ABSTRACT

LIFESTYLE HABITS AND BMI OF FIRST YEAR UNIVERSITY STUDENTS AT THE UNIVERSITY OF MONTEMORELOS: A TWO-YEAR ANALYSIS, 2012-2013 AND 2013-2014

by

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ABSTRACT

University of Montemorelos

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Title: LIFESTYLE HABITS AND BMI OF FIRST YEAR UNIVERSITY STUDENTS AT THE UNIVERSITY OF MONTEMORELOS: A TWO-YEAR ANALYSIS, 2012-2013 AND 2013-2014

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Problem

Lifestyle habits play a major role in influencing one's Body Mass Index (BMI) and consequently, quality of life. This study will examine the relationship between these lifestyle habits and the BMI of two cohorts of first year students at the University of Montemorelos (UM) over a two-year academic period, 2012-2014. Meal patterns, food choices, sleep duration and student housing are the variables that will be discussed.

Method

A total of 539 students participated in the study, 228 in 2012 and 311 in 2013. This research was quantitative and employed a correlational method of investigation and also employed a retrospective pre-post self-assessment design. Data was collected to evaluate the

lifestyle habits of first year students using the Healthy Habits Questionnaire. Questions were based on the Likert Scale, with five options from which students had to respond. A simple t-test of the difference in mean, as well as Pearson's correlations were calculated to measure the changes in BMI from the beginning to the end of the semester. The simple t-test and the Pearson's correlation were also used to see if there was any relationship between sleep duration and BMI among first year students in both academic years. The independent sample test was used to uncover the relationship between gender and choice of student housing. To discover the relationship between food choice and BMI and meal pattern and BMI, the Spearman's rho correlation coefficients were calculated. The significance of all results were checked and determined by calculating probability values (*p*-values).

Findings

The study discovered that there were positive associations between the BMI from the start and end of the semester. This was revealed by a *p*-value of <.001. However, for the year 2012-2013 and only the beginning of the semester of 2013-2014, there was no statistical significance. At the end of the semester of 2013-2014, a t-test of .092 indicated that there was statistical significance. In addition, the study showed that the difference of BMI between male and female students was not statistically significant in both cohorts. It also indicated that the BMI of students who live on-campus was higher than those who live off-campus amongst both study samples and that there was no statistical significance. This occurrence of no statistical significance was also detected in both academic years between BMI and sleep duration.

Negative associations were revealed between BMI and food choices (home-cooked food, canned and frozen food and snacks) in both cohorts. This is with the exception of fast food at the start of the 2012-2013 semester which revealed a positive association (Rho=.507 and *p*-

value=.002). Within the variable of meal patterns, the study showed that students who consumed breakfast, lunch or dinner less frequently tended to have a greater BMI. There were also negative associations between these variables and BMI, with no statistical significance in the first semester of the years 2012-2014. However, there was statistical significance between BMI and lunch and dinner at the beginning of the semester for both study samples.

Conclusion

Among the study sample in each academic year, the majority of students were within the normal weight range. Therefore, it seems that presently, there is a relatively low prevalence of overweight and obese students at the UM. However at the end of the semester of both years, a considerable percentage of students had a BMI either overweight or obese. If this trend continues throughout the university years of these students, it can be anticipated that the UM can be faced with a serious health crisis. Considering the adverse effects of excess weight on the body, these students should be monitored and assistance should be offered to them to acquire a healthier weight.

University of Montemorelos

Faculty of Health Sciences

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Thesis
presented in partial fulfillment of the
requirements for the degree
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by

Aniqueka Jamie Scott

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Tesis
presentada en cumplimiento parcial
de los requisitos para el título de
Maestría en Salud Pública

por

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LIST OF ABBREVIATIONS

AALMMA	Association of Student Latin American Medical Missionary Adventists (*Asociación de Alumnos Latinoamericanos Médicos Misioneros Adventistas*)
CELEBRATIONS	Acronym created by the General Conference Health Department of SDA and it stands for: Choice, Exercise, Liquids, Environment, Belief, Rest, Air, Temperance, Integrity, Optimism, Nutrition, and Social Support.
ENSANUT	National Health and Nutrition Survey (*Encuesta Nacional de Salud y Nutrición*).
NCD	Non-communicable disease
NEWSTART	Acronym created by a group of physicians and teachers of the Weimar Institute in California: Nutrition, Exercise, Water, Sunlight, Temperance, Air, Rest, and Trust in Divine Power
UM	University of Montemorelos in Nuevo Leon, Mexico

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CHAPTER I

INTRODUCTION

Problem Statement

The public health crisis of obesity in Mexico is largely related to lifestyle habits. Lifestyle, is defined as the personal customs or habits of an individual or group of individuals. Additionally, lifestyle alludes to people's active adaptation to the social milieu, which develops as a product of need for integration and socialization (Derman, Patel, Nossel, & Schwellnus, 2008). Habits are defined as behavioral dispositions to repeat well practiced actions given recurring circumstances and are assumed to develop through repetition of the behavior in the presence of consistent stimuli (Lally, Chipperfield, & Wadle, 2008). Moreover, there is a significant amount of research which states that different types of lifestyles are comprised of a combination of habits and that poor lifestyle habits increase the risk of non-communicable diseases (NCDs).

NCDs that are associated with lifestyle habits represent the single largest cause of mortality in individuals of working age at a global level (Derman, Patel, Nossel, & Schwellnus, 2008). Individual health choices are contributing to the current global obesity epidemic. Consequently, as changes in lifestyle habits increase, particularly dietary habits, a simultaneous increase in the prevalence of obesity has been observed in the United States, Europe, and the lower and middle income countries of Asia, Africa, the Middle East, and Latin America (Popkin & Gordon-Larsen, 2004).

According to the World Obesity Federation (WOF), there are approximately 475 million obese adults worldwide and over 1 billion adults who are considered to be overweight. The WOF also suggested that over 200 million school-age children are overweight, making this generation the first predicted to have a shorter lifespan than their parents (World Obesity Federation [WOF], 2012). As a result of the alarming statistics regarding obesity and its effects, the American Medical Association, in 2013, has classified obesity as a disease (American Medical Association, 2013).

Derman, Patel, Nossel, & Schwellnus (2008) added that lifestyle related diseases included cardiovascular disease, diabetes, cancer, and respiratory disease. The authors continued that lifestyle habits are also important in the pathogenesis of other diseases including gout, gastro-esophageal reflux disease, osteoporosis, metabolic syndrome, polycystic ovarian syndrome, irritable bowel syndrome, and erectile dysfunction. Other health challenges which affect young adults and can be attributed to obesity are poor self-image, depression, orthopedic problems, hypertension and sleep apnea (American Obesity Association, 2002).

Quality of health is heavily influenced by lifestyle habits and since habits are resistant to change, it is important to develop good habits in the early stages of life. People can experience good health and retard the process of aging by managing or changing their lifestyle habits to included healthier practices. It has been suggested that if the huge health benefits of these few habits were put into a pill, it would be declared a scientific milestone in the field of medicine (Bandura, 2004).

Universities are an important setting in which healthy lifestyles should be encouraged. The transition of young people to university is a time of increased responsibility for food choices and other lifestyle habits. Popular media suggest that with the transition to university,

freshmen gain approximately 15 pounds (the "Freshman 15"), despite research indicating that most gain only six pounds (Freedman, 2010). However, these small increases in weight can be significant if it persist over four years, or the duration of a student's program of study.

Students initiate their university careers with well-established lifestyle habits that were transferred from their homes. These include their eating patterns, levels of physical activity, sleep habits, and social practices. However, the university is a new environment for students and it facilitates the formation of new friendships and changes to daily routine. Therefore, this new change of environment can further cement their previous habits or drastically modify them. This developmental period of first year university students is a critical time during which they will make independent decisions. Hence, it is necessary to implement educational programs that would assist and encourage them to make healthier choices.

In Mexico, approximately 70% of the population is overweight and children represent 40% of this statistic (World Health Organization [WHO], 2011). In a more recent investigation, the National Inquiry of Health and Nutrition (ENSANUT), indicated that the prevalence of overweight and obesity in Mexican adults, 20 years or older, was 71.3%. The study specified that 32.4% of that population was obese and the remaining 38.8% was overweight (Barquera, Campos-Nonato, Hernández-Barrera, Pedroza-Tobías, & Rivera-Dommarco, 2013). As a consequence, hypertension and diabetes are two of the diseases that are prevalent in Mexican adults (Barquera et al., 2013).

Contributing factors that are involved in the etiology of obesity include genetics, sedentary behavior and consumption of high-fat, energy-dense foods that are readily accessible, inexpensive, heavily advertised, and palatable (Cohen, Scribner, & Farley, 2000). The authors added that other factors which contribute to obesity amongst young adults include lack of

knowledge about proper nutrition and recommended serving sizes of specific food groups. Additionally, the perceived importance of healthy diet, taste of healthy foods versus unhealthy foods, cost, and perceived time constraints also influence students' anthropometric make up (Cohen et al., 2000).

Lifestyle habits play a major role in influencing one's Body Mass Index (BMI) and consequently, quality of life. This study will examine the relationship between these lifestyle habits and BMI of two cohorts of first year students at the University of Montemorelos (UM) over a two-year period, academic years 2012-2013 and 2013-2014. Meal patterns, food choices, sleep duration and student housing are the variables that will be discussed.

Justification

Obesity is a public health crisis in Mexico. Research conducted in Mexico, such as the ENSANUT, a survey led by the Instituto Nacional de Salud Pública (INSP), demonstrated that obesity is directly related to poor lifestyle habits (Barquera et al., 2013). Poor lifestyle habits increase the risk of NCDs and cause a spiraling increase in the prevalence of obesity.

The ENSANUT, conducted in 2012 in the state of Nuevo Leon, where the UM is located, revealed that 28.8% of the population was overweight or obese (Barquera et al., 2013). The state's Secretary of Health stated that approximately 71% of adults in Nuevo Leon are overweight or obese. He attributed this alarming figure to poor nutrition and sedentary lifestyle. Meanwhile, he added that 33.9% of adolescents are obese (Rodríguez Palacios, 2013). Therefore, there is crucial need for further research of the factors that contribute to an elevated BMI in an attempt to encourage better weight control in this area of Mexico.

The findings of this study would assist the UM with developing improved healthy lifestyle educational programs that encourage students to purposefully make wiser dietary choices

and develop healthier habits. It would also provide an impetus for change and improvements of the meal compositions at the university's cafeteria by advocating for lower caloric meals. Furthermore, given that one of the main goals of any university is to broaden the knowledge base of society, imparting information on healthy lifestyles and assisting students in cultivating these lifestyles, should be of utmost importance. Students will likely make positive changes and will integrate and share their knowledge in their professional service to their communities. Thus, the creation of a health conscious culture will be initiated.

Lifestyle is a concept that changes as society changes. In order to track these changes amongst students, this study will allow for continuity of research, specifically in this geographical location. The data can be used for other similar lines of investigation such as longitudinal study of the cohorts to examine the BMI of these students over various years. Another interesting investigation would be to study the differences of BMI amongst students of different countries and amongst degree programs. A study can also be conducted between the UM and other universities to explore the differences that exist between lifestyle habits and BMI. In addition, recommendations will be made to assist the UM to help students to further develop and maintain healthy lifestyle habits.

General Objective

To investigate the relationship between the BMI and lifestyle habits of two cohorts of first year students at the UM; one in the first semester of 2012-2013 and another in the first semester of 2013-2014.

Specific Objectives

The specific objectives that will be addressed in this research are as follows:

1. To determine whether there is a significant increase in the BMI of both cohorts of first year students from the beginning of the semester to the end of the semester in each academic year.

2. To examine the differences between the BMI of male and female students.

3. To investigate the relationship between the choice of residence and BMI.

4. To see whether food choices significantly influence BMI.

5. To investigate whether there is a considerable effect of meal patterns on BMI.

6. To understand the association between sleep duration and BMI.

Hypotheses

This research will use the hypotheses stated below to advance the scope of the study:

H_1: There is a significant increase in the BMI at the end of the first semester.

H_2: There are noteworthy differences in overweight female students than male students.

H_3: Students who live on the campus dormitories have a greater BMI.

H_4: There is a relationship between food choice and BMI.

H_5: There is a relationship between meal patterns and BMI.

H_6: A relationship exists between sleep duration and BMI.

Philosophical Framework

The University of Montemorelos is a Seventh-day Adventist (SDA) institution and therefore promotes the core beliefs of the church. Adventists are known for living longer, healthier lives and for promoting a natural vegetarian diet rich in fruits, vegetables, nuts, and grains (Buettner, 2005). A number of studies conducted since the late 1950's in the United

States show that Adventists enjoy better health and live six to ten years longer than the general population. Vegetarian Adventists are even healthier and live about five years longer than non-vegetarian Adventists (Fraser, 2009).

Biblical Principles

In accordance with biblical principles, Adventists believe that the body is the temple of the Holy Spirit and are given the divine mandate of presenting the body as a living sacrifice before God. The Bible also counsels, "Do you not know that your bodies are temples of the Holy Spirit, who is in you, whom you have received from God? You are not your own" (1 Corinthians 6:19). On account of this, God, through the Bible, expressed, "Dear friend, I pray that you may enjoy good health and that all may go well with you…" (3 John 2). Therefore, the manner in which the body is maintained is important to God as the Creator. He wants people to experience the best of health and wellness.

When God created mankind, the blueprint for optimal health and wellness was also given to him. "God said, I give you every seed-bearing plant on the face of the whole earth and every tree that has fruit with seed in it. They will be yours for food" (Genesis 1:29). Hence, it is clear that originally, human beings were designed to consume fruits, grains and seeds only before the entrance of sin and thereafter, plants and vegetables were added to that diet.

The Bible further recounts the experience of Daniel and his three companions who were captured from Jerusalem and taken to Babylon to live in exile. These young men were to be trained to serve in the king's service and thus, they were to be fed food and wine from the king's table. However, Daniel 1:12 and 13 records that Daniel requested that they be given nothing but vegetables to eat and water to drink and thereafter, that their appearance be com-

pared with that of the young men who ate the royal food. Daniel stated that, "At the end of the ten days they looked healthier and better nourished than any of the young men who ate the royal food" (Daniel 1:15). Subsequently, the story of Daniel and the three Hebrew boys showed that the exemplary diet for mankind consisted of only plant based foods and water.

Counsels from Ellen G. White

Ellen G. White, one of the pioneers of the SDA church and an accepted prophetess propounded in 1946:

> God gave man no permission to eat animal food until after the flood. Everything had been destroyed upon which man could subsist. As such, the Lord in their necessity gave Noah permission to eat of the clean animals which he had taken with him into the ark. But animal food was not the most healthful article of food for man. (p. 373)

Although the consumption of meat was permitted after the flood, God gave specific details about meats that were clean or acceptable to be eaten and those that were not. These specifications can be found in the Bible in Leviticus chapter 11. Apart from that, consuming the blood and fat from animals was prohibited as stated in Leviticus 7 and 17. God in His wisdom gave these instructions to safeguard mankind from illness.

Hawlitschek (2008) noted that Genesis chapters 5 and 11 give the genealogies before and after the flood. There was a rapid decrease of the lifespan from an average of 912 years before the flood, to Abraham, who lived up until 175 years. Not only was longevity shortened, but also the size of the human race and the intellectual power decreased accordingly. White (1946) suggested:

> After the flood, the people ate largely of animal food. God saw that the ways of man were corrupt and that he was disposed to exalt himself proudly against his Creator and to follow the inclinations of his own heart. He permitted that long-lived race to eat animal food to shorten their sinful lives. Soon after the flood the race began to rapidly decrease in size, and in length of years. (p. 373)

SDA Principles

The SDA church has advocated a holistic healthy lifestyle, including dietary habits, since its foundation in 1863. This special emphasis on health is reflected in the 22nd of its 28 Fundamental Beliefs (General Conference of Seventh-day Adventists, 2013) states:

> Because our bodies are the temples of the Holy Spirit, we are to care for them intelligently. Along with adequate exercise and rest, we are to adopt the most healthful diet possible and abstain from the unclean foods identified in the Scriptures. Since alcoholic beverages, tobacco and the irresponsible use of drugs and narcotics are harmful to our bodies, we are to abstain from them as well. (p. 9)

These tenets were encapsulated in the acronym NEWSTART and are also known as the eight remedies or laws of health. The NEWSTART acronym was created by a group of physicians and teachers of the Weimar Institute in California approximately 35 years ago. The acronym stands for, Nutrition, Exercise, Water, Sunlight, Temperance, Air, Rest, and Trust in Divine Power (NEWSTART Weimar Institute, 2014).

In addition, Hawlitschek (2008) mentioned that a new acronym was created by the General Conference Health Department of SDA. It is called CELEBRATIONS and it includes some additional important factors. CELEBRATIONS stand for Choice, Exercise, Liquids, Environment, Belief, Rest, Air, Temperance, Integrity, Optimism, Nutrition, and Social Support.

Consistently following these laws of health can prevent diseases and contribute to good health and longevity. The Bible states that, “the curse causeless shall not come” (Proverbs 26:2). This principle is echoed by White, when she wrote, "Disease is an effort of nature to free the system from conditions that result from a violation of the laws of health" (White, 1946).

Adventists Health Studies

In accordance with the SDA health principles, researchers at the Loma Linda University (LLU) in California have collected extensive data on the lifestyle of SDAs. Loma Linda is a city located in South-eastern California and home to a large SDA community. A generation ago, nearly 80% of the city is SDA. Presently, however, Adventists make up about half of the city's population. Despite this, the influence of the denomination on the town remains clear. Buettner, in 2005, identified Loma Linda as one of four places in the world with a high concentration of people living healthy lives past the age of 100. These places he called Blue Zones (Buettner, 2005).

Buettner's research demonstrated that the secret to longevity has less to do with diet or even exercise and more to do with the social and physical environment in which people live. He identified nine powerful yet simple lessons to promote health and wellbeing. These are listed as follows:

1. Keep moving. Find ways to move naturally, such as walking and gardening, using fewer labor saving devices.

2. Find purpose. Pursue it with passion.

3. Slow down. Work less, rest and take vacations.

4. Stop eating …when you're 80% full.

5. Dine on plants. Eat more vegetables and less meat and processed foods.

6. Drink red wine. Do it consistently but in moderation.

7. Join a group. Create a healthy social network.

8. Feed your soul. Engage in spiritual activities.

9. Love your tribe. Make family a high priority.

SDAs have been practicing these health counsels long before Buettner discovered that they promote and boost longevity, with the exception of the consumption of red wine. LLU conducted three major studies amongst the Adventist population and found that Adventists tend to live longer as a result of the lifestyle practices. Juneby (2012) noted that about half of the Adventists in these studies were vegetarian. This made it possible to discover significant health advantages of a plant based diet by comparing vegetarians with non-vegetarians. Current research shows that the closer you are to being a vegetarian, the lower the health risk (LLU, School of Public Health [SPH], 2012).

The first study conducted by the LLU was the Adventist Mortality Study. This was a prospective study of 22,940 Adventists in California that began in 1958, with an intensive 5-year follow-up and a more informal 25-year follow-up. This study clearly demonstrated that Adventists living in California lived longer than other Californians and that fewer died of heart disease and from smoking related cancers (Fraser, 2009).

The succeeding study was the Adventist Health Study 1 (AHS-1), conducted during 1974 to 1988 and involved 34,000 Adventists in California (LLU, SPH, 2012). It established direct relationships among lifestyle, diet, disease and mortality. Data from this study has been analyzed for more than a decade and the main findings are summarized by Juneby (2012) as follows:

1. On average, Adventist men live 7.3 years longer while Adventist women live 4.4 years longer than other Californians.

2. Five simple health behaviors promoted by the SDA Church for more than 100 years (not smoking, eating a plant-based diet, eating nuts several times per week, regular exercise and maintaining normal body weight) increase life span (about two years each) up to 10 years.

3. Increasing consumption of red and white meat was associated with an increase of colon cancer.

4. Eating legumes (e.g. beans, lentils, and peanuts) was protective for colon cancer.

5. Eating nuts several times a week reduced the risk of heart attack by up to 50%.

6. Eating whole-grain bread instead of white bread reduced non-fatal heart attack risk by 50%.

7. High daily intakes of water (five or more glasses) may reduce coronary heart disease by 50%.

8. Men who had a high consumption of tomatoes reduced their risk of prostate cancer by 40%. Tomatoes have also been found to significantly reduce the risk of ovarian cancer.

9. Drinking soy milk more than once daily may reduce prostate cancer by 70%.

The final study conducted amongst SDAs was the Adventist Health Study 2 (AHS-2), which focused on cancer (LLU, SPH, 2012). It began in 2002 and now has an enrollment of more than 96,000 Adventists, ages 30 to 112, from the United States and Canada. Subjects who were church members by the age of 15 accounted of 64% and females represented 65% of the participants in the study. The mean age at enrollment was 62. Smokers represented 1.1% of the study sample and 6.6% reported current alcohol use (Juneby, 2012).

This study discovered pertinent differences between non-vegetarians and vegans/vegetarians. Vegans/vegetarians watched less television than non-vegetarians (Juneby, 2012). The author added that, they slept more hours per night, consumed more fruits and vegetables, consumed less saturated fat and typically ate foods with a low glycemic index, such as beans, legumes and nuts. These healthy practices resulted in a better quality of life for vegans/vegetarians as opposed to non-vegetarians.

UM's Initiatives

Considering the health counsels given to the SDA church and the overwhelming success of the scientific data regarding its lifestyle, the UM strives to uphold the health principles of the church. There are only vegetarian (lacto-ovo) and vegan options at the university's cafeteria. In addition, there are a number of physical fitness programs in which students can get involved. These include organized exercise classes and groups such as high intensity interval training, aerobics, team sports, walking and jogging clubs. The fitness center is also available to those inclined to use weight lifting equipment and the swimming pool is made accessible during the warm months of the year.

The campus dormitories have an established curfew to maximize rest time. This includes a mandatory lights-out policy by 11pm. Students are encouraged to get sufficient rest and to engage in wise time management. The university also has designated dieticians and counsellors to whom students can go for advice and guidance in planning and leading a healthy diet and lifestyle.

To further enhance the promotion of healthy lifestyles, all first year students must enroll in the physical fitness and healthy lifestyle courses. These courses teach the various health principles of the SDA church in light of current scientific evidence and explain why students should modify their habits in order to enjoy the benefits of a healthy lifestyle.

The university also recommends students to get involved in church clubs such as the Master Guides, Youth Leaders and the Association of Student Latin American Medical Missionary Adventists (AALMMA). Via these clubs, students get the opportunity to participate in several community service projects throughout their university career. These activities promote social and mental equilibrium and provide an avenue by which students can have a sense

of belonging. Such activities also motivate students to desire healthy bodies in order to be fit to serve others and ultimately, serve God.

Limitations

The following limitations guided the scope of this research:

1. Only first year students who were enrolled in the Physical Fitness and Health Lifestyle courses were included in this study; irrespective of the degree program in which they are enrolled.

2. Only the first semester, August to December, for the academic years 2012-2013 and 2013-2014 were examined. Questionnaires were applied at the beginning of the semester and at the end of the semester.

3. The deans of some programs did not give permission for their students to participate in this study, opting instead to arrange their own lifestyle and wellness program. This reduced the size of the study sample.

4. Despite having anthropometric measurements taken, not all first year students visited the physical fitness office to be measured. This resulted in some data missing either for the beginning or end of the semester.

5. While anthropometric measurements were taken by a licensed dietitian, the questionnaires were self-reported. Self-reporting could have resulted in the unreliability of data as some respondents could have exaggerated their responses, while others could have underreported data. This is particularly relevant for students who live off-campus and are not compelled to follow the university's regulations regarding dietary and sleeping patterns.

6. The Healthy Habits Questionnaire was applied for this study. It was developed by the School of Public Health approximately five years ago and has been administered to stu-

dents annually. However, the questionnaire has not been validated and so the outcome of this research will only be feasible for use within the University of Montemorelos.

7. Obesity in this study was measured using BMI only. The calculation of BMI requires only height and weight and it was inexpensive and easy to use. Other methods that could have been used to measure body fatness include skinfold thickness measurements, underwater weighing, bioelectrical impedance, dual-energy x-ray absorptiometry (DXA), and isotope dilution (Centers for Disease Control and Prevention (CDC), 2011). However, these methods were not readily available at the university because they are either expensive or require highly trained personnel. According to the CDC (2011), calculating BMI is one of the best methods for assessment of overweight and obesity. Nevertheless, the CDC added that BMI is not a direct measure of body fatness as it calculated from an individual's weight which includes both muscle and fat. As a result, some individuals may have a high BMI but not have a high percentage of body fat (CDC, 2011). For example, highly athletic people may have a high BMI due to increase muscularity rather than increased body fatness, particularly amongst men.

Delimitations

The delimitations outlined below defined the course of this research:

1. The students who were not enrolled in the Physical Fitness and Healthy Lifestyle courses, which are first year general education courses, were omitted from the study.

2. Students who did not complete the questionnaire and those that did not go to be measured were excluded from the research.

3. Lifestyle habits only entailed food choices, meal patterns, sleep duration and choice of student housing. Other lifestyle habits such as physical activity, management of stress and substance intake (tobacco and alcohol) were not included in this research.

4. Despite not being validated, this questionnaire was selected in order to utilize and contribute to the existing data. Data collected over the years were not being utilized. This research did not only use existing data up until 2012, but collected additional data for 2013.

Definition of Terms

The key terms that were used in this document are listed below.

Meal Patterns: Meal patterns is the regularity of the consumption of meals. In this study, meals refer to breakfast, lunch and dinner.

Food Choices: The types of foods students choose to eat and the way in which it is prepared. Food choice decisions are frequent, multifaceted, situational, and dynamic. In the university environment, where there are other influencing factors such as peer pressure, food choices are even more varied (Sobal & Bisogni, 2009). In this study, food choices consisted of four factors: home cooked meals, frozen or canned foods, fast food or food eaten outside of the home or cafeteria and snacks.

Home Cooked Meals: Meals consumed at the university's cafeteria is considered as home cooked meals for students who live on campus. Food cooked at a home, is considered to be home cooked meals for students who live off campus.

Fast Food: Food consumed from a fast food restaurant, in which one can order, purchase and receive the food in about ten minutes (Morse & Driskell, 2009). The authors also suggested that it includes traditional fast-food restaurants where customers order and receive food at counters and drive-in locations, as well as fast or casual restaurants where customers

order at the counters and their food is delivered to the table. In addition, fast food refers to food ordered by telephone and delivered to where a person lives (Morse & Driskell, 2009). In this study, fast food would also refer to traditional street food. This include tacos, fried empanadas, and gorditas (a typical Mexican bread with a filling of meat or vegetables).

Snacking: The consumption of food or drinks at other times than socially accepted meal times (Bellisle, 2004).

Student Housing: Refers to where a student chooses to live. Students can live on-campus, meaning on the universities dormitories, or off-campus, either living alone or with friends, or with a family (Brunt & Rhee, 2008).

Sleep Duration: Signifies the number of daily sleep hours a student gets (Pantic et al., 2011).

Freshmen: Student's newly admitted in to the university at the beginning of the academic year.

Body Mass Index (BMI): A simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2) (WHO, 2013). According to guidelines stipulated by the National Institute of Health, weight status was classified into four categories as illustrated in Table 1.

Table 1

Classification of the BMI Categories

BMI	Categories
< 18.5	Underweight
18.5–24.9	Normal weight
25- 29.9	Overweight
$\geq$ 30	Obese

Source: The World Health Organization's (WHO) factsheet number 311, updated in March 2013.

CHAPTER II

LITERATURE REVIEW

Lifestyle habits of university students are dynamic and can be influenced by various factors such as peer pressure, increased knowledge of healthier practices, or the demanding routine of university life. The literature review focuses on lifestyle habits as they pertain to first year students at the UM and how these habits affect their BMI. The lifestyle habits that will be emphasized in this literature review are meal patterns, food choices, sleep duration and students housing.

Meal Patterns

The number of studies food, meals, and nutrient intake has increased since the middle of the twentieth century. These studies highlight the effects of food consumption on the body and its proper functioning. One writer, Fjellstrom (2004) suggested that the concept of meals is universal, existing in every society, culture, and social class, but it is significantly different across individuals and groups.

Cultural Influences

The three-meal-a-day concept is worldwide (Fjellstrom, 2004). However, meals such as breakfast, lunch, and dinner, have different structural and cultural meanings. For instance, breakfast or lunch, for some people, are considered more important or as a proper meal, while

dinner has strong cultural significance because this is the time when the entire family can join to eat together.

Association between Meal Patterns and BMI

Previous studies have shown an inverse association between meal frequency and the prevalence of obesity in adults and in children (Mota et al., 2008). Skipping breakfast was associated with less healthy choices and negative lifestyle factors (Sjoberg, Hallberg, Hoglund, & Hulthen, 2003), as well as an increased BMI (Affenito et al., 2005). This view was supported by a study in Norway, in which special attention was given to the importance of eating breakfast (Øverby, Stea, Vik, Klepp, & Bere, 2011). It was also noted that in Pakistan, the habit of skipping breakfast contributed to obesity (Sajwani et al., 2009).

Regular breakfast consumption has been associated with lower blood cholesterol (Sjoberg et al., 2003). This study also highlighted the importance of energy supply after overnight fasting for cognitive function and endurance. While most studies reported an inverse relationship between meal frequency and the prevalence of weight gain, others failed to detect significant associations (Mota et al., 2008). However, the most common notion that has been revealed among university students, is that an inadequate meal frequency is associated with weight gain and obesity.

Reports from Other Universities

In Pakistan, lifestyle and dietary habits in 350 medical and non-medical students were examined (Sajwani et al., 2009). This report indicated that less than half of the students reported eating regular meals or three meals a day. A significant amount of the remaining students

consumed two meals. Breakfast was the most commonly skipped meal, followed by lunch. The study revealed that 15.9% of the cohort had a BMI classified as overweight.

A similar pattern of irregular meals consumption was observed in Saudi Arabia among 357 university students. This investigation revealed that 66.3% of the students ate meals irregularly. Notwithstanding, the majority of students (88.6%) ate breakfast at least three times per week (Al-Rethaiaa, Fahmy, & Al-Shwaiyat, 2010). The researchers added that most of the participants ate two meals per day, while a considerable amount of them ate three meals. Despite a more frequent meal consumption pattern, a greater amount of students were found to be overweight (21.8%) and obese (15.7%) than in the research conducted in Pakistan.

A study conducted in China among 540 university students revealed a contrasting occurrence. The majority of the students reported eating meals regularly (Sakamaki, Toyaman, Amamoto, Liu, & Shinfuku, 2005). This study showed that 80.5% of the students had a normal BMI, with the prevalence of overweight and obesity being very low in the study sample, 2.5% and 0.4% respectively. Among the Chinese students, habits reported involved regular eating patterns and the frequent consumption of fruits and vegetables (Sakamaki et al., 2005). Therefore, the consistency of meals intake proves to influence the BMI. This highlights the importance of developing healthy habits regarding the regularity of consuming meals.

Food Choices

Food provides both the energy and the materials needed to build and maintain cellular functions in the body. Hence, it is important for individuals to choose foods that promote optimal health. The Food Standards Agency (FSA), an independent government department responsible for food safety and hygiene across the United Kingdom, defined food choice as the selection of foods for consumption, which result from competing, reinforcing, and interacting

influences of a variety of factors (Buttriss et al., 2004). These factors range from the sensory, physiological, and psychological responses of individual consumers to the interactions between social, environmental, and economic influences.

Purpose of Food

Nutrition is the process of absorbing and using food nutrients for growth, repair and maintenance of the body (Olusanya & Omotayo, 2011). Sajwani et al. (2009) advocated that inappropriate nutrition increases the risk of diabetes, osteoporosis, obesity, and cardiovascular diseases. Therefore, it is necessary that university students make proper food choices in order to benefit from adequate nutrition and prevent diseases.

Reasons for Food Choices

Food selection is frequent, multifaceted, situational, and dynamic (Sobal & Bisogni, 2009). In fact, food psychologist Wansink (2010) suggested that the mind makes food-related decisions more than 200 times per day. Consequently, people have several eating opportunities, and although some food choice decisions do not lead to eating, people still need to make a decision not to eat. Menu choices, cost, convenience, taste, socializing with friends, dining out, advertisement, lack of cooking skills, and location were some of the reasons given for food selection (Morse & Driskell, 2009).

Other influences on food choice are based on beliefs, attitudes, availability, access, education, and knowledge. Labelling, presentation, packaging, and media communications are additional mechanisms by which food choice is influenced (Buttriss et al., 2004). The authors added that other variables include culture, ethnicity, biological and physiological factors, as in the case of someone adopting a special diet due to an illness.

It is well documented that vegetables and fruits are important elements of a healthy, balanced diet. They provide vitamins, minerals, fiber, and energy, mainly in the form of fructose (Todea, Rosca, Coman, Suatean, & Herescu, 2013). The WHO (2008) recommends eating at least 400 grams of fruits and vegetables per day, excluding potatoes and other starchy tubers. This quantity of 400 grams refers to five servings of 80 grams per day.

Dietary Regimens

Popular dietary regimens influence food selection. The Mediterranean diet is one of the most endemic diets in the world. It is not a specific diet, but rather a collection of eating habits traditionally followed by people in the different countries bordering the Mediterranean Sea. The diet was first described in the 1960s by Ancel Keys and emphasizes a consumption of fat primarily from foods rich in monounsaturated fatty acids and mainly olive oil (Todea et al., 2013). The Mediterranean diet encourages daily consumption of fruits, vegetables, low fat dairy products and whole grains. It also places an emphasis on weekly consumption of fish, poultry, tree nuts, legumes, sparse consumption of red meat, as well as a moderate consumption of alcohol (mainly wine during meals).

Todea et al. (2013) continued that it is also advised that a daily intake of one and a half to two liters of water (equivalent to six to eight cups) should be consumed each day. Proper hydration is essential to maintain the corporal water balance, although needs may vary among people due to age, physical activity, personal circumstances, and weather conditions (Todea et al., 2013). While the benefits of a well-balanced diet have long been encouraged, society has experienced a shift from the Mediterranean type diet to fast food.

Dansinger, Gleason, Griffith, Selker, and Schaefer (2009), in a study on the comparison of different diets, have recorded additional programs for weight loss or maintaining a

healthy weight. These programs are the Atkins diet, the Zone diet, the Weight Watchers diet, and the Ornish diet. The Atkins diet aims for less than 20 grams of carbohydrate intake per day, with a gradual increase toward 50 grams per day. The Zone diet aims for a 40-30-30 distribution of total calories from carbohydrates, lipids, and protein, respectively. The Weight Watchers diet aims to keep total daily "points" in a range determined by current weight of each individual. Each "point" is equivalent to approximately 50 calories, and most participants aimed for 24 to 32 points per day. The Ornish diet aims for a plant-based diet containing 10% of total daily calories from fats.

The Vegetarian Diet

The vegetarian diet is an influencing factor on food choices and play a beneficial role in promoting a healthy lifestyle and preventing obesity (Tonstad, Butler, Yan, & Fraser, 2009). Additionally, vegetarianism encompasses a spectrum of eating patterns: from diets that leave out all animal meats and products (vegan), to diets that include eggs, milk, and milk products (lacto-ovo vegetarian), or even fish in addition to eggs, milk, and milk products (pesco-vegetarian).

As evidence of the benefits of vegetarianism, the AHS-2 conducted by the LLU reported that the mean BMI was lowest in vegans (23.6 kg/m2) and gradually increased in lacto-ovovegetarians (25.7 kg/m^2), pesco-vegetarians (26.3 kg/m^2), semi-vegetarians (27.3 kg/m2), and non-vegetarians (28.8 kg/m2) (Juneby, 2012). It was also noted that the prevalence of type 2 diabetes increased from 2.9% in vegans, to 7.6% in non-vegetarians. Additional studies agreed that there is an increase in BMI when a wider spectrum of animal products is consumed and concluded that BMI was highest in meat eaters, and lowest in vegans (Tonstad et al., 2009). It is also suggested that the effects of the vegetarian diet in preventing weight gain is

due to avoidance of major food groups such animal based proteins and lipids. This exemplifies that a vegetarian diet can help to prevent obesity and type 2 diabetes.

Fast Food Consumption

The consumption of fast food is another option for university student when making food choices. Higher regularity of dining out has been linked to obesity (Lee, 2008). In addition, the shift towards an increase in the frequency of eating meals away from home and the proportion of food budget spent on these foods, have coincided with the increasing prevalence of obesity (Swinburn, Caterson, Seidell, & James, 2004).

Fast food consumption is a significant phenomenon in industrialized and modernized societies and is common amongst university students. Students have cited taste, convenience, and opportunity to socialize as reasons for choosing fast food or eating at restaurants (Swinburn et al., 2004). However, despite the reason for choosing to consume fast foods, the authors suggest that the fact remains that food prepared away from home is higher in total energy intake, fat, cholesterol, sodium, and contains less fiber and calcium. Notwithstanding, fast food is popular among university students as shown in a study conducted at a large Midwestern University in the US among 259 students. It was revealed that college students eat at fast food restaurants, on average, six to eight times per week (Morse & Driskell, 2009). The study also highlighted that food intakes of most college students do not meet the recommended daily allowance for most of the food groups.

Snack Consumption

The consumption of snacks is also frequent amongst university students. Although researchers proposed that the relationship between snacking and one's weight is not clear, the

most popular perception suggests that there is a positive association between these two variables (Forslund, Torgerson, Sjostrom, & Lindroos, 2005). Moreover, high-caloric food choices, accompanied by frequent snacking, facilitates increased energy intake. On the contrary, it is hypothesized that the lack of relationship between increased snacking and BMI may be explained by the fact that frequent snacking can be due to higher physical activity levels which in turn, helps to maintain normal weight (Forslund et al., 2005).

It is clear that snacking has different effects on different people (Bellisle, 2004). Referencing a study conducted in France, Bellisle recorded that most people snack at least once per day and that snacking can occur any time of the day. He further noted that in healthy, non-obese individuals, days without snacks resulted in the same amount of energy as days with snacks, suggesting some form of energy compensation. However, it was also suggested that snacking could have a deleterious influence on the development, and or, the maintenance of obesity. Booth (1988, cited in Bellisle, 2004) stated that the "growing trend for 'grazing or nibbling' rather than of the traditional pattern of three proper meals a day is a major factor in the etiology of obesity" (p. 116), because it leads to higher energy intake. In addition, high-fat, high-sugar, and high-energy foods were observed to be associated with snacking (Lee, 2008). In summary, Bellisle resolved that snacking can contribute to improve the nutrient balance in some people, but may be deleterious in others, such as persons with weight control problems.

Reports from Other Universities on Food Choices

In several universities around the world, food choices of students have been studied. Research in Nigeria conducted among 371 students demonstrated that university students usually do not follow healthy eating habits (Olusanya & Omotayo, 2011). Furthermore, the study showed that university students often selected fast food due to its availability, palatability, and

convenience. Additionally, daily intake of snacks was reported by the majority of students and a high intake of fried food was observed. Most of the students reported eating fried foods three or four times per week.

Another study conducted at a university in Saudi Arabia showed insignificant correlation between BMI and the consumption of fruits and vegetables (Al-Rethaiaa et al., 2010). The lack of correlation can be attributed to the fact that eating raw vegetables and fruits in the course of a meal is generally uncommon in Saudi Arabia. The authors added that the vegetable content in most of the traditional Saudi Arabian dishes is too insignificant to have an impact on the overall energy density of the diet. Moreover, fruits are usually consumed as a dessert at the end of meals, thus, losing their "satiety effect" and lowering the overall energy intake of the diet (Al-Rethaiaa et al., 2010). In this study the Saudi students consumed snacks frequently, but no correlation to BMI was noted.

In Lebanon, a nutritional transition in food choices from the Mediterranean diet to fast food meals has been experienced (Yahia, Achkar, Abdallah, & Rizk, 2008). Yahia et al. (2008) added that the eating habits of young adults were affected by the fast food market, resulting in overweight and obesity. The researchers referenced a study conducted at a Lebanese University which revealed an unhealthy eating practice among 220 students. Most of the students reported eating fried foods more than three times per week and a frequent intake of snacks. Despite this indication, the study also showed that the intake of colored vegetables and fruits was also common among the students, resulting in a low prevalence of overweight and obesity in the sample (Yahia et al., 2008).

Sleep Duration

University life is accompanied by many unfamiliar and stressful challenges such as independence, readjusted social life, and academic obligations. To cope with these challenges, first year university students engage in self-imposed sleep deprivation. Recent data suggested that there is an inverse relationship between sleep duration and overweight and obesity (Chaput & Tremlay, 2012). This implied that students are putting themselves at unnecessary risk for developing harmful health conditions.

Physiological Characteristics of Sleep

Sleep is an important phase of the 24 hour (circadian) rhythm of the body and melatonin is responsible for indicating the time for sleep in this rhythm. Melatonin is a natural hormone produced by the body's pineal gland, which is located in the brain. During the day the pineal gland is inactive, since melatonin production is suppressed by light (Jouret, 2013). However, when darkness occurs, the pineal gland actively produces melatonin and this production peaks around three to five hours after the onset of sleep. Melatonin regulates the sleep–wake cycle by lowering body temperature and causes drowsiness. It also inhibits insulin secretion by pancreatic beta cells (Jouret, 2013).

Purpose of Sleep

During the period of sleep, the basic metabolic rate decreases, soft tissues and muscles are relaxed and revitalized, and the brain is able to process thoughts accumulated during the day (Afandi et al., 2013). Evidently, sleep duration has neurobehavioral and physiological consequences that affect students' health, well-being, and academic functioning. Insufficient sleep is associated with a number of non-communicable diseases (Wells & Cruess, 2006).

Other researchers agreed that insufficient sleep has been implicated in affecting endocrine, immune, and nervous systems. Insufficient sleep has also been noted to increase cardio metabolic risk including obesity, diabetes, impaired glucose tolerance, and hypertension (Afandi et al., 2013; Chaput & Tremlay, 2012; Shochat, 2012).

Recommended Daily Sleep Duration

Adults sleeping five or less hours per night were 55% more likely to be obese than those sleeping more than five hours per night (Chaput & Tremlay, 2012). A study at the University of Chicago, noted that individuals who reported sleeping nine or more hours per night had less than half the risk of obesity than those who reported sleeping only six hours or less per night (Gangwisch, Malaspina, Boden-Albala, & Heymsfield, 2005). This study also revealed that short-term sleep curtailment impacted the neuroendocrine control of appetite and subjects were found to particularly crave sweets, starch, and salty snacks after being deprived of sleep.

To further understand the effects of sleep on the body, a study that utilized whole-room calorimetry, a system that allows energy expenditure to be calculated based on measurements of air samples was conducted examined (Jouret, 2013). It measured daily energy expenditure in adults undergoing five-day cycles of inadequate (five hours) or adequate (nine hours) nightly sleep. The study revealed that energy expenditure was about 5% higher in subjects with insufficient sleep, but increased food intake more than compensated for this energetic rise. The participants who had inadequate sleep ate a smaller breakfast, but consumed 42% more calories as after-dinner snacks, leading to weight gain.

This study by Jouret also suggested that participants' eating patterns, during sleep loss, resulted from a delayed circadian rhythm (Jouret, 2013). This refers to a later onset of melato-

nin secretion at night, assessed by hourly blood samples from an intravenous catheter, which might have led to a drive for more food intake. Furthermore, the time between waking and melatonin offset was longer in the five hour sleep condition. Thus, participants awoke during an earlier phase of the circadian rhythm, while still being in the state of biological sleep and might have been less hungry for consuming breakfast (Jouret, 2013).

Effects of Insufficient Sleep

Other studies agreed that insufficient sleep is associated with decreases in the satiety hormone leptin, increases in the hunger-stimulating hormone ghrelin, and increases in appetite (Markwald et al., 2013). A consequent increased food intake during sleep loss appears to be a physiological adaptation to provide the body with the energy needed to sustain extended wakefulness. However, when exposed to the modern obesogenic environment of readily accessible food, weight gain occurs because a larger food intake is necessary to compensate for the energy loss from insufficient sleep (Markwald et al., 2013). This weight gain will be exacerbated if physical exhaustion from sleep loss leads to increased sedentary behavior. In addition, sleep loss may be thought of as a source of stress for some individuals, which subsequently influence food choice and food consumption as well. Increases in stress levels lead to more snacking and a decrease in the consumption of typical foods associated with complete meals (Wells & Cruess, 2006).

Due to the fact that insufficient sleep is a major public health concern, the CDC recommended durations of sleep of eight and a half to nine and a half hours for adolescents and seven to nine hours for adults (Vélez et al., 2013). However, Vélez et al. argued that despite these recommendations, many college students fail to reach these recommendations, sleeping six or less hours per night as observed amongst college students in Patagonia, Chile.

Reports About Other University Students

For university students, short sleeping hours can be attributed to a heavy study load, home-work, strict deadlines, and part-time employment. However, modern lifestyle factors that affect sleep are also closely linked to advances in modern technology, which enables and encourages later bedtimes and longer hours of nocturnal arousal (Shochat, 2012). These modern lifestyle factors include electronic media devices such as television, computers, and smart phones. An investigation on 734 students at a Belgrade University, confirmed that online social networking sites such as MySpace, Twitter and Facebook, are becoming increasingly popular among young people and also contribute to less sleeping hours (Pantic et al., 2011).

A cross-sectional survey on health and nutrition in European teens was conducted and a similar trend was discovered (Shochat, 2012). This survey revealed that shorter sleep was associated with higher measures of obesity, including BMI, waist circumference, and body fat percentage. The study also showed that inadequate sleepers reported more sedentary time, watched more television, and maintained a less nutritional diet compared to adequate sleepers.

The studies presented demonstrate that voluntary sleep curtailment has become endemic and short sleep duration has mental and physiological consequences. In conclusion, sleep is crucial for university students to maintain a healthy lifestyle, which includes a normal BMI.

Student Housing

Influence of Student Housing on BMI

The determination of student housing influence lifestyle factors such as food choices, nutrient content of the diet, alcohol consumption, smoking and dieting (Brunt & Rhee, 2008). Another study reported that students living on campus identified factors associated with

weight gain to include decreased physical activity, high consumption of snacks, low intake of fruits and vegetables and other poor nutritional habits (Freedman, 2010).

Additional studies also proposed that the changes in living arrangements that a university student encounters influence their lifestyle factors such as food choices (Ansari, Stock, & Mikolajczyk, 2012; Bagordo, Grassi, Serio, Idolo, & De Donno, 2013). It was also observed that the lack of parental oversight means that students are more likely to eat an unbalanced diet (Zagorsky & Smith, 2011). Furthermore, when college students leave home and adjust to independent living, good dietary habits decline and poor dietary habits often tend to get worse (Brunt & Rhee, 2008). These researchers continued that students in general frequently have a diet of limited variety, high snacking and high consumption of fast foods and in an effort to control weight, a pattern of skipping meals occurs.

On-Campus vs Off-Campus

Those who live on-campus and participate in a campus meal plan, presumably consume a larger number of servings from fruit, vegetable and meat groups, due to availability and convenience (Brunt & Rhee, 2008). Students, who live off-campus and do not consume meals served at the university's cafeteria, also have a tendency to decrease their consumption of fresh fruits, cooked and raw vegetables, oily fish and increase their sugar and fast food intake (Ansari et al., 2012). Cost and lack of cooking skills can also contribute to the decline of the intake of nutritious foods (Morse & Driskell, 2009). Unlike their counterparts who live on-campus, the students who live off-campus, with little or no supervision by parents or university authorities, have a greater responsibility for their food choices and health practices.

Influence of Physical Activity on BMI

Mota et al. (2008) suggested that other factors that influence BMI are genetic predisposition, physical inactivity, and a toxic environment. Of these factors, physical inactivity pertains to university students the most. Patterns of physical activity as well as sedentary living play an important role in long-term weight regulation (Mota et al., 2008). It has become apparent that chronic physical activity in the form of exercise training has the ability to prevent or delay the onset of illness and disease (Derman, Patel, Nossel, & Schwellnus, 2008). In addition, it facilitates favorable changes in metabolism, body mass and body composition.

Most first year university students are young and are at a stage where they are still developing and so, with exercise included in their daily regime, ideal weight can be attained or maintained. Derman, Patel, Nossel, & Schwellnus, 2008) explained the importance of developing this habit by stating that the health benefits of physical activity increase with increasing frequency, duration and intensity of exercise. Moreover, these authors added that the effects of exercise training are short-lived, and that a long-term commitment to perform regular exercise training is necessary to maintain body weight within the normal range. Consequently, if students understand the importance of developing the habit of regular exercise while they are still young, it would not be perceived as a burden, but as a normal and necessary activity of their lives.

In conclusion, the literature reviewed about meal patterns, food choices, sleep duration and choice of student housing of university student confirm that these variables impact BMI. Although, not included in this study, physical activity also play a major role in influencing university students' BMI. Recent studies have all alluded to the notion that it is essential for students to develop holistic healthy lifestyle habits to maintain healthy minds and bodies.

CHAPTER III

METHODOLOGY

Type of Investigation

This research was quantitative and employed a correlational method of investigation. The purpose of the correlational method was to ascertain the degree of association that existed between BMI and lifestyle habits amongst two cohorts of first year students at the UM in the first semester of two school years, one in 2012-2013 and another in 2013-2014. The research also employed a retrospective pre-post self-assessment design. As a result, the changes that occurred amongst students between the start of the semester and the end of the semester among both study samples were examined.

Participants

The sample under review consisted of 539 first year university students at the UM. Of this sum, 228 students represented the total sample from 2012 and 311 from 2013. However, only students who were enrolled in the Physical Fitness and Healthy Lifestyle courses in the first semester, of academic years 2012-2013 and 2013-2014 were included in the study. As a requirement of these courses, students had to have their anthropometric measurements taken at the physical fitness office and this data was recorded by the dietitian assigned for this activity. Students who did not go to the physical fitness office to be measured in either of the academic years were excluded from the study.

Anthropometric Measurements

A data recording sheet was utilized to register each student's measurements. Anthropometric measurements included height and weight to determine the BMI. Students were weighed with a bathroom weighing scale. Before they were weighed, students were asked to remove their shoes, heavy garments such as jackets and sweaters and to empty their pockets. Each student's weight was recorded in kilograms. Height measurements were taken with a metric ruler, also without shoes and were recorded in centimeters. These measurements were taken by the dietitian employed at the physical fitness office.

Once the measurements for each student were taken, they were carefully recorded in an excel spreadsheet. Students were measured during the first two weeks of admission to the university and again within the last two weeks before the semester ended, after approximately ten weeks had elapsed. The data sheet used to collect this data also recorded the students' age, gender and identification number to allow for the referencing the anthropometric measurements with their responses to the questionnaires.

Instrument

The Healthy Habits Questionnaire (see Appendix 1) was used to evaluate the lifestyle habits of freshmen. This instrument was developed by Dr. Zeno Charles-Marcel, the former Coordinator of the School of Public Health and Mr. Jason Aragon, the Academic Secretary of the School of Public Health. It has been in existence for the past five years and was designed to collect and evaluate data for use within the university. Although it allows for the examination of pertinent data, it was not validated as it was designed for use within the confines of the UM. In this research, the lifestyle habits that were studied were meals patterns, food choices, sleep duration and choice of student housing. The instrument was applied at the beginning of

the semester and students had to respond based on their habits at their homes before coming to the university. At the end of the semester, the same questionnaire was administered and students responded based on their actual habits while being at the university for the semester.

The questionnaire consisted of 14 questions, with some of the questions having several parts. Each question had multiple options. A five point Likert Scale was employed for questions regarding meal patterns and food choices. The options on the Likert scale were 0 = never, 1 = almost never, 2 = sometimes, 3 = almost every day, and 4 = always. All of the questions that were utilized for this study will be further explained.

Meal Patterns

Question 1 from the questionnaire corresponded to meal patterns: "*How often do you consume the following meals?*" This question was asked three times to get responses from students about how often they consumed breakfast, lunch and dinner. This question is illustrated in Appendix 5 as Model 1.

Food Choices

Question 2 focused on food choices. Specifically: "*How often do you consume these types of foods?*" The types of foods asked were: home cooked meals, canned or frozen foods, and fast food or food purchased at a restaurant. Included in the category of food choices, was Question 4, which inquired about the intake of snacks. That is: "*Do you eat snacks between meals (more than two times a day)?"* in Appendix 5 in Model 2.

Sleep Duration

The final question used for this research was Question 11, which pertained to sleep duration. The amount of hours students slept each night was asked. The question that students

had to answer was: *"How many hours do you sleep every night?* However, in this instance, 1 = 5 or less hours, 2 = 6 hours, 3 = 7 hours and 4 = 8 or more hours of sleep a student gets each night. This question is shown in Appendix 5 as Model 3.

Student Housing

Students were asked to state their housing arrangements at the physical fitness office when they went to have their anthropometric measurements taken. This was recorded on the Evaluation of Physical Fitness Record Form (see Appendix 2). This questions is illustrated in Appendix 5 as Model 4.

Data Collection

Before completing the questionnaire, students were given instructions and were encouraged to complete the questionnaire completely and truthfully by research assistants of the Department of Physical Fitness. This first phase of the data collection occurred concurrently with collecting anthropometric measurements, within the first two weeks of admission to the university. The same questionnaire was administered during the last two weeks of the semester to the same study sample of each school year. Secondary data, data that was previously collected by the department of Physical Fitness was utilized for 2012-2013. This data was collected by the department's research assistant. However, primary data, data collected by the researcher of this study was utilized for 2013-2014.

During the taking of the measurements, students were asked to sign the data recording form, confirming that the information recorded was truthful. Signing the form also provided consent to use the data for educational research purposes. This form was signed by each student of both cohorts at the beginning and at the end of the semester. Model 5 in Appendix 5

shows an excerpt of the section that pertained to the consent for use of the data. It also indicated that the information would be stored and used in a confidential manner and that it would only be used for statistical analysis or other scientific educational purposes.

Data Analysis

All statistical tests were done using the Statistical Package for Social Sciences (SPSS) version 22 software. To test the hypothesis of whether there was a significant increase in the BMI at the end of the semester, a simple *t*-test of the difference in mean as well as Pearson's correlations were calculated and performed. The simple *t*-test was used to see if there were any major changes in BMI of students from the start and end of each semester amongst both study samples. Pearson's correlation coefficient was calculated to get the association between the BMI at the start and the end of the semester for both cohorts. These methods were utilized because they were easy to implement and were appropriate to uncover the intended change in BMI. Additionally, since BMI is a quantitative measure, these tests would have given meaningful results and conclusions. The simple *t*-test and the Pearson's correlation were also used to see if there was any relationship between sleep duration and BMI among first year students in both academic years.

The independent sample test is particularly useful when a researcher wants to uncover any differences in the relationship between nominal-type variables. Given that gender and choice of student housing data/variables were nominal, that is, they were simply names and there was no natural ordering that could have been assigned to either variables, the independent sample test was appropriate and was applied. To ensure that the results that were obtained were comprehensive, the independent sample test was performed on the assumptions that there were both equal and unequal variances across gender and choice of student housing.

Unlike gender and choice of student housing, the responses for food choice and meal patterns were constructed on a Likert scale. The Likert scale is oftentimes used on survey-type questions and the strength of responses are assumed to be linear, typically on a continuum from strongly agree to strongly disagree. Thus, it could be assumed that there is a 'natural' ordering to the responses. Consequently, to uncover the relationship between food choice and BMI and meal pattern and BMI, the Spearman rho's correlation coefficients were calculated. The Spearman rho's correlation coefficient is the nonparametric equivalent of the Pearson's correlation, but it has the advantage of obtaining association between ranked descriptive variables.

The significance of all results were checked and determined by calculating probability values (*p*-values). To see if there was any statistical significance to the results, *p*-values must be less than 10%. In fact, the lower the *p*-value, the stronger the statistical relationship would be and thus 10% should be viewed as the minimum requirement to get meaningful statistical results.

CHAPTER IV

RESULTS

To address objectives one, two and five of this research, all of the students who were measured at the start and end of the first semester of both academic years were included. Objectives one was to determine whether there was a significant increase in the BMI of both cohorts of first year students from the beginning of the semester to the end of the semester in each academic year. Objective two was to examine the differences between BMI of male and female students and objective five was to investigate whether there is a considerable effect of meal patterns on BMI respectively. A sample of 247 students was utilized, 124 from 2012-2013 and as a result of missing data, 123 from 2013-2014.

The other objectives were to investigate the relationship between the choice of residence and BMI, to see whether food choices significantly influence BMI and, to understand the association between sleep duration and BMI. To assess these objectives, a sample of 240 students was utilized, 62 from 2012-2013 and 178 from 2013-2014. The differences of the *n* was due to missing data, as some students who did not complete questionnaires for either the beginning or the end of the semester were eliminated, even though they their measurements were taken. Therefore, only the percentages amongst the samples will be examined and discussed.

Table 2 presents demographic data on the participants for both cohorts. It shows that in the first semester of 2012-2013, 50.4% of the students were male and 49.2% were female. In 2013-2014, 47.2% of the students were male, while 52.8% were female.

In addition, Table 2 illustrates that the majority of the students were between the ages of 16 and 20, representing 91.1% in 2012-2013 and 86.1% in 2013-2014. The demographic that contained the next popular age group was 21 to 25 in both years. Furthermore, in 2012-2013, there was a very small amount of 0.8% of students in the sample between the ages of 26 to 30. In this same age group of 26 to 30, there were no first year students in the first semester of 2013-2014. First year students above the age of 30 accounted for 2.4% in 2012-2013 and 3.2% in 2013-2014. The mean age and standard deviation for 2012-2013 was 18.83 and 3.39, while for 2013-2014, the mean age and standard deviation were 19.07 and 2.98 respectively.

Table 2

Demographic Data of First Year Students in 2012-2013 and 2013-2014

Variables	Academic Year 2012-2013 %	Academic Year 2013-2014 %
Gender		
Male	50.4	47.2
Female	49.2	52.8
Age		
16-20	91.1	86.1
21-25	5.6	10.5
26-30	0.8	0
>30	2.4	3.2
Student Housing		
On-campus	62.9	46.3
Off-campus	37.1	53.7

Table 2 further indicates that in 2012-2013, the percentage of students who lived off-campus was 37.1%, while 62.7% lived on-campus. In 2013-2014, 46.3% of the students lived off-campus, which showed an increase when compared to 2012-2013.

Distribution of BMI Categories

Table 3 provides data on the distribution of the BMI categories for the participants in both cohorts. The normal weight category represented the largest percentage of the two samples. There were small differences in the percentage of normal weight students in both cohorts. In the first year, the normal weight category for males increased from 57.1% at the beginning of the semester to 60.3% at the end and in the second year, there was no change in the percentage of normal weight male students. For females, there was no change in the percentage of normal weight female students in the first year. However, in the second year, there was a decrease from 66.2% at the start of the semester to 64.6%.

Interestingly, amongst overweight students, only males of the 2012-2013 cohort showed a decrease of approximately 3%. There was an increase of 5.2% of males in the 2013-2014 cohort. On the other hand, there were increases of overweight female students in both years, of 4.9% in the first year and 1.5% among those of the second year. Among obese students, small differences were observed. In 2012-2013, male obese students increased by 1.6%, but in 2013-2014, there was a decrease by 3.5%. No change was recorded for female obese students in the first year, but there was an increase by 1.6% in the participants of the following year. Underweight male and female students of both cohorts decreased.

Table 3

Distribution of BMI Categories at the Start and End of the First Semester of Both Academic Years

	Academic Year 2012 – 2013				Academic Year 2013 -2014			
	Start		End		Start		End	
BMI semester	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)
Underweight	7.9	9.8	6.3	4.9	6.9	6.2	5.2	4.6
Normal weight	57.1	72.1	60.3	72.1	58.6	66.2	58.6	64.6
Overweight	31.7	14.8	28.6	19.7	22.4	23.1	27.6	24.6
Obese	3.2	3.3	4.8	3.3	12.1	4.6	8.6	6.2

Results of Meal Patterns for 2012-2013

Table 4 displays data on the responses of meal pattern for 2012-2013. The results indicated that both at the start and at the end of the semester, most of the students either always had breakfast or had breakfast almost every day. These two responses accounted for 71% and 77.4% at the start and at the end of the semester, respectively. Several respondents stated that they sometimes had breakfast and only a few stated that they almost never or never ate breakfast at the start and the end of the semester.

Similar to breakfast, most of the students responded that they ate lunch always or almost every day. Specially, all students selected these two options at the start of the semester, while 93.3% of students chose these two responses at the end of the semester. This also means that no one in the sample stated that they never or almost never ate lunch. Additionally, only 6.7% of the students stated that they sometimes consumed lunch at the end of the semester.

Table 4

Meal Patterns for Academic Year 2012-2013

Meal semester	Breakfast		Lunch		Dinner	
	Start %	End %	Start %	End %	Start %	End %
Never	1.6	0	0	0	1.7	0
Almost never	9.7	9.7	0	0	3.3	4.9
Sometimes	17.7	12.9	0	6.7	16.7	13.1
Almost every day	21.0	25.8	8.3	13.3	20.0	39.3
Always	50.0	51.6	91.7	80.0	58.3	42.6

The responses for dinner were consistent with those for breakfast and lunch. In particular, 78.3% stated that either ate dinner always or almost every day at the start of the semester, while 81.9% selected these responses at the end of the semester. While some students stated that sometimes had dinner, very few noted that they almost never or never ate dinner on a regular basis.

Results of Meal Patterns for 2013-2014

Table 5 shows the responses of meal pattern for 2013-2014. The results were similar to those in 2012-2013. Specifically, most of the students indicated that they ate breakfast always or almost every day; 78.7% and 75.7% respectively. Several respondents stated that they sometimes had breakfast and only a few stated that they almost never or never had breakfast at the start and the end of the semester.

None of the students stated that they never or almost never ate lunch at the start and at the end of the semester in both years. Furthermore, the majority of the students stated that they always ate lunch. The response was selected by 80.2% of student at the start of the semester

Table 5

Meal Patterns for Academic Year 2013-2014

	Breakfast		Lunch		Dinner	
Meal semester	Start %	End %	Start %	End %	Start %	End %
Never	1.2	3.5	0	0	0	0
Almost never	5.8	4.6	0	0	7.0	3.5
Sometimes	14.5	16.2	3.5	4.7	16.3	12.9
Almost every day	30.1	34.1	16.3	15.8	36.6	33.5
Always	48.6	41.6	80.2	79.5	40.1	50.0

and 79.5% of the students at the end of the semester. The next popular response was that they had lunch almost every day, with a few responses that they had lunch sometimes.

Similar to the responses for breakfast and lunch, most students noted that they had dinner every day or almost every day. Specifically, 76.7% stated that they either always had dinner or had dinner almost every day at the start of the semester, while 83.5% selected these responses at the end of the semester. While some students stated that they sometimes had dinner, few noted that they almost never or never had dinner on a regular basis.

Results of Food Choices for 2012-2013

Table 6 gives the results of the responses to food choices for the 2012-2013 semester. Examining the frequency of food prepared at home, the results indicated that most students selected always and almost every day. At the start of the semester, 88.7% of the students noted that they prepared their food at home either always or almost every day. Although this conclusion was consistent with the responses at the end of the semester, only 79% of respondents

Table 6

Food Choices for Academic Year 2012-2013

	Home cooked Food		Canned/Frozen Food		Fast Food/ Restaurant		Snacks (> 2 per day)	
Type of food semester	Start %	End %	Start %	End %	Start %	End %	Start %	End %
Never	3.2	3.2	5.1	18.3	4.9	14.5	4.9	11.7
Almost never	3.2	8.1	44.1	41.7	42.6	43.5	34.4	41.7
Sometimes	4.8	9.7	42.4	30.0	45.9	37.1	32.8	33.3
Almost every day	25.8	29.0	3.4	8.3	3.3	1.6	14.8	11.7
Always	62.9	50.0	5.1	1.7	3.3	3.2	13.1	1.7

selected these options. Only a small percentage of students selected the other three options which were never, almost never, and sometimes.

Most students indicated that they consumed canned or frozen food sometimes or almost never. For the start of the semester, 44.1% stated they almost never had canned or frozen food, while 42.4% stated that they had canned or frozen food sometimes. At the end of the semester, 41.7% of students stated that they almost never had canned or frozen food, while 30% and 18.3% indicated that they either had canned or frozen food sometimes or never, respectively. Only a small percentage of students reported that they always consumed canned or frozen food almost every day; 5.1% at the beginning of the semester and 1.7% at the end of the semester.

The results for the response on the frequency of having fast food or eating at restaurants were similar to the conclusions from canned or frozen food. In particular, at the start of the semester, 88.5% of students noted that they had fast food or ate at restaurants sometimes or almost never. At the end of the semester, 80.6% of students selected sometimes or almost nev-

er when they were asked how often they had fast food or ate at a restaurant. Although 14.5% of students stated that they never had fast food or ate at a restaurant at the end of the semester, only a minority selected the other options of almost every day and always, both at the start and at the end of the semester.

Both at the start and the end of the semester, most students indicated that they almost never or they sometimes had snacks more than twice per day. At the beginning of the semester, 34.4% of the students stated that they almost never had snacks more than twice per day, while 32.8% responded by saying sometimes. At the end of the semester, the responses were somewhat symmetric. Even though most of the responses were almost never or sometimes, 11.4% of students each noted that they never had snacks or had snacks more than twice per day almost every day.

Results of Food Choices for 2013-2014

Table 7 presents the results of the responses to food choices for the 2013-2014 semester. At the start of the semester, 85.6% of the students noted that they either always prepared their food at home or almost every day. At the end of the semester, 76.1% of respondents selected these options. Only a small percentage of students selected the other three options.

Majority of the students indicated that they consume canned or frozen food sometimes or almost never. For the start of the semester, 37.9% stated they almost never had canned or frozen food, while 48.5% stated that they had canned or frozen food sometimes. At the end of the semester, 42.1% of students stated that they almost never had canned or frozen food, while 41.5% indicated that they had canned or frozen food sometimes.

Table 7

Food Choices for Academic Year 2013-2014

Type of food semester	Home cooked Food		Canned/Frozen Food		Fast Food/ Restaurant		Snacks (> 2 per day)	
	Start %	End %	Start %	End %	Start %	End %	Start %	End %
Never	1.7	3.5	7.1	12.3	4.1	7.6	6.6	9.9
Almost never	1.2	9.3	37.9	42.1	42.4	43.5	36.1	33.1
Sometimes	11.6	11.0	48.5	41.5	43.5	38.8	39.2	44.8
Almost every day	32.4	33.1	5.9	2.9	5.9	5.9	11.4	10.5
Always	53.2	43.0	0.6	1.2	4.1	4.1	6.6	1.7

At the start of the semester, 85.9% of students noted that they had fast food or ate at restaurants sometimes or almost never. At the end of the semester, 82.3% of students selected sometimes or almost never when they were asked how often they had fast food or ate at a restaurant. Only a small percentage of students selected the other options both at the start and at the end of the semester.

Both at the start and the end of the semester, most students indicated that they almost never or they sometimes had snacks more than twice per day. At the beginning of the semester, 36.1% of the students stated that they almost never had snacks more than twice per day, while 39.2% responded by saying sometimes. Similar to 2012, at the end of the semester in 2013, the responses were fairly symmetric. Even though most of the responses were almost never or sometimes, 10.5% of students each noted that they always had snacks more than twice per day and 9.9% stated that they never had snacks more than twice per day.

Results of Sleep Duration

Table 8 summarizes the responses to the question on sleep duration for the first semester of both 2012-2013 and 2013-2014. In 2012-2013, the percentage of students who slept five or less hours increased from 24.6% to 25.8%. In the following year, the percentage of those students also increased from 29% to 30.6%. This means that those students were getting more sleep by the end of the semester. Conversely, there was a considerable decrease in the students who slept 8 or more hours. The percentage of students in the first cohort reduced from 16.4% to 4.8% and in the second cohort, reduced from 18.3% to 11%. These students received less sleep than when they started the semester. Amongst students who slept six hours or seven hours, there was a percentage increase in both samples. This indicated that a greater number of students were getting more sleep by the end of the semester.

Table 8

Sleep Duration for Academic Years 2012-2013 and 2013-2014

	Academic Year 2012 - 2013		Academic Year 2013 - 2014	
	Start	End	Start	End
Hours of sleep	%	%	%	%
5 or less hours	24.6	25.8	29.0	30.6
6 hours	31.1	37.1	22.5	27.2
7 hours	27.9	32.3	30.2	31.2
8 or more hours	16.4	4.8	18.3	11

Differences in BMI between the Start and End of the Semester

As illustrated in Appendix 5, for 2012-2013, the Pearson correlation for BMI at the start and end of the first semester was .941. Table 9 below represents such. This indicated that there was a strong positive association between the two BMIs for first year students for that semester. This strong positive association was credible because the probability value (hereafter called *p*-value) of less than .001 indicated that the result was statistically significant. There was an increase in the BMI of first year students in the fall 2012 semester, albeit marginally. Specifically, the mean BMI increased from 23.17 at the start of the semester to 23.27 at the end of the semester. In fact, a *t*-test of the mean difference between the reported BMI numbers revealed that there was no significant increase during the semester. This conclusion was derived because the *p*-value was .436.

Based on the results, the same situation for BMI applied for the 2013-2014 first-year cohort. The Pearson's correlation coefficient was .963, which indicated a strong positive association between the two BMI for that semester. This association was meaningful and highly statistically significant because the p-value was lesser than .001.

Table 9

Pearson's Correlation Coefficients and t-Test Showing Differences in BMI between Start and End of Semester for Both Study Samples

	Academic Year 2012-2013			Academic Year 2013-2014		
	Pearson's Correlation		t-test	Pearson's Correlation		t-test
Variable	*r*	*p*	*p*	*r*	*p*	*p*
BMI	.941	<.001	.436	.963	<.001	.092

Similar to 2012-2013, there was no pronounced increase in the BMI from the start to the end of the semester of first year students. In particular, the mean BMI at the start and the end of the semester were 23.58 and 23.75, respectively. These mean BMIs were small increases when compared to their comparative values in 2012-2013. Unlike 2012-2013, however, the simple *t*-test indicated that the difference in their means was slightly statistically significant. No concrete conclusions can be inferred from this result because the *p*-value was .092.

Changes in BMI Based on Gender

At the start of 2012-2013, the BMIs for males and females were 23.62 and 22.71, respectively (see Appendix 5). These results suggested that first year males, on average, had a higher BMI than first year females at the beginning of the semester. However, as shown in Table 10, an independent sample test, assuming both equal and unequal variances rejects any meaningful statistical relationship between the differences in BMI for males and females. That is, the *p*-value under both assumptions about the variances was .179, which suggested that although males had higher BMIs at the start of the semester, there were no significant differences across gender.

Table 10

Independent Sample t-Tests Measuring Changes in BMI Based on Gender for Both Cohorts: Levels of Significance

Academic Year 2012-2013				Academic Year 2013-2014			
Start		End		Start		End	
Equal variances	Unequal variances	Equal variances	Unequal variances	Equal variances	Unequal variances	Equal variances	Unequal variances
.179	.179	.205	.204	.221	.231	.159	.168

At the end of the 2012-2013 semester, there were increases in BMIs for both genders, albeit marginal. For males, their BMI increased from 23.62 to 23.63 and from 22.71 to 22.89 for females. These values further confirmed the results in the start of the semester in that males had, on average, higher BMI. Furthermore, like the start of the semester, the independent sample test indicated that there were no major differences in the BMI for males and females. This conclusion was based on a *p*-value of .21.

For the start of the 2013-2014 semester, males had a higher BMI than females. Specifically, the average BMI for males was 24.14 and 23.08 for females at the start of the semester. These values were slightly higher than the reported BMIs at the first year's cohort at the start of 2012-2013. Assuming both equal and unequal variances, the independent sample test indicated that the difference in BMI for males and females were not statistically significant.

Results indicated that at the end of the 2013-2014 semester, males had an average BMI of 24.21 and the average BMI for females was 23.34. Additionally, the average BMIs for both genders increased marginally relative to the average BMIs at the beginning of the semester.

Variations in BMI Based on Student Housing

First year students who lived on-campus had higher BMIs than students who resided off-campus at the start of the 2012-2013 semester. This conclusion was derived because the mean BMIs were 23.59 and 22.48 for students who lived on-campus and off-campus, respectively (see Appendix 5). The independent sample test with equal and unequal variances indicated that there no significant statistical difference in the BMIs for students who live on and off-campus. These conclusions were made because the *p*-values with equal and unequal variances were .114 and .109, respectively as displayed in Table 11.

Table 11

Independent Sample t-Tests Measuring Variations in BMI and Student Housing in Both Cohorts: Levels of Significance

Academic Year 2012-2013				Academic Year 2013-2014			
Start		End		Start		End	
Equal variances	Unequal variances	Equal variances	Unequal variances	Equal variances	Unequal variances	Equal variances	Unequal variances
.114	.109	.078	.087	.580	.576	.757	.756

At the end of the first semester in 2012-2013, the average BMI for students who lived on-campus was higher than their peers who lived off-campus. In fact, the average BMIs for both residence types increased during the semester. Specifically, the average BMIs for students living on-campus increased from 23.59 to 23.66, while the average BMI for off-campus students increased from 22.48 to 22.60 at the end of the semester. The independent sample test of the equality of the BMIs at the end of the semester indicated that there was statistical evidence supporting higher BMIs for students who lived on-campus.

Similarly, for the start of the 2013-2014 semester, the data indicated that the average BMI for first year students living on-campus was higher than their peers who lived off-campus. The average BMI for first year students living on-campus was 23.45, while it was 23.69 for off-campus first year students. Further analysis revealed that there was no evidence for significant differences between the average BMIs amongst residence choice. This conclusion was informed by the independent sample test assuming both equal and unequal variances.

At the end of the 2013-2014, the results indicated that the BMI for first year students who resided on-campus was higher than their off-campus counterparts. Similar to 2012-2013,

the average BMI for both groups of students were higher at the end of the semester relative to the start of the semester. Consistent with the start of the 2013-2014 semester, the difference of the BMIs for on and off-campus students was not statistically significant and thus no meaningful inferences can have been made regarding this statistic.

Correlation between Food Choice and BMI
Home Food

The results indicated that at the start of 2012-2013, as shown in Table 12, there was a negative association between the frequencies of food cooked at home and BMI as the Spearman's rho correlation coefficient was -.153 (see Appendix 5). The results suggested that students who consumed food cooked at home, more often had a lower BMI. However, caution must be exercised in making further inferences from this result because the *p*-value of .366 associated with this correlation coefficient suggested that there was no statistical significance.

Table 12

Spearman's Rho Correlation Coefficients between Food Choice and BMI

	Academic Year 2012-2013				Academic Year 2013-2014			
	Start		End		Start		End	
Food choice	r_s	*p*	r_s	*p*	r_s	*p*	r_s	*p*
Home cooked	-.153	.366	-.184	.197	-.133	.098	-.059	.500
Canned/Frozen	.090	.602	-.108	.460	-.023	.780	-.119	.173
Fast Food	.507	.002	.140	.328	-.014	.862	-.066	.448
Snacks	-.147	.393	-.006	.967	-.027	.746	-.056	.519

At the end of the 2012-2013 semester, the Spearman's rho correlation coefficient between home prepared food and BMI was -.184. This result suggested that there was a negative association between these two variables. Additionally, the *p*-value of .197 indicated that the negative association between food prepared at home and BMI was not statistically significant. These conclusions were consistent with those at the start of the 2012-2013 semester.

Like 2012-2013, there was a weak negative association between home cooked meals and BMI at the start of 2013-2014. This association was based on the result that the Spearman's rho correlation coefficient which was -.133. While the interpretation of this result was consistent with those in 2012-2013, the *p*-value of .098 indicated that this association was weakly statistically significant. This suggested that while the result can infer meaningful conclusions, significant policy prescriptions must be implemented with caution.

At the end of the 2013-2014 semester, the Spearman's rho coefficient was -.059. This result indicated that there was a weak negative association between home cooked meals and BMI. Once more, the interpretation of the preceding three paragraphs would hold for this result. However, the *p*-value of .500 indicated that this negative association was not statistically significant.

Correlation between Food Choice and BMI
Canned and Frozen Food

At the beginning of the 2012-2013 semester, the Spearman's rho correlation coefficient was -.090 between the frequency of consuming canned/frozen food and BMI (see Appendix 5). This result suggested that there was a weak negative association between the two variables. Specifically, the result can be interpreted as the less frozen or canned food that first year students consume, the higher their BMI would be and vice versa. This result seemed counterintui-

tive, however, as the *p*-value of .602 indicated that it was statistically insignificant and therefore no meaningful inferences should be made.

The Spearman's rho correlation coefficient for the association between canned/frozen food and BMI at the end of the 2012-2013 semester was -.108. This result suggested that, like at the start of the semester, the consumption of less frozen or canned food by first year students consume would translate into low BMI and vice versa. Once more, this correlation was not statistically significant because the *p*-value was .460.

For the start of the 2013-2014 semester, it was uncovered that the Spearman's rho correlation coefficient was -.023. The interpretation of this result was consistent with the negative correlation values seen for 2012-2013. The correlation coefficient, however, indicated that, at best, there was a very weak statistical relationship between canned/frozen food and BMI. Consequently, it was not surprising that the *p*-value suggested that no meaningful inferences could have been made from this result.

At the end of 2013-2014, the correlation between canned/frozen food and BMI was -.119. This result suggested that the consumption of less canned/frozen food was associated with higher BMI. Similar with the previous results in this section, the correlation coefficient was not statistically significant.

Correlation between Food Choice and BMI
Fast Food

The results implied that there was a positive association between consuming fast food and BMI at the start of the 2012-2013 semester (see Appendix 5). In fact, the Spearman's rho correlation coefficient was .507 and had a *p*-value of .002. These statistics revealed that the frequent consumption of fast food was associated with greater BMIs and it was statistically

significant. This result indicated that meaningful conclusions could have been made from this result.

At the end of the 2012-2013 semester, the Spearman's rho correlation coefficient was .140. The interpretation of this result was consistent with that at the beginning of the semester. However, unlike the start of the semester, the correlation coefficient was not statistically significant as the *p*-value was .328.

From the start of the 2013-2014 semester, the results revealed that the association between fast food and BMI was -.014. This suggested that there was a weak negative relationship between the two variables. The precise interpretation of the result is that more frequent consumption of fast food was associated with lower BMIs. While this result was counterintuitive, the *p*-value of .862 for this correlation indicated that it was highly statistically insignificant and therefore no meaningful interpretations should be done.

At the end of the 2013-2014 semester, the Spearman's rho correlation coefficient was -.066, which indicated that there was a weak negative association between eating fast food and BMI. The *p*-value of .448 for this coefficient implied that it was not statistically significant.

Correlation between Food Choice and BMI

Snacks

The Spearman's rho correlation coefficient between snacks and BMI at the start of semester in 2012-2013 was -.147 (see Appendix 5). This indicated that students who ate less snacks had higher BMIs. Much thought or inference should not be derived from this result because the correlation coefficient had a *p*-value of .393, indicating that it was not statistically significant.

For the end of the 2012-2013 semester, the correlation between snacks and BMI was -.006. This result indicated that there was a weak negative association between the two variables. Further, the *p*-value of .967 for this coefficient suggested that this result was not statistically significant.

The Spearman's rho correlation coefficients for the start and end of the 2013-2014 semester were -.027 and -.056, respectively. These results suggested that there was a weak association between snacks and BMI. Neither of these correlations were statistically significant because of their *p*-values much larger than .10.

Correlation between Meal Patterns and BMI

Table 13 illustrates that the association between breakfast, lunch and dinner with BMI were -.029, -.187 and -.320, respectively for the start of the 2012 semester (see Appendix 5). These results indicated that students who ate breakfast, lunch or dinner less frequently tended to have higher BMIs. With the example of the correlation between dinner and BMI, the results showed that there was no statistical significance between meal pattern and BMI.

Table 13

Spearman's Rho Correlation Coefficients between Meal Patterns and BMI

Meal Pattern	Academic Year 2012-2013				Academic Year 2013-2014			
	Start		End		Start		End	
	r_s	*p*	r_s	*p*	r_s	*p*	r_s	*p*
Breakfast	-.029	.865	-.021	.882	.016	.838	-.099	.253
Lunch	-.187	.283	-.235	.104	-.161	.045	-.235	.006
Dinner	-.320	.061	-.148	.306	-.133	.099	-.192	.027

The results for the end of the 2012-2013 semester also indicated a negative association between meal pattern and BMI. The correlation coefficients for breakfast, lunch and dinner with BMI were -.021, -.235 and -.148, respectively. The interpretation from the preceding paragraph would apply for these results as well. However, all the correlation values are statistically insignificant because their *p*-values were greater than 10%.

For the beginning of the 2013-2014 semester, lunch and dinner had negative associations with BMI. Their correlation values of -.161 and -.133 indicated that the more frequent consumption of lunch and dinner were associated with higher BMI values. They were both statistically significant, which suggested that any inferences from these results would be meaningful or useful. On the other hand, the correlation between breakfast and BMI was positive and statistically insignificant.

At the end of this semester, the correlation values between breakfast, lunch and dinner with BMI were -.099, -.235 and -.192, respectively. These values indicated that there were negative associations between meal patterns and BMI. Additionally, like the start of 2013-2014 semester, only the correlations between lunch and dinner with BMI were statistically significant.

Correlation between Sleep Duration and BMI

The results from the Pearson's correlation coefficients, as shown in Table 14, revealed that there were negative associations between the hours of sleep and BMI both at the start and the end of the 2012-2013 semester (see Appendix 5). That is, students who slept less during the night had higher BMIs. While these results confirmed what was expected, their *p*-values indicated that they were not statistically significant.

Table 14

Pearson's Correlation Coefficients between Sleep Duration and BMI

	Academic Year 2012-2013				Academic Year 2013-2014			
	Start		End		Start		End	
Variable	*r*	*p*	*r*	*p*	*r*	*p*	*r*	*p*
Sleep Duration	-.236	.166	-.033	.816	.006	.944	-.079	.363

The correlation value at the start of the 2013-2014 semester was approximately <.001 (the actual value was .006), which indicated that there was little association between the hours of sleep and BMI. Additionally, the *p*-value indicated that there was no statistical relevance between sleep and BMI.

Unlike the start of the 2013-2014 semester, the correlation between sleep and BMI at the end of this same semester was -.079. This result was consistent with results from 2012-2013. Unfortunately, there was no significant evidence supporting this result because the *p*-value was .363.

CHAPTER V

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Discussion

Differences in BMI between the Beginning and End of the Semester Across Genders

The Pearson's correlation coefficients for BMI in 2012-2013 and 2013-2014 indicated a strong positive association between the BMIs at the beginning and the end of the semester among first year students. However, no significant increase in BMI was observed. While some students gained or lost weight during this period, they remained within the BMI category they had identified with at the start of the semester. Although, the university presented a different daily regime to which they were accustomed, first year students had the opportunity to form their own meal patterns, food choices, and sleeping habits. Off-campus students, particularly those who lived alone or rented an apartment with friends, had to be more responsible in managing their habits. These off-campus students, may not have had the support and supervision from mature adults, parents or other relatives to assist them with making healthful choices.

Despite the novelty of university life, first year students learned to adapt and many took measures to control their weight through exercise and participation in sporting activities. In many instances these exercise and sporting activities are apart from the requirements of the Healthy Lifestyle and Physical Fitness programs. Therefore, students may grow to enjoy exercising and do it not only for health reasons, but to have fun and socialize with friends. The ef-

fects of the students' new lifestyle habits were observed for both male and female students and this was demonstrated by the results, that there were no that there were no significant differences in BMI across genders.

Differences between BMI and Students Living On-Campus and Off-Campus

Students who lived on-campus had a higher BMI than students living off-campus, at the start and end of the semester both in 2012 and 2013. This pattern was concurrent with literature reviewed. Brunt and Rhee (2008) suggested that students who live on-campus and participate in the campus meal plan, usually consume a larger amount of fruits and vegetables, due to its availability and convenience. However, these same students may also consume more snacks and fast foods if they dislike what is being served at the university's cafeteria. In addition, the UM's cafeteria serve meals based on 3000 calories per day to compensate for the physical activity that students are supposed to engage in each day. However, for students who are not as physically active, the excess energy intake may result in weight gain.

While some students may choose to limit their portions and engage in exercise, others resort to skipping meals. The practice of skipping meals lowers the body's metabolism resulting in the storage of fat to compensate for the periods of no food intake (Bellisle, 2004). When food is later ingested, usually, there is an increase in the appetite causing over-eating and the consumption of more calories than needed. Skipping meals also promotes snacking, which for young people usually include snacks that provide empty calories.

Students who live off-campus, live with a family, rent an apartment alone or rent with friends. Those who live with a family, can have better economic and moral support to purchase food items and to prepare their meals. Therefore, it is likely that students who live with

a family can expect a more balanced diet. However, students who rent alone or with friends, in many instances, eat what is affordable, available, and quick to prepare. Consequently, there is usually low a consumption of fruits and vegetables.

One staple food that most students consume frequently is tortillas. In Mexico, corn tortillas is a staple food, as it is easily accessible, cost effective, and convenient. Tortillas are known to be low in calories and fat content and provide fiber, vitamins and minerals. However, among students who live off-campus and alone, the consumption of tortillas in abundance, most commonly eaten with cheese (quesadillas), cannot provide all of the necessary nutrients they require. Therefore, tortillas should be accompanied with vegetables and other healthful foods to allow for a balanced meal. Nonetheless, while students may have a good knowledge of cooking and selecting nutritious foods, time limits to prepare meals and financial constraints are prohibiting factors for off-campus students to practice better dietary and food consumption habits.

Relationship between Meal Patterns and BMI

The results indicated that students who consumed less breakfast, lunch and dinner had a higher BMI. This was confirmed by other investigations that concluded that the habit of skipping meals contribute to weight gain amongst both male and female students. Mota et al. (2008) for example, suggested that there is an inverse association between meal frequency and the prevalence of obesity. Many researchers also highlighted skipping breakfast as a common practice among university students. In Pakistan, breakfast was the most commonly skipped meal and in Saudi Arabia a similar pattern was observed (Al-Rethaiaa et al., 2010; Sajwani et al., 2009). In a study conducted in China however, most students reported eating all three

meals regularly and there was a very low prevalence of overweight or obesity in the study sample (Sakamaki et al., 2005).

At the UM, skipping meals may be attributed to the lack of time to prepare meals, amongst off-campus students and also, the lack of means to purchase adequate food supplies. On-campus students who skip meals most times do so because they dislike what is being served at the cafeteria or as a measure of weight control. In addition, some students may choose to sleep late in the morning, thus missing the breakfast time at the cafeteria.

Correlation between Food Choice and BMI

The types of foods examined in this research, home cooked meals, canned or frozen foods, fast foods and snacks, showed that there was a negative association in relation to BMI. This is with the exception of fast foods as there was a positive association between fast foods and BMI. Despite the literature supported that fast foods are directly related to an increased BMI, the physical activity that students engage in, can be attributed to the maintenance of a BMI within the normal range or the reduction of BMI for those who are obese.

Students who consume home cooked meals have a lower BMI. Home cooked meals are usually prepared with less oils, condiments and preservatives that may contribute to poor nutrition. At the university's cafeteria, they serve food, which in this study was classified as home cooked food, that include a wide variety of salads, fruits, and vegetables which students can select. In addition, no meat is served at the cafeteria. These food options are offered to ensure that students get balanced meals and the necessary nutrients.

Canned and frozen foods are utilized in the preparation of meals at the cafeteria and also meals cooked at homes. Although these type of foods also provide nutrients, it is not the healthiest option. Despite the adverse effects that canned and frozen foods can have on one's

health with prolonged use, it is convenient and saves cooking time. Therefore, if students use canned or frozen foods because of its accessibility and convenience, moderation should be exercised. Nonetheless, the results showed that there was a weak negative association to BMI and so, it has no significant short term consequences.

Fast food is higher in fats, cholesterol, sodium and they contain less fiber and calcium and is of poorer nutritional quality than food prepared at home (Swinburn et al., 2004). Some freshmen consume fast foods, including traditional street foods, because they are unaccustomed to the vegetarian diet to which the university subscribes. They also go to fast food restaurants as a means of socializing. In Mexico, tacos are a very popular and inexpensive fast food. However, they are rich in oils and usually contain meat. Most fast food outlets offer carbonated beverages that have high glucose and fructose content. The combination of these foods when consumed on a regular basis is an ideal recipe for weight gain.

The consumption of snacks among university students, particularly among females, is also quite common. Students consume snacks to make up for lack of energy from sleep loss, skipping meals, while studying or as "comfort food" to assist them with managing the stress of a demanding university life. However, the negative association between the consumption of snacks and BMI can be accredited to physical activity that aids in controlling body weight. In fact, Bellisle (2004) proposed that in healthy, non-obese persons snacking improves the nutrient content without adding energy to it. Furthermore, the author argued that very active people snack often but are leaner than less active persons, suggesting some form of energy compensation through physical activity. Moreover, active persons have a tendency to control hunger by snacking on healthy carbohydrates, protein-rich foods, nuts, fruits and vegetables. Therefore,

if students choose to eat snacks, it is necessary to make healthful snack selections, which should be coupled with physical activity to avoid excessive energy intake.

Relationship between Sleep Duration and BMI

The study sample showed that more than half of the first year students in the first academic year reported that they slept six hours, or five or less hours per night. These students probably had a more difficult experience adjusting to university life. In the second academic year, a difference was observed in the hours of sleep among those first year students, where they indicated that they slept seven or more hours per night. This cohort also had a greater percentage of more mature students. Therefore, they were probably better able to manage their time and study activities in order to maximize sleeping time.

The UM's regulations and possibly the teachings of the Healthy Lifestyle class may also be attributed to increased sleeping hours. In addition, since students had to engage in more physical activity to fulfill the requirements of the Physical Fitness class, fatigue could have promoted more sleep. These requirements included that students must engage in some form of physical activity for at least three days each week and for a minimum of 30 minutes each session. Students could have chosen to run, walk, ride a bicycle, go to the gym or play a sport of their choice. As a control measure, the physical fitness class also required students to submit weekly reports of their exercise activities to the physical fitness office.

On the contrary, there was a decrease in the percentage of students who slept eight or more hours in both school years. The demands of university life, such as long hours of study and preparation of assignments and projects, could have resulted in students studying up late at night. Apart from the requirements for school work, many students are guilty of spending hours late into the night on social networking websites like Facebook and Twitter on their

computers or smart cellular phones (Pantic et al., 2011). Although students who live on-campus are controlled by the specified time for lights-out, they can engage in these night time activities without being noticed. For students who live off-campus there is no control over their sleeping patterns.

With the lack of sleep, the body reacts by increases in appetite and therefore, greater food intake to compensate for energy lost. Shorter sleep duration also contributes to increased stress levels and food, particularly snacks is often used as a coping mechanism. First year students usually do not pay attention to their sleeping habits and this can lead to more sedentary time and less desire for physical activity as a result of tiredness (Shochat, 2012).

Conclusions

According to the results obtained, lifestyle habits influence the BMI of first year university students at the UM. Among the study sample in each academic year, the majority of students were within the normal weight range. Therefore, it seems that presently, there is a relatively low prevalence of overweight and obese students at the UM. The study on the prevalence of overweight and obesity in Mexico, based on the ENSANUT reported, 32.4% of the population was obese and the remaining 38.8% was overweight (Barquera et al., 2013). Contrary to this data, there are some factors that can be accredited to students' maintenance of acceptable weight at the UM.

These factors include, their higher education level, mandatory exercise regime, diet and portion control at the university's cafeteria and a presumed higher economic status than the rest of the general Mexican population. However, given that students were evaluated only in the first year, further and consistent evaluations should be conducted to curtail any significant weight gain.

The institution also has the advantage of having approximately 95% of the student body being SDAs and this also assists in consciousness pertaining to maintaining a healthy body which is the temple of the Holy Spirit. Consequently, it can be suggested that most students have sufficient knowledge to make wise choices that promote health and wellbeing, especially since they must enroll in the Healthy Lifestyle and Physical Education courses. The results suggested that a considerable amount of these students are applying the knowledge acquired, in addition to the knowledge they already had.

While the statistics are not as alarming as the remainder of Mexico, at the end of the semester in 2012-2013 Figure 1 below illustrates, 28.6% of the males were overweight and 19.7% of the female students in the study sample were overweight. In addition, the table shows that 4.8% of the males were obese, while 3.3% of the female students were obese.

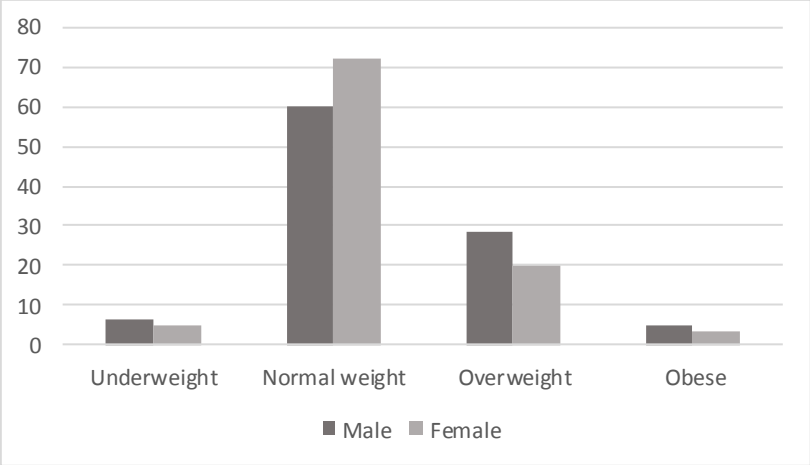

Figure 1. BMI of students at the end of the first semester of 2012-2013.

Figure 2 demonstrates that in the following year, 2013-2014, at the end of the semester, 27.6% of the males was overweight and 8.6% of them were obese. In this same period, 24.6% of female students were overweight and 6.2% were obese.

If this trend continues throughout the university years of these students, it can be anticipated that the UM can be faced with a serious health crisis.

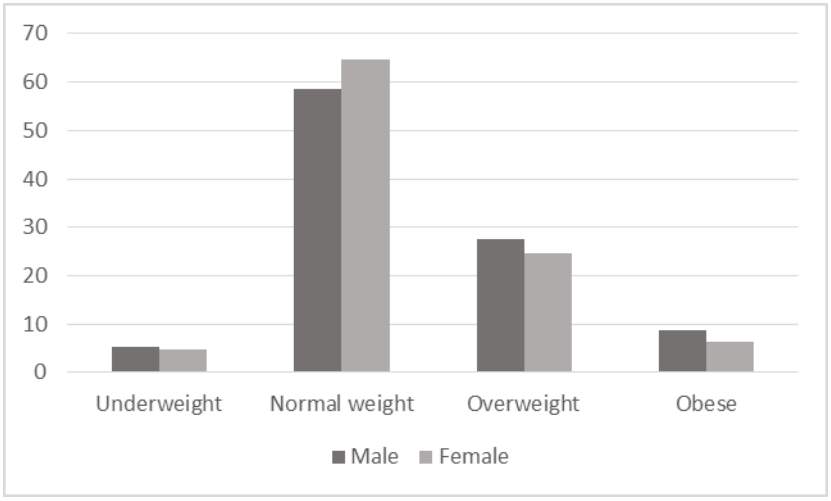

Figure 2. BMI of students at the end of the first semester of 2013-2014.

Considering the adverse effects of excess body weight, these students should be monitored and assistance should be offered to them to acquire a healthier weight.

Recommendations

The following recommendations can be applied to encourage students to maintain a healthy BMI and also to assist the university with further research on this subject.

1. Further research is needed to investigate the prevalence of factors associated with overweight and obesity among larger samples representing all university students at the UM.

This would also include a longitudinal investigation on the same first year students to monitor their progress with their weight loss for those who are overweight or obese or weight maintenance for those in the range of normal weight.

2. Although students are required to enroll in the Healthy Lifestyle course in their first semester at the university, there should be continuous education on healthy lifestyle habits. For instance, health nuggets can be introduced during assemblies in which students can present on the different lifestyle habits using creative means, like drama, poetry or song writing. Incentives can also be offered for encourage students' participation. If students learn about the effects of their poor health choices from their peers, they are more likely to have a desire to change or improve their lifestyle habits.

3. While the UM has rules to promote admirable principles that support wellbeing, such as only having healthy food options on campus, these rules should be enforced. For example, the selection of snacks sold on the dormitories should not include commercial sweets, chocolates, cookies, and chips. However, options such as fruits, wholesome breads, and granola bars can be offered instead.

4. Since students who live on campus have a higher BMI than those who live off-campus, the menus at the UM's cafeteria should be adjusted to include less cheese and other fatty foods, especially for dinner. In addition, the amount of calories served per day should be reduced to the recommended amount of 2000 calories per day, instead of 3000 calories per day. Notwithstanding, students who are athletic, especially males, should be allowed to consume larger portions since they use more energy in their exercise activities.

5. The instrument, Healthy Habits Questionnaire should be modified and validated so that future research can be published and be used as an impetus to fuel further investigations in

other universities in Mexico. Data regarding the relationship between lifestyle habits and BMI is limited in Mexico. With data being made more available, the health authorities would be in a better position to plan and implement policies to promote healthy lifestyle habits to counter-act obesity.

6. Students should be allowed to participate in designing and implementing policies and programs that would assist their peers in practicing healthy lifestyle habits. For example, students can be paired in a "Big brother/sister" program, in which they can be accountable to each other for their lifestyle habits, with the younger students taking an example from a more mature student. This responsibility can encourage students to be more mindful of their general lifestyle habits, knowing that someone is depending on them for guidance. This inclusionary approach can help students to develop interest and desire to work towards acquiring or maintaining a healthy body weight without doing it only to fulfill the requirements of a course or to get a good grade. It would also assist students in taking responsibility for their own wellbeing.

Once applied, these recommendations should be monitored and evaluated. This would enable the UM to keep abreast of changes that may occur amongst students. Consequently, modifications can be made over time as changes are observed.

APPENDIX 1

HEALTHY HABITS QUESTIONNAIRE
(SPANISH VERSION)

Cuestionario

Hábitos Saludables

Nombre(s) _____ Apellido(s) _____

Matricula: _____

Sección 1: *Hábitos Alimenticios*: **Marca la respuesta correcta con una "X" a las preguntas en el espacio correspondiente.**

1. ¿**Con que frecuencia a la semana consumes las siguientes comidas?**	**Nunca**	**Casi Nunca**	**De vez en cuando**	**Casi todos los días**	**Siempre**
Desayuno					
Comida					
Cena					
2. **¿Cuántas veces consumes este tipo de alimentos?**	**Nunca**	**Casi Nunca**	**De vez en cuando**	**Casi todos los días**	**Siempre**
Comida casera					
Alimentos enlatados o congelados					
Comida rápida o en restaurante					
3. **¿Consumes más alimentos cuando estás estresado o bajo presión?**					
4. **Comes aperitivos o botana entre comidas (** más de dos porciones)					

Marcar con una "X" la respuesta correcta a la pregunta					
5. **¿En cuál situación eres más propenso a comer bocadillos?**	En fiestas o salidas con amigos		Estudiando	Cuando estoy aburrido(a)	Otra:
6. **¿Qué tipos de alimentos consumes como botana o aperitivos?**	Papas fritas , sabritas ó botana salada		Dulces (nieve, chocolates, pastel)	Comida rápida (Hamburguesa, pizza,etc)	Otra:
7. **¿Cómo clasificarías tus hábitos de alimentación?**	*Pobres	*Razonables	Promedio	Buenos	Excelentes
8. ***Si contestaste (Pobre/ Razonable) en la pregunta #7*, ¿Cuál es la razón principal por la que tus hábitos no son saludables?**	Falta de dinero	Falta de tiempo	Falta de opciones saludables	No me interesa	Otra:

Sección 2: *Frecuencia de Alimentos*

Indicaciones: ***Marcar con una "X" la respuesta correcta y especifica si es el consumo por día o semana.***

9. **¿Cuantas veces al dia o a la semana, consumes los siguientes alimentos?**	**Nunca**	**Menos de una vez por semana**	**Pocas veces por semana**	**1-3 veces al día**	**4+ veces al día**
Platillos variados/comidas mixtas (como): pizza, tacos, sopas tipo ramen					
Pan, cereales, pasta, arroz y otros tipos de harina o granos.					
Verduras color verde oscuras (acelgas,espinacas)					
Frutas o jugo de frutas					
Carne, pescado, huevo, frijoles, oleaginosas(nueces) y tofu					
Leche (cualquier tipo), yogurt y queso					
Margarina o mantequilla (cualquier tipo), tocino, aderezos, aceites, frituras o comida frita y aceitunas					
Azúcar, dulces, miel, jarabe maple, mermeladas, repostería, galletas y chocolates					
Agua: Cantidad de vasos bebes en un día (240 ml/1 vaso aprox.)	1 o menos	2-5	5-7	8	
Sueño/dormir: Cuantas horas duermes cada noche.	5 o menos	6	7	8 o mas	
Estrés: Estrés se define como sentimientos de tensión, irritabilidad, y ansiedad que frecuentemente causan perdida de sueño. ¿Tienes la sensación de estrés en la escuela o el trabajo?	Nunca	A veces	Frecuente mente	Estrés permanente o contínuo	

Alumnos "Internos" - Califica el servicio de alimentos con respecto al Costo y Calidad marcando una "X" en la respuesta deseada:

Costo:	**Barato**	Razonable	Caro		
Calidad:	**Pobre**	Razonable	Promedio	Buena	Excelente

APPENDIX 2

HEALTHY HABITS QUESTIONNAIRE
(ENGLISH VERSION)

Questionnaire

Healthy Habits

1. How often do you consume the following foods?	**Never**	**Almost never**	**Sometimes**	**Almost everyday**	**Always**
1a. Breakfast					
1b. Lunch					
1c. Dinner					
2. **How often do you consume these types of foods?**	**Never**	**Almost never**	**Sometimes**	**Almost everyday**	**Always**
2a. Home cooked food					
2b. Canned or Frozen Foods					
2c. Fast food or at a restaurant					
3. Do you eat more when you are stressed or under pressure?					
4. Do you consume snacks (>2 times per day)					

Marcar con una "X" la respuesta correcta a la pregunta

5. In which situations are you more likely to eat snacks?	At parties or while socializing with friends		Studying	When I am bored	Other
6. What type of foods do you eat as snacks	French fries , potato chips or salty snacks		Sweets (ice-cream, choco-lates, cakes)	Fast food (hamburgers, pizzs, etc.)	Other
7. How would you classify you eating habits?	*Poor	*Reasonable	Average	Good	Excellent
8. * ***If you answered, (Poor/Reasonable) in question #7, What is that principal reason for your habits not being healthy?***	Lack of money	Lack of time	Lack of healthy options	I don't care	Other

Section 2: *Frequency of foods consumed*

Instructions: ***Mark with an "X" the correct response and specify if consumption is per day or per week.***

9. How often do you consume these foods each day or week?	**Never**	**Less than once per week**	**Few times a week**	**1-3 times per day**	**4+ times per day**
Varied dishes (like): pizza, tacos, ramen soups					
Bread, cereals, pasta, rice and other types of flour or grains					
Dark Green leafy vegetables (chard, spinach)					
Fruits or fruit juices					
Meat, fish, eggs, beans, oilseed (wal-nuts) and tofu					
Milk(any type), yogurt and cheese					
Margarine or butter (any type), bacon, dressings, oils, fries or fried foods and olives					
Sugar, sweets, honey, maple syrup, marmalades, cakes, cookies and choco-lates					
Water: Number of cups consumed in a day (240 ml/1 cup approx.)	1 or Less	2-5	5-7	8	
Sleep duration: Hours you sleep each night.	5 or less	6	7	8 o more	

Stress: Stress is defined as feelings of tension, irritability and anxiety that fre-quently causes loss of sleep. Do you feel stressed at school or at work?	Never	Some-times	Frequent-ly	Permanent or contin-ued stress

Student housing – Rate the food service with respect to cost and quality marking an X in your desired response:

Cost:	**Cheap**	Reasonable	Expensive		
Quality:	**Poor**	Reasonable	Average	Good	Excellent

APPENDIX 3

EVALUATION OF PHYSICAL FITNESS FORM
(SPANISH VERSION)

EVALUACION DE APTITUD FISICA

Fecha de hoy ___/___/___

Día mes año

Nombre(s):_____ Apellidos: _____, _____
Paterno Materno

Carrera: _____ Semestre_____ Matricula_____

Fecha de nacimiento: ____/____/_____ Edad:_____ Sexo: masculino___ femenino___

Residencia:

Interno dormitorio: 1____ 2____3____4____.

Externo:____

Correo Electrónico (E-mail)_____@_____

*NOTA: No llenar debajo de esta línea, uso exclusivo de la oficina Aptitud física.

SIGNOS VITALES		ANTROPOMETRÍA	
PA		TALLA	
FCR		PESO	
		IMC	
		% GRASA	
		CIRCUMFERENCIA ABD.	
DIETA	VEGETARIANO	NO VEGETARIANO	

EL NUEVO PAR-Q

¿NECESITAS UNA CONSULTA MÉDICA ANTES DE INICIAR UN EJERCICIO FISICO? ESTAS ENCUESTA SOBRE TU BUENA DISPOSICION PARA LA ACTIVIDAD FISICA (PAR-Q) PUEDE AYUDARTE A DECIDIR.

El sentido es tu mejor guía para que respondas a esta encuesta. Por favor lea las cuestiones con mucha atención y responda cada una honestamente. Asígnalas con un SI o un NO,
Encierra en un círculo.

1. ¿Le ha dicho su médico que usted tiene problemas cardiacos y que debe de hacer solo actividad física recomendada por su médico?

SI NO

2. ¿Siente UD. Dolor del pecho cuando hace actividad física?

SI NO

3. ¿En el último mes ha sentido dolor de pecho aun cuando no estuvo haciendo actividad física?

SI NO

4. ¿UD. Pierde su balance debido a mareo o se ha desmayado?

SI NO

5. ¿Tiene un problema de huesos o de las articulaciones que se empeore cuando hay cambios en su actividad física?

SI NO

6. ¿Está tomando medicamentos para la presión o un problema cardiaco prescrito por su médico?

SI NO

7. ¿Sabes de cualquier razón por la cual no debe de hacer actividades físicas?

SI NO

Consentimiento Informado para una Prueba de Aptitud Física.

Propósito de la evaluación:

Usted participara en una prueba que servirá para identificar su presente condición de aptitud física. Esta prueba está dividida en ocho (8) estacione, en las cueles se medirán los cinco componentes de la aptitud física. Estos componentes son (1) la composición corporal, (2) la condición cardiorrespiratoria, (3) la fuerza muscular esquelética, (4) la resistencia muscular esquelética, (5) la flexibilidad músculo esquelética.

2. Libertad de consentimiento:

Yo consiento voluntariamente mi participación en esta prueba de aptitud física para determinar mi condición física. Yo entiendo que estoy libre de parar la prueba en cualquier momento, si así lo deseo.

3. Uso de datos para investigación:

La información que será recogida durante la prueba de aptitud físico será tratada de manera confidencial. Esta información no será revelada a ninguna persona sin su consentimiento por escrito. No obstante, la información obtenida podrá ser utilizada para análisis estadísticos u otros propósitos científicos pero siempre con su derecho de privacidad.

*Firma del Estudiante._____ Fecha de la prueba.____/____/____

*Firma del Médico, Nutriólogo(a) o delegado de Aptitud Física._____

APPENDIX 4

EVALUATION OF PHYSICAL FITNESS FORM
(ENGLISH VERSION)

EVALUATION OF PHYSICAL FITNESS

Date ___/_____/____

Day month year

Name(s):_____ Last names: _____, _____
First name(s) Paternal Maternal

Degree: _____ Semester_____ ID number_____

Date of Birth: ____/____/_____ Age:_____ Sex: Masculine_____ Feminine_____

Housing:

On-Campus: 1____ 2____3____4____.

Off-campus:____

(E-mail)_____@_____

*NOTE: Do not write below this line. Exclusive use for the Physical Fitness office.

VITAL SIGNS		ANTHROPOMETRIC	
PA		HEIGHT	
FCR		WEIGHT	
		BMI	
		% FAT	
		ABDOMINAL CIR-CUMFERENCE	
DIET	VEGETARIAN	NO VEGETARIAN	

The new PAR-Q

DO YOU NEED A PHYSICAL MEDICAL EXAMINATION PRIOR TO PHYSICAL EXERCISE?

Common sense is you best guide in answering these questions. Please read the questions carefully and respond. Circle YES or NO.

1. Did a doctor ever tell you that you have cardiac problems and that you should do only physical activity recommended by a doctor?

YES NO

2. Do you experience chest pains when you exercise?

YES NO

3. In the last month have to experienced chest pains even when you are not exercising?

YES NO

4. Do you lose your balance due to dizziness or have you fainted?

YES NO

5. Do you have a problem with your bones or articulations that get worse when there are changes in your physical activity?

YES NO

6. Are you taking medication for hypertension or for a cardiac problem prescribed by a doctor?

YES NO

7. Do you know of any reason why you should not exercise?

YES NO

Informed Consent for a Physical Fitness Test

1. Purpose of the evaluation:
You will participate in a series of tests that will serve to identify your present condition of physical fitness. This test is divided into eight (8) parts, in which the five components of physical fitness will be measured. These components are (1) body composition (2) the cardiorespiratory (3) skeletal muscle strength, (4) skeletal muscle resistance, (5) skeletal/muscle flexibility.

2. Freedom of consent:
I voluntarily agree to my participation in this fitness test to determine my fitness. I understand that I am free to stop the test at any time, if I so wish.

3. Use of data for research:
The information that will be collected during the physical aptitude test will be treated confidential manner. This information will not be disclosed to anyone without your consent in writing. However, the information obtained may be used for statistical analysis or other scientific purposes but always with his right to privacy.

*Signed by Students._____ Date of test____/____/____

Signed by a Physician, Dietician or Physical Fitness delegate _____

APPENDIX 5

MODELS – EXCERPTS FROM INSTRUMENT

Model 1. Healthy Lifestyle Habits Questionnaire - Question 1 – Meal Patterns

1. How often do you consume the following meals?	Never	Almost never	Sometimes	Almost everyday	Always
1a. Breakfast	0	1	2	3	4
1. How often do you consume the following foods?	Never	Almost never	Sometimes	Almost everyday	Always
1b. Lunch					
1. How often do you consume the following foods?	Never	Almost never	Sometimes	Almost everyday	Always
1c. Dinner					

Model 2. Healthy Lifestyle Habits Questionnaire - Questions 2 and 4

2. **How often do you consume these types of foods?**	Never	Almost never	Sometimes	Almost everyday	Always
2a. Home cooked food	0	1	2	3	4
2. **How often do you consume these types of foods?**	Never	Almost never	Sometimes	Almost everyday	Always
2b. Canned or Frozen Foods					
2. **How often do you consume these types of foods?**	Never	Almost never	Sometimes	Almost everyday	Always
2c. Fast food or at a restaurant					
4. **Do you consume snacks (more than two times a day)**	Never	Almost never	Sometimes	Almost everyday	Always

Model 3. Healthy Lifestyle Habits Questionnaire - Question 11

Sleep duration: Hours you sleep each night	5 or less	6	7	8 or more
	1	2	3	4

Model 4. Evaluation of Physical Fitness Record Form – Section on Student Housing

Student housing:	
On-campus	Dormitory: **1____ 2____3____4____**
Off-campus	External :

Model 5. Excerpt illustrating consent for confidential scientific use of the data.

3. Use of data for research: *The information that will be collected during the physical aptitude test will be treated as confidential. This information will not be disclosed to anyone without your consent in writing. However, the information obtained may be used for statistical analysis or other scientific purposes but always with his right to privacy.*

APPENDIX 6

TABLES – DATA ANALYSIS OUTPUT
(2012-2013 AND 2013-2014)

H_1: There is a significant increase in the BMI at the end of the first semester. (Differences between BMI – Start and end of semester)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	BMI1	23.266129	124	3.2539379	.2922122
	BMI	23.174758	124	3.7614526	.3377884

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	BMI1 & BMI	124	.941	.000

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair1 BMI1 - BMI	.0913710	1.3012891	.1168592	-.1399447	.3226866	.782	123	.436

Correlations

		BMI	BMI1
BMI	Pearson Correlation	1	.941**
	Sig. (2-tailed)		.000
	N	124	124
BMI1	Pearson Correlation	.941**	1
	Sig. (2-tailed)	.000	
	N	124	124

**. Correlation is significant at the 0.01 level (2-tailed).

H_2: There are noteworthy differences in overweight female students than male students.

Group Statistics

	Gen	N	Mean	Std. Deviation	Std. Error Mean
BMI	Male	63	23.623016	3.6128979	.4551823
	Female	61	22.711803	3.8842586	.4973284
BMI1	Male	63	23.631746	3.3737519	.4250528
	Female	61	22.888525	3.1078448	.3979188

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
BMI	Equal variances assumed	.413	.522	1.353	122	.179	.9112126	.6733937	-.4218374	2.2442626
	Equal variances not assumed			1.352	120.676	.179	.9112126	.6741858	-.4235521	2.2459773
BMI1	Equal variances assumed	.234	.630	1.275	122	.205	.7432214	.5830210	-.4109269	1.8973698
	Equal variances not assumed			1.276	121.702	.204	.7432214	.5822450	-.4094189	1.8958618

Correlations

			BMI	Gen
Spearman's rho	BMI	Correlation Coefficient	1.000	-.161
		Sig. (2-tailed)	.	.074
		N	124	124
	Gen	Correlation Coefficient	-.161	1.000
		Sig. (2-tailed)	.074	.
		N	124	124

Correlations

			Gen	BMI1
Spearman's rho	Gen	Correlation Coefficient	1.000	-.118
		Sig. (2-tailed)	.	.193
		N	124	124
	BMI1	Correlation Coefficient	-.118	1.000
		Sig. (2-tailed)	.193	.
		N	124	124

H_3: Students who live on the campus dormitories have a greater BMI. (Differences between choice of student housing – Start and end of semester)

Group Statistics

	Res	N	Mean	Std. Deviation	Std. Error Mean
BMI	Off Campus	46	22.478261	3.6056180	.5316194
	On Campus	78	23.585513	3.8134620	.4317895
BMI1	Off Campus	46	22.595652	3.4266249	.5052283
	On Campus	78	23.661538	3.1023339	.3512701

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
BMI	Equal variances assumed	.000	.989	-1.593	122	.114	-1.1072520	.6949293	-2.4829339	.2684300
	Equal variances not assumed			-1.617	98.822	.109	-1.1072520	.6848806	-2.4662338	.2517299
BMI1	Equal variances assumed	.168	.682	-1.777	122	.078	-1.0658863	.5996735	-2.2529999	.1212273
	Equal variances not assumed			-1.732	87.124	.087	-1.0658863	.6153424	-2.2889216	.1571490

H_4: There is a relationship between food choice and BMI.

Correlations

			BMI	HomeFood
Spearman's rho	BMI	Correlation Coefficient	1.000	-.153
		Sig. (2-tailed)	.	.366
		N	37	37
	HomeFood	Correlation Coefficient	-.153	1.000
		Sig. (2-tailed)	.366	.
		N	37	62

Correlations

			BMI1	HomeFood1
Spearman's rho	BMI1	Correlation Coefficient	1.000	-.184
		Sig. (2-tailed)	.	.197
		N	51	51
	HomeFood1	Correlation Coefficient	-.184	1.000
		Sig. (2-tailed)	.197	.
		N	51	62

Correlations

			BMI	Can/FrozFood
Spearman's rho	BMI	Correlation Coefficient	1.000	-.090
		Sig. (2-tailed)	.	.602
		N	37	36
	Can/FrozFood	Correlation Coefficient	-.090	1.000
		Sig. (2-tailed)	.602	.
		N	36	59

Correlations

			BMI1	Can/FrozFood1
Spearman's rho	BMI1	Correlation Coefficient	1.000	-.108
		Sig. (2-tailed)	.	.460
		N	51	49
	Can/FrozFood1	Correlation Coefficient	-.108	1.000
		Sig. (2-tailed)	.460	.
		N	49	60

Correlations

			BMI	FastFood
Spearman's rho	BMI	Correlation Coefficient	1.000	.507**
		Sig. (2-tailed)	.	.002
		N	37	36
	FastFood	Correlation Coefficient	.507**	1.000
		Sig. (2-tailed)	.002	.
		N	36	61

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

			BMI1	FastFood1
Spearman's rho	BMI1	Correlation Coefficient	1.000	.140
		Sig. (2-tailed)	.	.328
		N	51	51
	FastFood1	Correlation Coefficient	.140	1.000
		Sig. (2-tailed)	.328	.
		N	51	62

Correlations

			BMI	Snacks
Spearman's rho	BMI	Correlation Coefficient	1.000	-.147
		Sig. (2-tailed)	.	.393
		N	37	36
	Snacks	Correlation Coefficient	-.147	1.000
		Sig. (2-tailed)	.393	.
		N	36	61

H_5: There is a relationship between meal patterns and BMI.

Correlations

			BMI	Breakfast	Lunch	Dinner
Spearman's rho	BMI	Correlation Coefficient	1.000	-.029	-.187	-.320
		Sig. (2-tailed)	.	.865	.283	.061
		N	37	37	35	35
	Breakfast	Correlation Coefficient	-.029	1.000	.287*	.311*
		Sig. (2-tailed)	.865	.	.026	.015
		N	37	62	60	60
	Lunch	Correlation Coefficient	-.187	.287*	1.000	.118
		Sig. (2-tailed)	.283	.026	.	.371
		N	35	60	60	60
	Dinner	Correlation Coefficient	-.320	.311*	.118	1.000
		Sig. (2-tailed)	.061	.015	.371	.
		N	35	60	60	60

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

			BMI1	Breakfast1	Lunch1	Dinner1
Spearman's rho	BMI1	Correlation Coefficient	1.000	-.021	-.235	-.148
		Sig. (2-tailed)	.	.882	.104	.306
		N	51	51	49	50
	Breakfast1	Correlation Coefficient	-.021	1.000	.386**	.226
		Sig. (2-tailed)	.882	.	.002	.080
		N	51	62	60	61
	Lunch1	Correlation Coefficient	-.235	.386**	1.000	.213
		Sig. (2-tailed)	.104	.002	.	.102
		N	49	60	60	60
	Dinner1	Correlation Coefficient	-.148	.226	.213	1.000
		Sig. (2-tailed)	.306	.080	.102	.
		N	50	61	60	61

**. Correlation is significant at the 0.01 level (2-tailed).

H_6: A relationship exists between sleep duration and BMI.

Correlations

		BMI	SleepDuration
BMI	Pearson Correlation	1	-.236
	Sig. (2-tailed)		.166
	N	37	36
SleepDuration	Pearson Correlation	-.236	1
	Sig. (2-tailed)	.166	
	N	36	61

Correlations

		BMI1	SleepDuration
BMI1	Pearson Correlation	1	-.033
	Sig. (2-tailed)		.816
	N	51	51
SleepDuration	Pearson Correlation	-.033	1
	Sig. (2-tailed)	.816	
	N	51	62

Data Analysis Output - 2013-2014

H_1: There is a significant increase in the BMI at the end of the first semester. (Differences between BMI – Start and end of semester)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	BMI1	23.749117	123	3.9445066	.3556642
	BMI	23.578049	123	4.1493601	.3741352

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	BMI1 & BMI	123	.963	.000

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 BMI1 - BMI	.1710679	1.1164403	.1006660	-.0282106	.3703463	1.699	122	.092

H_2: There are noteworthy differences in overweight female students than male students. (Differences between gender – Start and end of semester)

Group Statistics

	Gen	N	Mean	Std. Deviation	Std. Error Mean
BMI1	Male	58	24.211449	4.6652647	.6125793
	Female	65	23.336574	3.1478329	.3904406
BMI	Male	58	24.136897	4.8819302	.6410288
	Female	65	23.079385	3.3253876	.4124636

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
BMI1	Equal variances assumed	4.324	.040	1.231	121	.221	.8748755	.7109865	-.5327098	2.2824608
	Equal variances not assumed			1.204	98.274	.231	.8748755	.7264277	-.5666464	2.3163974
BMI	Equal variances assumed	4.024	.047	1.417	121	.159	1.0575119	.7464100	-.4202036	2.5352274
	Equal variances not assumed			1.387	98.874	.168	1.0575119	.7622625	-.4550062	2.5700301

H_3: Students who live on the campus dormitories have a greater BMI. (Differences between choice of student housing – Start and end of semester)

Group Statistics

	Res	N	Mean	Std. Deviation	Std. Error Mean
BMI1	Off Campus	57	23.536404	3.6023661	.4771451
	On Campus	66	23.932823	4.2366412	.5214945
BMI	Off Campus	57	23.452807	3.9664948	.5253751
	On Campus	66	23.686212	4.3284006	.5327893

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
BMI1	Equal variances assumed	.319	.573	-.554	121	.580	-.3964191	.7152742	-1.8124930	1.0196548
	Equal variances not assumed			-.561	120.975	.576	-.3964191	.7068408	-1.7957998	1.0029616
BMI	Equal variances assumed	.001	.975	-.310	121	.757	-.2334051	.7530767	-1.7243190	1.2575088
	Equal variances not assumed			-.312	120.558	.756	-.2334051	.7482536	-1.7148252	1.2480150

H_4: There is a relationship between food choice and BMI.

Correlations

			BMI	HomeFood
Spearman's rho	BMI	Correlation Coefficient	1.000	-.133
		Sig. (2-tailed)	.	.098
		N	159	156
	HomeFood	Correlation Coefficient	-.133	1.000
		Sig. (2-tailed)	.098	.
		N	156	175

Correlations

			BMI1	HomeFood1
Spearman's rho	BMI1	Correlation Coefficient	1.000	-.059
		Sig. (2-tailed)	.	.500
		N	137	134
	HomeFood1	Correlation Coefficient	-.059	1.000
		Sig. (2-tailed)	.500	.
		N	134	175

Correlations

			BMI	Can/FrozFood
Spearman's rho	BMI	Correlation Coefficient	1.000	-.023
		Sig. (2-tailed)	.	.780
		N	159	152
	Can/FrozFood	Correlation Coefficient	-.023	1.000
		Sig. (2-tailed)	.780	.
		N	152	171

Correlations

			BMI1	Can/FrozFood1
Spearman's rho	BMI1	Correlation Coefficient	1.000	-.119
		Sig. (2-tailed)	.	.173
		N	137	133
	Can/FrozFood1	Correlation Coefficient	-.119	1.000
		Sig. (2-tailed)	.173	.
		N	133	174

Correlations

			BMI	FastFood
Spearman's rho	BMI	Correlation Coefficient	1.000	-.014
		Sig. (2-tailed)	.	.862
		N	159	153
	FastFood	Correlation Coefficient	-.014	1.000
		Sig. (2-tailed)	.862	.

Correlations

			BMI1	FastFood1
Spearman's rho	BMI1	Correlation Coefficient	1.000	-.066
		Sig. (2-tailed)	.	.448
		N	137	133
	FastFood1	Correlation Coefficient	-.066	1.000
		Sig. (2-tailed)	.448	.
		N	133	173

Correlations

			BMI	Snacks
Spearman's rho	BMI	Correlation Coefficient	1.000	-.027
		Sig. (2-tailed)	.	.746
		N	159	150
	Snacks	Correlation Coefficient	-.027	1.000
		Sig. (2-tailed)	.746	.
		N	150	168

Correlations

			BMI1	Snacks1
Spearman's rho	BMI1	Correlation Coefficient	1.000	-.056
		Sig. (2-tailed)	.	.519
		N	137	134
	Snacks1	Correlation Coefficient	-.056	1.000
		Sig. (2-tailed)	.519	.
		N	134	175

H_5: There is a relationship between meal patterns and BMI.

Correlations

			BMI	Breakfast	Lunch	Dinner
Spearman's rho	BMI	Correlation Coefficient	1.000	.016	-.161*	-.133
		Sig. (2-tailed)	.	.838	.045	.099
		N	159	156	155	155
	Breakfast	Correlation Coefficient	.016	1.000	.246**	.172*
		Sig. (2-tailed)	.838	.	.001	.023
		N	156	175	174	174
	Lunch	Correlation Coefficient	-.161*	.246**	1.000	.263**
		Sig. (2-tailed)	.045	.001	.	.000
		N	155	174	174	174
	Dinner	Correlation Coefficient	-.133	.172*	.263**	1.000
		Sig. (2-tailed)	.099	.023	.000	.
		N	155	174	174	174

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

			BMI1	Breakfast1	Lunch1	Dinner1
Spearman's rho	BMI1	Correlation Coefficient	1.000	-.099	-.235**	-.192*
		Sig. (2-tailed)	.	.253	.006	.027
		N	137	135	133	132
	Breakfast1	Correlation Coefficient	-.099	1.000	.298**	.201**
		Sig. (2-tailed)	.253	.	.000	.008
		N	135	176	174	173
	Lunch1	Correlation Coefficient	-.235**	.298**	1.000	.293**
		Sig. (2-tailed)	.006	.000	.	.000
		N	133	174	174	173
	Dinner1	Correlation Coefficient	-.192*	.201**	.293**	1.000
		Sig. (2-tailed)	.027	.008	.000	.
		N	132	173	173	173

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

H_6: A relationship exists between sleep duration and BMI.

Correlations

		BMI	SleepDuration
BMI	Pearson Correlation	1	.006
	Sig. (2-tailed)		.944
	N	159	153
SleepDuration	Pearson Correlation	.006	1
	Sig. (2-tailed)	.944	
	N	153	172

Correlations

		BMI1	SleepDuration1
BMI1	Pearson Correlation	1	-.079
	Sig. (2-tailed)		.363
	N	137	134
SleepDuration1	Pearson Correlation	-.079	1
	Sig. (2-tailed)	.363	
	N	134	175

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