health and appearance. Overall, for both sport participation and exercise,

enjoyment was the number one motivation and stress management was a significant motivation as well for both men and women. Gender did play an important role in motivation though. For men, the performance factor played a large role with competition and strength being primary motivators while weight management topped other factors for women. The greater concern for weight management by women seems appropriate on the surface, given that younger women are more likely to be overweight than their male peers. The foundation of this study is that “behavioral maintenance and adherence is most likely to occur when motivations are intrinsic rather than extrinsic in nature.”

But what can a university do to aid in the overall health of their students that they aren’t already doing? This was the purpose of the qualitative study done by Deliens et. al titled, “Determinants of physical activity and sedentary behavior in university students: a qualitative study using focus group discussions” (2015), along with determining the factors that play into the factors that influence both physical activity and sedentary behavior of Belgian University students through the facilitation of focus group discussions. For this study, physical activity included active transportation while sedentary behavior included screen behavior, school work, socializing and passive transportation. According to their findings, activity in the university student is influenced by individual factors, social networks, physical environment and macro environment. To many students, choosing sedentary behaviors over physical activities were for the sake of relaxation and recreation. Many also fell under the influence of their social environment which could have included parental control and peer pressure which basically meant if they weren’t encouraged to participate in physical activity, then they

weren't going to. Psychological factors such as perceived enjoyment, self-discipline, values, norms and beliefs, and time management were found to influence physical activity and sedentary behavior at the same time. Unfortunately, students spend a lot of time doing study related sedentary activities such as sitting in class and studying which makes it hard to participate in physical activities. Many complain about "not having enough time" to be active on a regular basis or at all. Deliens also took the time to inquire about any suggestions that the students might have to intervene on the trend of college students not being active. These recommendations included the improvement of the spread of information in regard to on-campus sports activities, cheaper and more flexible sports subscriptions, including sports time into the curricula of the different majors, and providing university bicycles for use around campus.

Debra Franko et. al in "Motivation, self-efficacy, physical activity and nutrition in college students: Randomized controlled trial of an Internet-based education program" (2008) looked to use a different motivational tool for college students to engage in better health habits in their study titled, "Motivation, self-efficacy, physical activity and nutrition in college students: Randomized controlled trial of an Internet-based education program". The study utilized over 475 full-time undergraduate college students as well as an online based nutritional and physical activity educational program called "mystudentbody.com-nutrition" (MSB-N). Students in this study were randomly assigned to one of three groups- two that used the MSB-N website and one that was an attention placebo group. Results showed that students who used the online program increased their food and vegetable intake as well as increased their motivation to change eating

behaviors. Social support and ability to create and achieve their goals for dietary change also increased in the two-internet program based groups. Unfortunately, no change in the amount of physical activity was noted but their attitude towards it did change. So, while MSB-N is an effective internet program with a wide range of applicability to college campuses to promote nutrition education and change in health behaviors, the important concept to grasp through this study is the idea of social support for college students when participating in healthy behaviors. Having a place to log their health habits and being able to compare with others to hold them accountable is a great motivator. Unfortunately, one may also run into the problem that often comes with self-reporting activities for others to see where people over estimate how healthy they are being in order to seem like they are completing what they are supposed to.

College of Health Sciences Students

Students in the College of Health Sciences are not immune to the effects that the college years can have on the health habits of individuals. Many require not only a full course load, but clinicals and internships as well. With this much time having to be dedicated to their major and the possibility of an outside job. It can be hard to have the time to focus on the individual health habits that are taught to them in the classroom.

Nursing Students

"Compared with students in courses of study other than nursing, nursing students usually spend more time in class, in the laboratory, and in the clinical setting,

and they have more emotional demands made on them" said Jennifer Bryer et. al in their study "Health Promotion Behavior of Undergraduate Nursing Students: A Survey Analysis" (2013). This study from 2013 sought to examine student health promotion behaviors and barriers to health promotion in traditional and nontraditional students. Although the sample size was relatively small (143 students), they were able to see a correlation in the amount of health promoting behaviors that nursing students participated in and the type of student they were. The facilitators were able to conclude that nontraditional students participated in health promoting behaviors less often than the traditional nursing students because of the extra barriers that they often face such as a job or children.

How stress is perceived and handled is a common factor looked at when looking at pre-professional programs such as nursing. Deborah Beck et. al in the study "Perceived Level and Sources of Stress in the University Professional Schools" (1997) pursued to answer what is a cause for stress in the nursing student and their perception of that stress. They then took the discovered stressors and levels of stress and compared it to stress experienced by students enrolled in other health related disciplines (Pharmacy and Social Work). After the participation of 552 full time students in a questionnaire, the results came to show that undergraduate baccalaureate nursing students, regardless of their year in the program or university of attendance, experienced higher levels of physiological and psychological stress than students in the other health related disciplines. Stressors included but were not limited to: amount of class material needing to be learned, lack of free time, and long clinical hours. Even

though the study was limited to two universities, implications for curriculum planning and stress counseling were made. It is imperative that nursing programs take a closer look at the stressors that are placed on their students that are unnecessary and can be controlled within the education program. The additional sources of stress that are experienced by nursing students, like long clinical hours, advocate that educators need to take a closer look at the clinical education process that is vital to the education of students pursuing the profession.

Stress can play a very large role in how the health science student can promote a healthy lifestyle to their patients and others around them. In order to determine how a health promoting lifestyle (HLP) and body mass index (BMI) could possibly be related, Fatimah Al-Kandari et.al in “Health- promoting lifestyle and body mass index among College of Nursing students in Kuwait: A correlational study” (2008) recruited 202 nursing students to take part in a questionnaire that specifically looked at sociodemographic variables and health promoting attitudes and behaviors. Through determining the BMI of each individual and their answers on the questionnaire, the researchers were able to find an association between the health promoting lifestyle behaviors and the BMI of those in the nursing program. This association was strongest through sociodemographic variables such as: age, marital status, and nationality. Low positive scores on the HLP section showed the need that there is for improved health behaviors in nursing students, particularly when it comes to physical activity. Although many students in this study had a normal BMI, they had a high tendency to be overweight or obese.

With BMI and health habits being comparable, Leonel Sao Romao Preto et. al in "Relationship between physical activity, muscle strength and body composition in a sample of nursing students" (2016) sought to also correlate physical activity, muscle strength and body composition in a sample of 86 nursing students. Through a sociodemographic questionnaire, an IPAQ test, strength tests (a pinch test, handgrip test, and quadriceps tests) and a Tanita Scan, the authors came to many conclusions regarding the body composition and activity level of the nursing students they studied. Through the results, it is seen that men were statistically heavier than women but had a higher prevalence of participating in higher levels of physical activity. 58.1% of the students surveyed had a low physical activity level, 29.1% had a moderate physical activity level, and only 12.8% had a high physical activity level. The profile of the students that were more physically active showed increase muscle strength and mass while having a lower percent of body fat. Body composition is important because the amount of fat can be indicative of multiple health disorders. Therefore, body fat is a key component in the prevention of chronic non-communicable diseases. Participating in regular physical activity is an easy life modification that nursing students can adopt in their own lives so that they can be positive role models for the individuals or groups that they will care for throughout their career.

Athletic Training Students

In order to understand how Athletic Training students, view participating in physical activity, we have to first understand where they are most likely learning their

habits from through clinical educational experiences. Both Jessica Groth et. al and Marchell Cuppett and Richard Latin in their separate studies “Self-Reported Health and Fitness Habits of Certified Athletic Trainers” (2008) and “A Survey of Physical Activity Levels of Certified Athletic Trainers” (2002) respectively, sought to determine and then analyze the self-reported health and fitness levels of certified Athletic Trainers. Cuppett and Latin’s study looked at physical activity levels both at work and at leisure which puts a focus on the setting that each of the certified Athletic Trainer’s work in. The study consisted of 636 certified Athletic Trainers from the Mid-American Athletic Trainer’s Association that self-reported their fitness habits through a survey. The results showed that those who worked in a clinic as opposed to a school (either high school or college), tended to be more physically active. Athletic Trainers that work in a clinic often have more control over their schedules than the Athletic Trainer at a school, allowing them to have time for a regular exercise routine. For males that participated in this study, the total activity index was no higher than that for the general population. Often, the added responsibilities for the certified Athletic Trainer, make it hard for these health habits to be maintained.

In their study, Groth sought to extend the work of Cuppett and Latin through the participation of 275 certified Athletic Trainers from the Great Lakes Athletic Training Association to complete their online questionnaire that was divided into four sections (fitness, nutrition, alcohol and tobacco, and demographics). After the answers were analyzed using ANOVAs, the results showed that only 41% of certified Athletic Trainers were meeting ACSM guidelines for activity and 7% were reported as being sedentary.

Although this percentage is higher than the normal population, still most of the participants were not meeting the guidelines for physical activity and none were meeting the daily reference intake for the five food groups. The participants were regularly substituting nutritious foods with fried foods, high-fat foods, high-fat dairy foods, and sweets 3 to 5 times in a typical 7-day week. Other poor habits that were shown included the excess intake of alcohol but only .8% of the participants reported smoking. If Athletic Training wants to continue to be a rising healthcare profession, certified Athletic Trainers need to take their healthy lifestyle more seriously. Unfortunately, although Athletic Trainers are taught the benefits of exercise and other healthy behaviors, they are not applying them to themselves. This limits their ability and reliability as the role models they often are when it comes to health behaviors. These habits need to come into effect as Athletic Training students are learning about these behaviors and the importance of them.

When it comes to physical activity in Athletic Training students, we see the same sort of attitude towards physical activity as we saw in nursing students. A study facilitated by Stanek et. al in “Physical Activity Participation and Constraints Among Athletic Training Students” (2015) showed through the study of 1125 entry level athletic training students that the physical activity participation among undergraduate athletic training students was similar to the participation of practicing Athletic Trainers. The values for both moderate and vigorous physical activity among the athletic training students were below the levels that are recommended by the ACSM. Many of the students noted that they felt that they “didn’t have the time” to participate in physical

activity due to constraints like the accumulation of clinical education hours, the class load that they had, and a job for many. But when they had the time, the results showed that athletic training students tended to be physically active for longer periods. Unfortunately, though, they weren't necessarily active on as frequent of a basis. In order to be better and more reliable health professionals, a greater emphasis needs to be placed on the work-life balance for athletic training students. This way there can be a greater promotion of opportunities for physical activity participation and potential academic benefits.

Perceptions of physical demands is another factor that may play into the participation of physical activity done by athletic training students. Kawaguchi, et. al. in "Self-Reported Perceptions of Physical Demands on Athletic Training Students" (2008) sought to assess the self-reported physical demands of athletic training students that were placed on them by their chosen major. The primary researchers of the study had the students complete a modified Baecke health questionnaire that divided health habits into "school related activity" and "leisure activities". The responses for the "school related activity" section indicated that athletic training students perceived their chosen major as physically demanding. However, the results for participation in sport and non-sport leisure activity were relatively low. This low participation rate in the leisure could have future health complications that could include things like burnout once the student becomes a certified athletic trainer.

Limitations of Current Research

Current research on body composition of college students, specifically in health science majors is limited by both number and currency. Some of the research that was utilized in this thesis is less current than others. Although some of the research isn't as current, the results from those studies have been verified by the newer studies. Most of the research to date is also limited due to the self-reporting aspect of the research design, the small sample size, or the gender bias of the research.

Methods

Research Design

Sample

The sample for this study was acquired by recruiting students from the College of Health Sciences at Eastern Kentucky University (EKU) through visits to individual classes within the respected programs as well as electronic mail (e-mail) communication. Specific majors that were targeted included: Nursing (NR), Athletic Training (AT), Occupational Science (OS), Fitness and Wellness, Sport Management, Public Health and Therapeutic Recreation.

As recruitment procedure, the primary researcher visited with the representative for each major and asked for volunteer recruits. For some, the researcher visited specific classes for the major. While for others, an e-mail that included the recruitment script as well as the process for signing up for the study was sent to everyone in that program by the program contact. Signups for the study were completed through Visibook, an online scheduling system.

The study was approved by the Institutional Review Board (IRB) at EKU on November 11, 2016.

Demographics of Participants

There was a total of 66 participants. 21 were Athletic Training (AT) students, 20 were Occupational Science (OS) students, 13 were Nursing (NR) students and 12 were in other areas of study within the College of Health Science.

Procedure

Questionnaire

Student volunteers were asked to complete a survey modeled after the BAEKE Questionnaire that discussed their health habits. There was a total of 25 questions on the questionnaire that were in the categories of physical activity during school and leisure time, nutritional habits, and sleep schedule. On the survey, participants marked under the categories of “never”, “seldom”, “sometimes”, “often”, and “always”.

Each answer was given a numerical value and the sum of each category was recorded. Data was then analyzed and compared with the anthropometric measurements.

Anthropometric Measurements

Air displacement plethysmography measurements were taken using the BodPod system and calibrated before each test in accordance with the manufacturer’s instructions to calculate body fat percentage. The Tanita Scan was also used as a comparison.

During their visit, subjects were asked to remove all jewelry, body piercings and hair accessories. For the BodPod and BIA measurements, subjects were asked to wear minimal, tight-fitting clothing such as a swimming costume, and a swim cap for the BodPod measurement only. All BodPod measurements were conducted by a trained clinician.

For each test, the body fat percentage as well as the fat mass in pounds (lbs.) was recorded in a spreadsheet.

Other Measurements

A vertical jump performance and hand grip dynamometer performance were recorded as well. For the vertical jump test, a total of three jumps were performed. The average of the 3 jumps were recorded to be analyzed. For the handgrip dynamometer test, the subject was asked to keep their arm against their body and have their elbow flexed to 90°. The number in kilograms (kg) was recorded for both the right and left hands.

Statistical Analysis

Data was analyzed utilizing ANOVAs for significant differences between each of the groups. Data obtained from the BodPod were then compared to the answers that students provided on the questionnaire to see the overall health status of the student.

Results were compared by both AT, OS, NR, and ETC students as individual groups as well as AT students and not AT students.

Results

Quantitative data results

For this study, there was a total of 66 participants. 21 were Athletic Training (AT) students, 20 were Occupational Science (OS) students, 13 were Nursing (NR) students and 12 were in other areas of study within the College of Health Science. Mean and standard deviations of demographic results are included in Table 1, Table 2, and Table 3. Students that were in the ETC category were the oldest (24.4 ± 10.6) with OS students being the youngest (21.5 ± 2.0). AT students had the highest year in school average with most being seniors (3.5 .96) and ETC had the lowest year in school average with the average being in their junior year (2.6 ± 1.4). ETC students (68.1 ± 4.6) and AT students (68.1± 3.7) had a very similar height and OS students were the shortest (65.4 ± 2.9). In the weight category, AT students were the heaviest (173.1 ± 46.0) and OS students weighed less on average by over 20 pounds (150.33 ± 30.6). A one-way analysis of variance (ANOVA) was calculated on these results and no measure was determined as significant, but year F (3,60) = 2.35, p=.081 more specifically between all ETC and AT and OS students p=.019 as well as ETC and Nursing students p=.049. Weight F (3, 62) = 2.58, p=.062, were trending between AT and OS students p=.079.

Major (n)	Avg. Age (years)	Avg. Year	Avg. height (in)	Avg. weight (lbs.)
ETC (12)	24.4 ± 10.6	2.6 ± 1.4	68.1 ± 4.6	171.6 ± 45.1
AT (21)	21.6 ± 1.6	3.5 ± .96	68.1 ± 3.7	173.1 ± 46.0
OS (20)	21.5 ± 2.0	3.5 ± .5	65.4 ± 2.9	150.3 ± 30.6
NR (13)	22.6 ± 2.9	3.4 ± 1.0	65.9 ± 4.0	155.1 ± 42.6
Total (66)	22 ± 4.9	3.3 ± .96**	66.8 ± 3.8	161.7 ± 41.0**

Table 5: Demographic Variables Mean and Standard Deviations (Age, Year, Height and Weight) between AT, OS, NR and ETC students. (*=significant data) (=trending data).**

The BMI category showed that AT students had the highest BMI ratings (26.1 ± 6.0) while OS students had the lowest BMI ratings (24.7± 4.9). Bod Pod measurements showed that even though nursing students had the highest fat percentages (27.2± 10.8), AT students had the highest fat mass measurements (46.3± 31.8). ETC students had the lowest Bod Pod fat percentages (20.3± 10.7) and the lowest Bod Pod fat mass (34.8 ± 21.6). ETC students also had the lowest Tanita scan measurements for fat percentage (23.7 ±10.0) and fat mass (40.9 ± 20.6). OS students had the highest Tanita fat percentage (30.3 ± 7.3), but AT students had the highest Tanita fat mass (48.9 ± 33.2). ANOVA was calculated for the body composition measurements of the participants and no results were significant or trending. But there was significance between the ETC and OS students for the Tanita fat percentage *p*=.047.

Major (n)	Avg. BMI	Avg. BPF%	Avg. BPFM (lbs.)	Avg. TF%	Avg. TFM (lbs.)
ETC (12)	25.7 ± 4.6	20.3 ± 10.7	34.8 ± 21.6	23.7 ± 10.0*	40.9± 20.6
AT (21)	26.1 ± 6.0	25.3 ± 10.9	46.3 ± 31.8	26.9 ± 10.2*	48.9± 33.2
OS (20)	24.7 ± 4.9	27.2 ± 10.1	43.4 ± 27.2	30.3 ± 7.3	47.1± 21.6
NR (13)	24.9 ± 5.3	27.2 ± 10.8	45.1 ± 28.9	25.7 ± 8.6	41.9± 22.8
Total (66)	25.3 ± 5.2	25.4 ± 10.7	43.0 ± 27.7	27.3 ± 9.1	45.4± 25.2

Table 6: Demographic Variables Mean and Standard Deviations (BMI, BodPod Fat Percent (BPF%), BodPod Fat Mass (BPFM), Tanita Fat Percent (TF%), and Tanita Fat Mass (TFM)) between AT, OS, NR and ETC students. (*=significant data) (=trending data).**

In the vertical jump test, ETC students had the highest vertical jumps (19.9 ± 4.5) and NR students had the lowest vertical jumps (15.4 ± 3.4). Right hand grips were the strongest in AT students (36.0 ± 8.1), Left hand grips were stronger in ETC students (36.3 ± 11.4). The lowest hand grips for both right and left hands were reported by OS students (28.3 ± 4.3) (26.7 ± 4.8). ANOVA was calculated on participants' results. The analysis was significant for vertical max, F (3, 62) = 5.80, p=.001 precisely between the ETC and OS/Nursing students p=.001, the AT and OS students p=.027, as well as the AT and Nursing students p=.036. The analysis was also significant for both hand grips: overall right hand grip, F (3, 62) = 4.03, p=.011 and when broken down into categories, the ETC and OS students p=.017 as well as the AT students compared to the OS students p=.002 were the significant categories. Overall left hand grip was significant F (3, 62) = 4.52, p=.006, when broken down into categories, ETC students compared to OS students was significant p=.002 as well as AT students compared to OS students

p=*.005*. The Nursing students and OS student comparison was trending as well, *p*=.063.

Major (n)	Avg. VertMax (in)	Avg. Right Hand Grip	Avg. Left Hand Grip
ETC (12)	19.9 ± 4.5	35.0 ± 10.8	36.3 ± 11.4
AT (21)	18.0 ± 3.8	36.0 ± 8.1	34.1 ± 8.4
OS (20)	15.6 ± 2.1	28.3 ± 4.3	26.7 ± 4.8
NR (13)	15.4 ± 3.4	32.5 ± 7.5	32.1 ± 9.4
Total (66)	17.0 ± 3.7*	32.5 ± 8.1*	31.6 ± 8.9*

Table 7: Demographic Variables Mean and Standard Deviations (Vertical Max (VertMax), Right Hand Grip, and Left Hand Grip) between AT, OS, NR and ETC students. (*=significant data) (=trending data).**

Analyses were then run to compare AT students to all the other participants combined. In age, the Non-AT's were older (22.6 ± 5.8), but more AT students were further along in their college career (3.4 ± 2.93). AT students were also taller and weighed more than the Non-AT students (68.1 ± 3.6) (174.7 ± 44.5). ANOVA was run for these categories and no category was significant. But height *F* (1, 64) = 3.64, *p*=.061, and weight *F* (1,64) = 3.24, *p*=.077, were trending.

Major (n)	Avg. Age (years)	Avg. Year	Avg. height (in)	Avg. weight (lbs.)
Not AT (45)	22.6 ± 5.8	3.3 ± .98	66.2 ± 3.8	155.6 ± 38.2
AT (21)	21.6 ± 1.5	3.42 ± .93	68.1 ± 3.6**	174.7 ± 44.5**

Table 8: Demographic Variables Mean and Standard Deviations (Age, Year, Height and Weight) between AT students and Non-AT students. (*=significant data) (=trending data).**

In the body composition measurements, AT students had the higher measurements in every category: BMI (26.4 ± 5.8), Bod Pod fat percentage (26.3 ±

10.9), Bod Pod fat mass (48.3 ± 30.9), Tanita fat percentage (27.4 ± 8.7), and Tanita fat mass (49.8 ± 31.7). ANOVA was run for the body composition measurements and no category showed to be significant or trending.

Major (n)	Avg. BMI	Avg. BPF%	Avg. BPFM(lbs.)	Avg. TF%	Avg. TFM
Not AT (45)	24.8 ± 4.9	25.0 ± 10.7	40.5 ± 26.1	27.2 ± 8.7	43.4 ± 21.6
AT (21)	26.4 ± 5.8	26.3 ± 10.9	48.3 ± 30.9	27.4 ± 10.1	49.8 ± 31.7

Table 9: Demographic Variables Mean and Standard Deviations (BMI, BodPod Fat Percent (BPF%), BodPod Fat Mass (BPFM), Tanita Fat Percent (TF%), and Tanita Fat Mass (TFM)) between AT students and Non-AT students. (*=significant data) (=trending data).**

Vertical max tests showed that AT students have the higher VertMax (17.7 ± 3.7). Both hand grip tests showed the AT students to have a stronger hand grip: Right (35.4 ± 8.1) and Left (34.2 ± 8.0). ANOVA was run for these measurements and right hand grip $F(1,64) = 4.2$, $p = .045$. Left hand grip was shown to be trending $F(1,64) = 2.61$, $p = .111$.

Major (n)	Avg. VertMax (in)	Avg. Right Hand Grip	Avg. Left Hand Grip
Not AT (45)	16.7 ± 3.8	31.19 ± 7.74	30.4 ± 9.1
AT (21)	17.7 ± 3.7	35.4 ± 8.1*	34.2 ± 8.0**

Table 10: Demographic Variables Mean and Standard Deviations (Vertical Max (VertMax), Right Hand Grip, and Left Hand Grip) between AT students and Non-AT students. (*=significant data) (=trending data).**

Qualitative data results

Each question in the questionnaire was given a numerical value and each section was totaled in order to achieve a score. The highest score possible in each category was: school (30), exercise (30), eat (40), and sleep (25). AT students reported

the highest amount of educationally associated activity (20.5 ± 1.8) while NR students reported the lowest amount (18.2 ± 1.6). The exercise habit category was close but the ETC students ended up having the higher average (17.2 ± 5.7) and NR students ended up with the lowest average (14.2 ± 4.0). When it came to eating habits, NR students had the highest score (15.8 ± 3.5) while OS students had the lowest (12.7 ± 1.8). In the sleep habit category, ETC students had the highest score (16.5 ± 3.7) while OS students had the lowest (14.9 ± 2.7). ANOVA were run on the given scores, the eating habit category was found to be significant F (3, 60) = 3.1, p=.033. The school associated activity was also significant F (3, 64), p= .045.

Major (n)	School Total (30)	Exercise Total (30)	Eat Total (40)	Sleep Total (25)
ETC (12)	20.4 ± 3.2	17.2 ± 5.7	13.8 ± 4.2	16.5 ± 3.7
AT (21)	20.5 ± 1.8	15.2 ± 3.0	13.7 ± 2.9	15.0 ± 2.7
OS (20)	20.1 ± 2.6	15.5 ± 4.2	12.7 ± 1.8	14.9 ± 2.7
NR (13)	18.2 ± 1.6	14.2 ± 4.0	15.8 ± 3.5	16.5 ± 3.0
Total (66)	19.9 ± 2.4*	15.4 ± 4.1	13.8 ± 3.1*	15.5 ± 2.9

Table 11: Questionnaire Mean Total and Standard Deviations by Category between AT, OS, NR, and ETC students. (*=significant data) (=trending data).**

The scores were then divided into AT students and Non-AT students and compared. AT students still had higher scores than non-AT students in school activity (20.6 ± 1.8), and Eating habits (34.2 ± 8.0). Non-AT students had the higher average (15.4 ± 4.9) in the exercise category though when compared to the AT students (14.9 ± 3.3). The averages were the same for both AT (15.0 ± 2.7) and non-AT students (15.0 ±

4.5) in the sleep habit category but had different standard deviations. ANOVA were run on these responses and no category came back to be statistically significant or trending.

Major (n)	School Total	Exercise Total	Eat Total	Sleep Total
Not AT (45)	19.1± 3.9	15.4± 4.9	30.4± 9.1	15.0± 4.5
AT (21)	20.6± 1.8	14.9± 3.3	34.2± 8.0	15.0± 2.7

Table 12: Questionnaire Mean Total and Standard Deviations by Category between AT students and Non-AT students. (*=significant data) (=trending data).**

Discussion

Limitations

Design Limitations

Limitations in this study included using a self-reported questionnaire as a tool. When having subjects self-report their habits, they may over-exaggerate or under exaggerate their level of health in order to seem “right” or “like everyone else”. Participants were not forced to answer all of the questions on the questionnaire either, which meant that many were left blank and therefore left gaps in some of the data correlations.

Implementation Limitations

Limitation in the implementation of the study included recruitment of subjects, motivation to participate, and time.

When recruiting subjects, both visiting classes and email was used. When recruiting in classes, specific professors were used for different areas of study. So, if students were not in that professor’s classes but fit into the inclusion criteria, they did not get the chance to be included in the study.

Some recruits were motivated by their professors to participate in the study through the mode of extra credit. This was seen for the “other” areas of study more than the other areas. The Occupational Science students were rewarded for coming in with a “point” of which they need so many of per semester in order to stay in the program.

Time was also a limitation in the study. Due to the person running the study needing to present the findings before the end of the semester, the time span for conducting the

research was limited to under a month which included a week of absence due to spring break.

Conclusion

When evaluating the AT students next to the other majors individually, year and weight were both significant. This could be due to the different programs that were evaluated. For example, for the OS program, students apply their sophomore year and enter the program their junior year. For the AT program, students apply their freshman year and are in the program beginning their sophomore year. This could cause the significance between years due to sophomores not being evaluated for the OS majors but every year being evaluated for the ETC and NR majors. The weight measurements that were statistically significant between the OS and AT students can also be considered clinically significant. While the AT students had a larger range of weights, there were several students that had a greater weight than the heaviest OS student at 245.2 pounds. Tanita scan fat percentages were also clinically significant between the OS and ETC students. Overall, the OS students had a higher fat percentage with a range of 18%-52% while the ETC students had a range of 6%-42%.

Other measures that were significant when evaluating individual areas of study were vertical max and hand grip dynamometer measurements. The vertical max jumps could be significant due to the mechanics of some students or their training leading up to the study (i.e. football players performing vertical jumps for training). These measurements would not be considered clinically significant other than the comparison between the AT and OS students. AT students jumped anywhere from 2-6 inches

higher than the OS students. Hand grips could be significant due to the type of educationally associated activity that the different areas of study participate in. For example, AT students are consistently using their hands during clinical hours to give massages, stretch athletes and carry water racks depending on where they are placed. Nursing majors can also use a lot of hand strength for their different activities where OS students do not.

The results were similar when AT students were evaluated next to the other health science students as a whole. Height and weight were trending between the two groups probably due to the higher percentage of AT male students who participated in the study as compared to the males from the other majors that participated. Although height is significant, it would not be considered clinically significant because AT students were on average only 2-3 inches taller than the non-AT students. Weight on the other hand could be considered clinically significant because the heaviest AT student weighed over 60 pounds more than the heaviest non-AT student.

Right hand grip was significant once again probably due to the activities that AT students must perform on a routine basis as compared to the other majors. Although the non-AT students had a higher maximum right hand grip, they also had a larger range of strength while the AT students were strong as a collective unit. Left hand grip was trending which means it was close to being significant but not quite there. This could be due to the number of people that participated that could have possibly been right hand dominant and therefore not as strong with their left hand.

For the qualitative portion of the study, both the school activity category and the eating habit categories were found to be significant. The school activity category was significant between the NR students and all of the other groups of students. AT students had the highest minimum score in this category which could be due to the activities such as clinicals that all students are required to participate in. The significance in the eating category can only be found between the OS and NR students with the relationship between AT and NR students being trending. This could be due to the consistency across all college students of the worsening of food habits whether it be fast food consumption or alcohol intake.

For the remaining measurements, it is hard to tell why they were not statistically significant. This could be due to the number of male/female students that participated or the smaller number of participants in general. Anthropometric measurements may not have been significant due to all participants being college students and therefore, the majority of them falling into the characteristic “worsening of health habits” that is generally shown by college students no matter their chosen field of study (Pribis, 2010).

Future Inquiry

Further investigations should take the time to have more students participate in the study so that all majors are well represented. This will give the researchers more of an idea of the differences between the specific health science majors. A more in depth questionnaire should be implemented as well to determine the specifics of the poor health habits of the students. The questionnaire should also ask more specifics for educationally associated activity and exercise habits to make the differences clearer.

Following the future research, action should be taken in order to create healthier health science students whether it be through their curriculum or outside of class activity. If students cannot learn to cope with stress and how to take care of their body while they are currently learning the basics of how to do so, how are they going to be able to keep themselves healthy once they are out working full time in their respective fields?

Summary

The primary intent of this research was to determine the overall health status of students in the College of Health Sciences at Eastern Kentucky University. Throughout the research procedure, it became apparent that more exploration of this kind is needed in the future. Nevertheless, this study was fruitful in showing that there were trends consistent with other research that shows the declining health habits of college students in health-care related majors and non-health-care majors alike. Continued research on this topic should be of interest to educators of those in health-science fields of study as it relates to their student's health, overall well-being, and their transition into health-care professionals. More specifically, this information could help employers to encourage their employees to use their knowledge and apply it to themselves so that they can be a trustworthy role model for their patients.

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