

Meal Preparation Habits and Diet Quality of College Students

by

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ABSTRACT

The purpose of this study was to investigate the meal preparation habits of college students as it relates to the quality of their diets. In addition, this study looked at cooking skills and barriers to meal preparation of college students living off campus. A 20 question survey was completed by 13 female and 17 male college students who live off campus. The survey included three sections; demographics, meal habits/cooking skills, and a food frequency questionnaire.

This study revealed that, although most participants claim to have adequate cooking skills, many are eating meals prepared away from home three or more times per week. Participants were also found to not be consuming the recommended servings of fruits, vegetables, and low fat dairy. In addition, these subjects are not making healthy choices when it comes to variety of these foods and choosing the most nutritious sources. The top three factors that had the largest impact on whether or not subjects were home preparing their meals were found to be limited time, money, and resources.

In conclusion, efforts should be made in nutrition education to target high school students and first year college students in order to teach them to prepare quick, simple, and inexpensive meals to help them meet their recommended dietary needs and improve their eating habits.

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Chapter I: Introduction

As young adults transition from high school to college, they move out on their own and become increasingly responsible for meeting their own basic needs. In the search for their independence, these young adults develop their own behaviors and habits which may influence choices that they'll continue throughout the rest of their lives. Of particular interest are the behaviors and habits that evolve when it comes to meeting their dietary needs. Because positive dietary practices will reduce the risk of many chronic health complications, it is important for young adults to adopt good behaviors and habits in regards to meal practices (Krinke, 2005).

When college students are living on campus, they usually have the option, or are sometimes required, to purchase a campus provided meal plan. These meal plans offer a variety of options that are ready to eat and may closely resemble complete and home cooked meals. On the other hand, students living off campus are largely responsible for their own meal purchasing and preparation. Because of this, their diets may be lacking in proper amounts of the foods associated with a healthy diet, such as fruits, vegetables, low fat dairy, and whole grains. As discovered in a study by Brown, Dresen, and Eggert (2005), students living on campus who participated in a meal plan program had greater intakes of fruits, vegetables, milk, and meat than those students living off campus.

The habits that students develop when it comes to meal preparation impact their diets a great deal. Larson, Perry, Story, and Neumark-Sztainer (2006) found that the majority of young adult subjects were performing meal preparation tasks less than once a week. When young adults are not preparing meals at home, the alternative meal options often includes eating at restaurants. Larson, Perry, Story, and Neumark-Sztainer (2006) also reported that more frequent food preparation by young adults was associated with less fast food intake. Soliah, Walter, and Antosh

(2006) found that 59% of the female college subjects were eating out one to three times a week, while the remaining 41% of subjects were eating out four or more times a week.

When foods are prepared at home, factors such as total calories, total fat, saturated fat, sugar, and sodium can greatly be controlled. On the other hand, foods eaten at restaurants, especially fast food restaurants, are generally high in those dietary components. Fast food options are also usually low in fruits, vegetables, whole grains, and calcium. A study by Schmidt et al. (2005) looking at fast food intake and diet quality in young girls, showed that as fast food frequency increased, so did total energy, total fat, saturated fat, and sodium, while quality foods such as fruits, vegetables, and milk were displaced in the diet. In addition, Larson, Perry, Story, and Neumark-Sztainer (2006) found that 31% of subjects who reported frequent meal preparation were able to meet their five daily servings of fruits and vegetables. Only 3% of those who reported low meal preparation performance were able to meet their five daily servings of fruits and vegetables. Of equal concern, Boutelle, Fulkerson, Neumark-Sztainer, Story, and French (2007) found that adults who consumed fast food more frequently weighed more.

Because young adults are developing food habits and behaviors that they may carry with them throughout their lives, it is problematic that so few young adults are participating in meal preparation. The intakes of fruits, vegetables, whole grains, and low fat dairy, which may be lacking in the diets of this population, are known to promote health and be preventative for many chronic health complications. Also, the high energy, total fat, saturated fat, and sodium intake that are found when restaurant and fast foods are consumed are associated with obesity, heart disease, diabetes mellitus, and certain types of cancers (USDA/HHS, 2005). Since this population may not make the connection between their current diet and their future health, these

factors may not affect their decisions when choosing whether to consume home prepared meals or eat away from home.

Besides health, there are many factors that may come into play when college students are determining their meal preparation habits. Many college students have limited time, money, cooking skills, space within their living arrangement, and equipment necessary for cooking. Larson, Perry, Story, and Neumark-Sztainer (2006), when researching the meal preparation habits of young adults, found that the top three reasons that young adults were not preparing meals were restricted time, limited money, and inadequate cooking skills.

The Dietary Guidelines for Americans are designed through joint efforts of the United States Department of Agriculture (USDA) and the Department of Health and Human Services (HHS) every five years based on scientific research to help advise all persons two years and older about positive dietary practices to support good health and prevent chronic disease. The most recent guidelines were set in 2005 and were also utilized to develop the recent food guide pyramid, My Pyramid. Within the guidelines, food groups that are encouraged include fruits, vegetables, whole grains, and low fat dairy. These food groups were chosen because they are excellent sources of many critical nutrients and because these food groups have been linked to a decreased risk of developing many chronic diseases. In addition, when these food groups are adequately consumed in the diet, intake of foods that are less nutrient-dense and high in calories decreases. Based on a 2,000 calorie diet, it is recommended that two cups of fruit and two and a half cups of vegetables are consumed each day. Variety is also stressed, as well as consuming dark greens, orange, legumes, starchy vegetables, and non-starchy vegetables several times a week. The guidelines also advocate that half of all grains consumed should be whole grains. Based on a 2,000 calorie diet, Americans should eat three servings of whole grains daily. Lastly,

it is recommended that American get three cups of fat free or low fat milk or milk equivalents each day (USDA/HHS, 2005).

In addition to the food groups that are encouraged, the dietary guidelines recommend that Americans choose a variety of foods that limit intake of saturated fats, trans fats, added sugar, and salt. Also, it is suggested that total fat comprise 20 to 35 percent of daily calories, with an emphasis of fatty acids coming from sources such as fish, nuts, and vegetables oils (USDA/HHS, 2005).

To provide for a healthier future, college students should be following the recommendations made within the Dietary Guidelines for Americans 2005. To this end, proper meal habits should be established for this population. It is important for health professionals, especially in the dietetics field, to understand the meal preparation habits, behaviors, and barriers of young adults in order to direct nutrition counseling and education targeted to this population.

Statement of the Problem

The purpose of this study was to determine the association between meal preparation habits, away-from-home meal consumption, fast food intake, and diet quality of UW-Stout students living off campus. Additionally, the study looked at the perceived barriers to food preparation among this population. Data was collected by use of a survey in the fall semester of the 2007-2008 school year on the UW-Stout campus. The survey included questions about meal preparation frequency and meal habits, along with a food frequency questionnaire.

Research Objectives

By completing this study, the researcher planned to meet the following objectives.

1. To determine if there is a positive/negative relationship between home meal preparation and the quality of the diet, including fruits, vegetables, whole grain, and low fat dairy intake, for students living off campus.
2. To determine if fast foods contribute to a significant portion of the diets of students living off campus.
3. To determine if there is a relationship between students' perceived cooking skills and dietary quality.
4. To determine if students living off campus feel that they have the adequate resources (time, money, equipment, and skills) to prepare meals at home.

Definition of Terms

The definition of some terms used throughout this research may have differing meanings from person to person. In order to universalize what the researcher intended by the use of certain words, the definitions are provided.

Away from home foods: "...foods obtained from fast food or traditional sit-down restaurants" (Duffey, Gordon-Larsen, Jacobs, Williams, & Popkin, 2007, p. 201).

Diet Quality: Determined by the amounts of fruits, vegetables, whole grains, dairy, sugar, and fat that is consumed in a person's diet.

Fast Food: Food that is prepared and served fast. The food is usually cooked in advance and served when ordered. The cost of fast food is relatively low (*Wikipedia: The Free Encyclopedia*, 2007).

Food Frequency Questionnaire: A tool used for dietary assessment, which asks participants to recall how frequently they consume certain foods over a specified period of time (*Babylon*, 2006).

Food Guide Pyramid: A tool developed by the United States Department of Agriculture to guide people on the recommended servings, based on scientific-based research, of fruits, vegetables, grains, milk, meat, and fats to include in their diet in order to promote health.

Take Out Food: Food purchased at a restaurant, but taken to eat elsewhere. This may come from a fast food restaurant or a sit-down restaurant, yet the food is ordered to go instead of dining on-site (*Wikipedia: The Free Encyclopedia*, 2007).

Home Prepared Meal: A meal prepared within the home, regardless of the components of the meal or the difficulty of preparation.

Whole Grains: Foods that contain all the parts, such as the bran, germ, and endosperm, of the original and naturally occurring grain seed. If processing has occurred, the same proportions of these components must exist in the product, as they would have without processing, in order to be considered whole grain (United States Department of Agriculture, 2005).

Assumptions of the Study

For the purpose of this study the researcher assumed the following;

1. All survey questions were answered openly and honestly, regardless of what is deemed socially acceptable.
2. All participants understood the survey questions as the researcher intended.
3. All participants had access to enough food to meet their basic needs and no participants were experiencing food insecurity.

Limitations of the Study

The researcher realizes that limitations do exist for this study.

1. Survey questions may not have been answered openly and honestly and may be swayed by what was deemed socially acceptable or by what participants felt the researcher would like to have received.
2. Survey questions may have had different meanings to different participants, and participants may have perceived questions to mean other than what was intended by the researcher.
3. Survey questions may not have applied to those participants who are experiencing food insecurity.
4. Data was collected from one population at one university. Results obtained may not be generalizable to other college populations.
5. The survey used in this study was developed specifically for this study and had not been previously tested for reliability or validity.

Chapter II: Literature Review

This chapter will begin with details of the dietary guidelines for Americans. Next, a discussion of food preparation habits is provided. In addition, habits of young adults will be discussed and the chapter will end with findings on barriers to food preparation in young adults.

Dietary Guidelines

Since 1980, the United States Department of Agriculture (USDA) and the Department of Health and Human Services (HHS) have been working together to jointly issue dietary guidelines for Americans. This document is updated and renewed every five years and contains science-based recommendations for all persons two years of age and above. The purpose of these guidelines is to advise Americans on how to “promote health and reduce the risk of chronic disease through diet and physical activity” (USDA/HHS, 2005, p. v). The most recent guidelines were set in 2005 and the document itself is intended to be the chief source of dietary information for policymakers, nutrition educators, and health providers. In addition, the USDA My Pyramid is a tool produced to translate the Dietary Guidelines into a form useable for consumers.

The importance of a proper diet and adequate physical activity to help prevent chronic disease is well established. Poor dietary factors are related to cardiovascular disease, hypertension, dyslipidemia, type 2 diabetes, overweight and obesity, osteoporosis, malnutrition, iron deficiency anemia, and certain types of cancers (USDA/HHS, 2005). The results for the 2003-2004 National Health and Nutrition Examination Survey (NHANES 2003-2004) showed that 66.3% of the U.S. population over the age of 20 is considered overweight and 32.2% is considered obese (Center for Disease Control, 2004). Since diet and physical activity are factors closely linked to weight status, and because weight status is closely linked to many forms of chronic diseases, the Dietary Guidelines for Americans are prudent to ensure a positive quality of

life. Within the dietary guidelines, it is estimated that adherence to the guidelines could decrease men's and women's mortality from all causes by 16 and 9%, respectively (USDA/HHS, 2005).

The key recommendations within the dietary guidelines include controlling calories, managing weight, getting proper amounts of certain food groups, getting the proper distribution of macronutrients and micronutrients, engaging in physical activity and ensuring food safety. Most important in the guidance of daily food choices for consumers are the encouragement of fruits, vegetables, whole grains, and low fat dairy consumption. When these foods are eaten in adequate amounts, there is less of an opportunity to consume nutrient deficient, high caloric foods. In addition, persons should be aware of their intakes of total fat, saturated fat, trans fat, sodium, and added sugar. The recommended intakes of food groups are based on a referenced 2,000 calorie diet, yet needs may be more or less based on a number of factors, including a person's size and activity level (USDA/HHS, 2005).

Total Calories. In order to maintain body weight, the amount of calories consumed must balance with the calories expended. When more calories are consumed than expended, weight gain results. Many Americans exceed their calorie requirement, which has led to the high incidence of overweight and obesity. The dietary guidelines recommend that Americans balance their calories with energy expenditure and maintain a healthy weight. The total calories needed to maintain body weight varies from person to person (USDA/HHS, 2005). Factors such as gender, body size, lean body mass, activity level, health status, hormones, and individual variations play a role in determining caloric needs (Krinke, 2005). Estimated energy requirements, provided by the Dietary Guidelines for Americans 2005, are shown in Table 1. The table shows "estimated amounts of calories needed to maintain energy balance for various gender and age groups at three different levels of physical activity. The estimates are rounded to

the nearest 200 calories and were determined using the Institute of Medicine equation” (USDA/HHS, 2005).

Table 1.

Estimated Calorie Requirements (in Kilocalories) for Each Gender and Age Group at Three Levels of Physical Activity ^a

Gender	Age (years)	Activity Level ^{b,c,d}		
		Sedentary ^b	Moderately Active ^c	Active ^d
Child	2-3	1,000	1,000-1,400 ^e	1,000-1,400 ^e
Female	4-8	1,200	1,400-1,600	1,400-1,800
	9-13	1,600	1,600-2,000	1,800-2,200
	14-18	1,800	2,000	2,400
	19-30	2,000	2,000-2,200	2,400
	31-50	1,800	2,000	2,200
	51+	1,600	1,800	2,000-2,200
Male	4-8	1,400	1,400-1,600	1,600-2,000
	9-13	1,800	1,800-2,200	2,000-2,600
	14-18	2,200	2,400-2,800	2,800-3,200
	19-30	2,400	2,600-2,800	3,000
	31-50	2,200	2,400-2,600	2,800-3,000
	51+	2,000	2,200-2,400	2,400-2,800

^a These levels are based on Estimated Energy Requirements (EER) from the Institute of Medicine Dietary Reference Intakes macronutrients report, 2002, calculated by gender, age, and activity level for reference-sized individuals. "Reference size," as determined by IOM, is based on median height and weight for ages up to age 18 years of age and median height and weight for that height to give a BMI of 21.5 for adult females and 22.5 for adult males.

^b Sedentary means a lifestyle that includes only the light physical activity associated with typical day-to-day life.

^c Moderately active means a lifestyle that includes physical activity equivalent to walking about 1.5 to 3 miles per day at 3 to 4 miles per hour, in addition to the light physical activity associated with typical day-to-day life.

^d Active means a lifestyle that includes physical activity equivalent to walking more than 3 miles per day at 3 to 4 miles per hour, in addition to the light physical activity associated with typical day-to-day life.

^e The calorie ranges shown are to accommodate needs of different ages within the group. For children and adolescents, more calories are needed at older ages. For adults, fewer calories are needed at older ages.

Fruits and Vegetables. Two cups of fruit and two and a half cups of vegetables are suggested for daily intake for those consuming a 2000 calorie diet. The guidelines emphasize that variety of fruits and vegetables are important. Since fruits and vegetables provide an

abundance of micronutrients and since different micronutrients are found within different sources, it is important to vary fruit and vegetable intake to ensure all nutrients are consumed. Dark green, orange, legumes, starchy, and non-starchy vegetables should all be consumed each week. Fruit intake should include the whole fruit, and fruit juice should be consumed in moderation. Fruits and vegetables are excellent sources of fiber, as well as key micronutrients, which both aid in disease prevention (USDA/HHS, 2005).

Whole Grains. At least half of all grains consumed should be whole grains. In the reference 2,000 calorie diet, a minimum of three servings of whole grains are encouraged each day. Whole grains and whole grain products are made with the entire grain seed, called the kernel, which contain the bran, germ, and endosperm. Like fruits and vegetables, the components of the kernel contain many essential micronutrients and fiber, which are lost when flour is processed to make refined grain products (USDA/HHS, 2005).

Low-fat Dairy or Dairy Equivalents. Three cups of low-fat or fat-free milk or dairy equivalents are recommended each day for all calorie levels. Dairy equivalents include low fat yogurt, cheese, and soy beverages. Dairy consumption is beneficial for bone health and drinking milk has been associated with weight maintenance. Also, milk is a good source of protein and many other essential nutrients (USDA/HHS, 2005).

Fats. Total fat intake is recommended to comprise between 20 and 35% of total daily calorie content. Also, saturated fat should not exceed 10% of total calories a day and trans fat intake should be as little as possible. The guidelines state that most of the fat in the diet should come from monounsaturated and polyunsaturated sources, namely from fish, nuts, and vegetable oils. Fats contain many vitamins and are an essential nutrient for many cellular functions. On the other hand, saturated and trans fats are known to increase low density lipoprotein (LDL)

cholesterol in the blood, which in turn increases risk of chronic disease. Fats also contain a higher amount of calories per a gram and high intakes are associated with exceeding energy needs (USDA/HHS, 2005).

Sodium. It is advised that sodium intake does not exceed 2,300 milligrams. This equals about one teaspoon of salt a day, and people should be aware of foods that contain a lot of salt or of adding a lot of salt to foods during preparation. Processed foods are the primary source of sodium in the diet, as few foods naturally contain it (Brown, Dresen, & Eggett, 2005). Salt, made of sodium chloride, is related to hypertension and generally there is a positive relationship between a person's salt intake and their blood pressure. Hypertension is considered a chronic disease and, if not treated, can lead to more serious health complications (USDA/HHS, 2005).

Added Sugar. Added sugar is recommended to not exceed 25% of total daily calories (Brown, Dresen, & Eggett, 2005). Sugar that is naturally found in foods, such as fruit and milk, are not considered added sugars. Added sugars are put into products during processing or added to foods during preparation. Although there is little difference in the metabolism of sugars that naturally occur in foods or the ones that are added, there is no nutritive value that accompanies added sugars and they are an added source of calories (USDA/HHS, 2005).

Meal Preparation Habits

In 1993, 38% of total money spent on food was used to purchase away-from-home foods and by 2001, this number rose to 42% (cited in Bowman & Vinyard, 2004). As stated in Duffey, Gordon-Larsen, Jacobs, Williams, and Popkin (2007, p. 201), "typically, away-from-home foods, are defined as food obtained from fast food or traditional sit-down family style restaurants." For a variety of reasons, home meal preparation has become a fading habit.

Home Meal Preparation. When home prepared meals are more frequently consumed, there is a greater opportunity for adherence to the dietary guidelines. Larson, Story, Eisenberg, and Neumark-Sztainer (2006) found that adolescent involvement in meal preparation was associated with a more healthful diet. In addition, the subjects who were involved with food preparation consumed one-half servings each of fruits and vegetables more than those subjects who were not involved. Larson, Perry, Story, and Neumark-Sztainer (2006) reported, in a separate study on food preparation habits of college students, that 31% of those subjects who stated they often prepared their meals were also consuming five servings of fruits and vegetables on a daily basis. In comparison, of those students who reported low meal preparation, only 3% were consuming five daily servings of fruits and vegetables. Also meeting their dietary recommendations for fat, calcium, fruit, vegetables, and whole grains was more promising for students who reported frequent meal preparation as opposed to the students who reported infrequent meal preparation.

Fast Food. As home meal preparation declines, use of away-from-home meals increases. Of the most concern is fast food consumption. Fast food consumption, most likely due to its convenience and low cost, has grown in popularity over the past few decades. In 2001, there were approximately 222,000 fast food restaurants, generating more than \$125 billion in sales in the U.S. (Paeratakul, Ferdinand, Champagne, Ryan, & Bray, 2003). Boutelle, Fulkerson, Neumark-Sztainer, Story, and French (2005) discovered that of their 902 adolescent subjects, 51% of their parents reported purchasing fast food for family meals one to two times a week, seven percent purchased fast food three to four times a week, and one percent purchased fast food five to six times a week for family meals.

Just as home meal preparation can help in following the dietary guidelines, away-from-home meals can be harmful when it comes to dietary quality. Fast food, in particular, tends to consist of components that are in opposition of the dietary guidelines. Total energy, total fat, saturated fat, trans fat, sugar, and sodium are found in high amounts in typical fast food. Bowman and Vinyard (2004) found that the subjects who reported eating fast food on a 24 hour recall, had higher intakes of energy, total fat, saturated fat, and added sugar than those who did not report fast food consumption. Likewise, Schmidt et al. (2005) reported a positive association between the frequency of fast food consumption in young girls and intakes of energy, total fat, saturated fat, and sodium. Bowman and Vinyard (2004) reported that twice the amount of non-diet soda was consumed by those reporting fast food intakes.

In addition to being high in the dietary components that are recommended to be limited, fast food is low in fruits, vegetables, whole grains, and low-fat dairy. Moreover, foods served in fast food restaurants are usually low in fiber. In data collected by Paeratakul et al. (2003) of 17,370 subjects in the 1994-1996, 1998 Continuing Survey of Food Intakes by Individuals (CSFII), 24 hour dietary recalls found that the children and adolescence who consumed fast food had lower intakes of dark green vegetables, other vegetables, legumes, non-citrus fruits, juice, milk, bread, and cereal. In the adult subjects, fast food consumption was linked to low intakes of breads, cereals, legumes, all fruits, and all vegetables with the exclusion of fried potatoes. Similarly, Bowman and Vinyard (2004) saw a decrease in milk, fruits, fruit juices, and non-starchy vegetables consumption on days when fast food was reported.

Fast food is not only found to be of poor nutritional quality, but it is also notorious for large portion sizes (cited in Schmidt et al., 2005). Fast food establishments often market their large portion options as being the most economical selection for consumers. The portion sizes

have grown substantially over the years and fast food portions are now approximately two to five times bigger than their original size (Young & Nestle, 2003). “Supersizing” meals provides customers with much more than additional food for less money; these meals are also providing more calories, total fat, saturated fat, sodium, and added sugar. A small french fry order at McDonalds, which is 2.4 ounces and the original size when introduced in 1955, contains 210 calories. In comparison, the “Supersize” order of french fries is 7.1 ounces and 610 calories. When both a “supersize” french fry and coca cola are consumed at McDonalds, it provides an intake of 1,020 calories. This, alone, is over half the daily calorie intake needed by much of the US population (Young & Nestle, 2003).

Because of the dietary inadequacy, the large portion sizes, and its growing popularity, it is likely that fast food intake may be contributing to the rise in overweight and obesity in the U.S. Fast food consumption was shown to increase daily calorie intake by an average 206 calories in the study by Bowman and Vinyard (2004). They also reported that when fast food is eaten, it contributes to over one third of daily calories. These excess calories being added to the diet are likely to cause weight gain when energy needs are exceeded. Duffey, Gordon-Larsen, Jacobs, Williams, and Popkin (2007) studied the eating habits of participants enrolled in the Coronary Artery Risk Development in Young Adults (CARDIA) Study over a three year period (years seven and ten) to determine if fast food and/or restaurant food consumption was associated with weight status. At years seven and ten, participants with a higher frequency of fast food intake had an average of 0.13 body mass index (BMI) units and 0.24 BMI units higher BMIs than participants with less frequent fast food consumption. Also, those with higher intakes of fast food at year seven were found to have a BMI increase of 0.16 BMI units at year ten. This same association could not be made with sit-down restaurant frequency and BMI status during

this study. Likewise, Boutelle et al. (2007) noted that in comparison to parents reporting less frequent fast food purchase, parents who purchased fast food for family meals three or more times a week had higher mean BMIs and were more likely to be overweight. Although this study did not also show a positive association between fast food consumption for family meals and adolescent weight status, the researchers discussed that this population still may be in need of calorie dense foods in order to support growth, yet frequent fast food consumption might increase their risk of being overweight or obese as they become adults. On the other hand, Duerksen et al. (2007) studied Mexican-American families to determine if restaurant choice was related to weight status. They found that children whose families consumed fast food more frequently from American, Mexican or other ethnic restaurants were most likely to be at risk for overweight.

Habits of Young Adults

Upon reaching their twenties, most young adults have stopped growing and nutritional needs are now more geared to health and body maintenance instead of meeting the needs of growth (Krinke, 2005). Generally, caloric expenditure reaches its highest in the late adolescent and early young adult years (mostly for men still growing at this stage), yet a decrease of about 20% is seen as adulthood progresses (Krinke, 2005). According to Krinke, co-author of *Nutrition Through the Life Cycle*, “nutrition habits that are developed now [during young adulthood] are investments in future health” (2005, p. 380). Thus, in order to reduce the risk of chronic disease, prevent excess weight gain, and provide for a better quality of life, formation of healthy eating habits is crucial in the young adult years.

Importantly, the dietary habits that are developed in young adulthood are habits that are likely to remain with the individual throughout life. In addition, as young adults begin to have

families of their own, they will pass their dietary habits on to their children. Studies have shown that the risk for some chronic diseases, especially heart disease, starts early in life and progresses into adulthood (cited in Demory-Luce et al. (2004); cited in Georgiou et al. (1997)). Also, Duffey et al. (2007) indicated that evidence suggests overweight and obesity in young adulthood is likely to continue into the late adulthood years.

Adolescents and teens have been found to have some of the most concerning dietary habits and nutritionally inadequate diets out of all age groups (Stang & Story, 2005). As adolescents age, they become more autonomous and family-based meals become less frequent. Meals are often eaten outside of the home and the average teen eats at a fast food restaurant twice a week (Stang & Story, 2005). As teens reach their young adult years, they become increasingly independent and are more responsible for meeting their own dietary needs. This may mean that as teens transition to the young adult stage, their eating habits will further decrease in nutritional quality.

Hampel and Betts (1995) observed the eating habits of 18-24 year olds participating in the 1989-1991 Continuing Survey of Food Intakes by Individuals (CSFII). Based on the subjects' 24 hour recalls, over 78% of the participants were consuming diets that derived 30% or more of the total energy from fat. A study conducted by Demory-Luce et al. (2004) on 19 to 28 year old adults who had previously participated in The Bogalusa Heart Study at age 10, compared the eating habits of the participants at age 10 versus their dietary intake data reported as adults. The results showed that the participants' diet quality decreased as they became young adults. When looking at consumption of food from the five nutrient-dense food groups, at age 10, 50% of the subjects consumed at least one food from each. When the subjects reported their dietary intake as young adults, only 19% had eaten an item from each of the five nutrient-dense food groups. In

particular, as the children became young adults, consumption of fruit/fruit juices, desserts, candy, and milk decreased. On the other hand, consumption of sweetened beverages, poultry, salty snacks, seafood, cheese, and beef increased.

In 1999, data from the U.S. Department of Agriculture (USDA) Economic Research Service showed that potatoes were the primary source of vegetable intake, less than half of the recommended three servings of fruit were eaten daily, and cheese accounted for more than two fifths of dairy intake among U.S. adults. In addition, adults were averaging 64 grams of added fat and 34 teaspoons, almost three times the recommended 12 teaspoons, of added sugar each day (Mathai, 2004).

As much of the research has shown, young adults are not meeting their needs recommended by the dietary guidelines. One contribution to this finding is that young adults do not develop home meal preparation habits. Larson, Perry, Story, and Neumark-Sztainer (2006) discovered that meal preparation behaviors were performed less than once a week for most of their young adult participants, with females being much more likely to cook a meal than males. Also, only one third of females and about one fifth of males reported buying fresh vegetables at least once a week.

On the other hand, dependence on away-from-home foods is common in the young adult population. In a survey of 18,000 subjects who ate at restaurants three or more times a week, it was found that 20% of them were in their 20s (cited in Mathai, 2004). Bowman and Vinyard (2004) reported that young adults ages 20-29 were utilizing fast food about four times more frequently than the participants 55 years or older. Dobson, Mishra, and Brown (1997) researched the eating habits of young and middle aged women living in Australia. Their study revealed that middle aged women were more likely than young adult women to consume adequate amounts of

fruits, vegetables, and reduced-fat dairy. Young women, on the other hand, consumed more high fat foods, including full-fat milk, fast foods, and take away foods. Likewise, Glanz, Basil, Maibach, Goldberg, and Snyder (1998) examined the eating habits of American adults and found younger adults ate more fast food and less fruits and vegetables than older adults. Betts, Amos, Keim, Peters, and Stewert (1997) surveyed young adults on their food views and habits. Their subjects reported eating fast food an average of three times a week, and dining at a sit-down restaurant was reported an average of one time a week.

College Students. According to the 2005 U.S. Census Bureau, 8.3% of the population over the age of 18 was enrolled in college or graduate school. More specifically, of the 18-24 year old population, 35.1% were enrolled in college or graduate school (U.S. Census Bureau, 2005). Enrollment in college provides additional factors that impacts meal preparation habits and diet quality. College students often are living away from home for the first time, have time constraints, have a limited income, and have minimal living accommodations. Yet, these young adults are supposed to be receiving more education than their counterparts not attending college, which could translate into more informed lifestyle behaviors. Research that has focused on the dietary habits of college students have shown conflicting results, yet like the majority of young adults, most college students are not meeting their recommended dietary needs.

When comparing the diets of college students and college graduates with those who are not attending college, it is unclear whether or not education level increases diet quality. Georgiou et al. (1997) studied the health-related habits of college students, college graduates, and non-students of an 18-24 year old population. They found that college students and college graduates were more likely to come closer to the dietary recommendations to eat more high-fiber grains, fruits, vegetables, and low-fat meats and dairy products than non-students. Yet, other research

showed that higher education status may not be indicative of better dietary habits. Paeratakul et al. (2003) found that the highest percentage of participants reporting fast food use in a two day, 24-hour recall were those who had completed some college education.

One factor that makes a difference in the meal habits of college students is their residence. When students live on campus they are offered, and sometimes required, to purchase a meal plan option. The meal plan usually offers three complete meals, which may resemble the meals consumed when students were living at home. Also, these meals are convenient and offer many different choices. Because of these features, it appears that meal plan participation helps college students to get adequate amounts of some important food groups. A study by Brown, Dresen, and Eggett (2005) compared the diet quality among students with and without a school provided meal plan. Regardless of partaking in an on campus meal plan, the above study showed that few students were meeting their suggested servings of grains, vegetables, meat, fruit, and milk. Yet, it was found that students on the meal plan were more likely to meet their food guide pyramid goals for fruit, vegetables, and meats. On the other hand, milk consumption did not improve with meal plan participation and those students without the meal plan were more likely to meet their grain recommendations. Because, Brown, Dresen, and Eggett did not look at whole grain consumption, it is unclear whether or not the increased grain consumption is in accordance with the dietary guidelines.

For those students who reside off campus, meal preparation and meeting dietary needs is essentially their own responsibility. This may be a new practice for these young adults and something that they were previously dependant on others to provide. These factors, in part, play a role in the poor dietary habits seen in college students. The majority of college students are consuming high fat, high sodium diets, which are also low in fruits and vegetables. College

subjects, in a study done by Brevard and Ricketts (1996), were shown to be consuming diets containing 34 to 36% of daily energy intake from fat. These subjects were exceeding dietary recommendations on total fat and saturated fat. A reason for these finding may be due to the fact that fast food is a common alternative to home meal preparation and is used frequently by this population (cited in Davy, Benes, & Driskell, 2006). While studying the cooking habits of female college students, Soliah, Walter, and Antosh (2006) found that 59% of subjects reported eating out one to three times a week, while the remaining 41% ate out four or more times a week. Davy, Benes, and Driskell (2006) reported much less fast food use among their subjects who were enrolled in an introductory nutrition course at a Midwestern college. Only 15% of the 286 participants said that they typically ate fast food for lunch and 9% said they typically ate fast food for dinner. The difference between the studies may be reflected in the type or the age of students surveyed, as the nutrition students might be much more interested in healthy eating, and by the words chosen to describe fast food use.

Barriers to Food Preparation

In order to help improve the dietary quality of college students, it is important for dietetics professionals to understand why college students are not preparing their own meals and why they are so dependant on away-from-home foods. Betts et al. (1997) found that of their study's 1,482 subjects, aged 18-24, 74% claimed that nutrition was fairly or very important when it came to choosing the foods that they eat. However, research showed that the diets of young adults are lacking in nutritional quality.

Young adults may forego home meal preparation due to limitations, such as time, money, skills, and resources. Discrepancies exist between research findings as to why young adults are not cooking more frequently. Larson, Perry, Story, and Neumark-Sztainer (2006) discovered

that, of their young adult subjects, one third of males and females reported that they did not have enough time to cook meals. In addition, 23% of males and 18% of females stated that they believed themselves to have inadequate cooking skills. The last major influence that deterred home meal preparation among this population was money. Twenty-five percent of respondents claimed that they had inadequate monetary resources to buy food for preparing meals at home. Associations were made between where the young adults lived and their frequency of food preparation, as more subjects living in houses or apartments were participating in cooking than those who lived in on campus housing or with their parents. In this situation, it may be generalized that those young adults living on campus or with their parents are being provided with home prepared meals or campus meal plans, yet they are not participating in the preparation.

Similar results were reported by Horacek and Betts (1998), who found that students' dietary intake was most influenced by hunger or taste, time and convenience, value and budget. Yet, in a study by Soliah, Walter, and Antosh (2006), women college students were asked reasons why they were unable to prepare certain foods. The most common answers were that they had never been taught or that they were not interested in learning. The least common answers were limited kitchen resources and not enough money to purchase the foods.

Betts et al. (1997) surveyed students about their thoughts toward food. The subjects were stratified into three different groups; students, college graduates, and non-students. All three groups reported positive views on healthful foods and negative views of fattening foods. This, however, was not reflected in their dietary intake when asked to fill out a food frequency questionnaire. Within the student group, convenience was more important than nutrition when making dietary decisions. Students were more likely than the other two groups to report

inadequate access to cooking appliances, lack of transportation to grocery stores, inadequate money to buy foods, and lack of time for food preparation as barrier to food preparation.

Thus, it seems that additional research would enhance the ability of dietetics professionals to educate and counsel young adults. Gaining a better understanding of the meal preparation habits of those adults who are newly responsible for their own food habits would guide dietetics professionals in helping improve dietary habits in order to ensure a healthy lifestyle.

Chapter III: Methodology

This chapter begins with a discussion on the study's subject selection and a description of the subjects. This is followed by a narrative of both the instrumentation used and the data collection procedure. Next, data analysis measures will be reported. To conclude the chapter, an explanation of the study's methodological limitations will be found.

Subject Selection and Description

The population for this study was all UW-Stout students, both undergraduate and graduate, who reside off campus. Within the population, subjects were recruited, from those who were visiting the Memorial Student Center on the days that data was collected. UW-Stout students were selected because of the researcher's interest in the fellow students' habits. Only those students living off campus were included because students living on campus are provided with meal plan options. On the other hand, students living off campus are responsible for their own meal habits. Specifically, these subjects were selected because it was thought to provide the most demographical variation that could be provided in an on-campus data collection.

Instrumentation

A consent form was created for use in this study to inform the participants of the purpose of the study, time commitment, cost, risks, benefits, confidentiality, right to withdraw, and approval of the Institutional Review Board at the University of Wisconsin –Stout. The consent form was given to participants along with the survey and informed the participants that by completing the survey, they were agreeing to participate in the study (See Appendix A).

The instrument used to collect data for this study was a survey (See Appendix B). The survey contained three sections; demographics, meal habits/cooking skills, and a food frequency questionnaire. The sections of the survey dedicated to questions about meal habits and food frequency were largely modified from an existing survey, the Harvard Adolescent Food

Frequency Questionnaire. The survey was modified to better meet the needs of this study and to be more user friendly for the targeted sample. The survey contained a total of 20 questions. The demographic portion contained four questions, and specifically asked if the student lived off campus, their gender, their age, and their grade in school. The eating habits/cooking skills section contained five questions. These questions asked where the participants eat their meals, how often they eat meals prepared away from home, how often they eat fast food, if they feel they have adequate cooking skills, and what their barriers to preparing their own meals were. The last section about food frequency contained eleven questions. Four of these questions were in table format and asked the subjects to mark how often they ate selected foods in the dairy, fruit, vegetable, and grains group considering the past year. Standard portion sizes were included next to each food item to help the user better identify their frequency of consumption. The last seven questions of this section pertained to the type of certain foods that the subject uses. This was included to help identify if the subject uses low fat dairy products or whole grain items.

Data Collection Procedures

Prior to data collection, the research project was approved by the Institutional Review Board for the Protection of Human Subjects at UW-Stout (See Appendix C). Also, approval was granted for use of a table on the first level of Memorial Student Center during data collection times. In November, 2007, data collection was scheduled for three different days to ensure a varied subject group. A table was set up in Memorial Student Center on the first floor on one day and on the second floor two days. On each of the days, data was collected from 11:00 am until 3:00 pm. These hours were selected because they represent the most heavily trafficked hours in the student center and would ensure a varied sample of students who visit both in the morning

and afternoon hours. A 20 question survey was administered by the researcher to those students who were 18 years of age or older and who stated that they lived off campus and were willing to participate.

Data Analysis

The data was entered by the researcher and analyzed by a UW-Stout statistician using the computer software Statistical Program for Social Sciences (SPSS) version 15.0. All appropriate descriptive statistics, including mean, median, and standard deviation, were run on the data. In addition, a Pearson product moment correlation coefficient (r) was computed for frequency of home meal preparation and weekly intakes of fruits, vegetables, whole grains, and low-fat dairy. Also, a t-test was computed for perceived cooking ability and intakes of fruits, vegetables, whole grains, and low-fat dairy.

Limitations

Some limitations to the methodology of this study do exist. First of all, the survey was modified from the Harvard Adolescent Food Frequency Questionnaire. In order to meet the needs of the research objectives, the food frequency was modified to the extent that the reliability or validity of that survey does not apply to the one used in this project. Therefore, this particular survey has not been proven valid or reliable. Next, the subjects who chose to participate may not be a good representation of all UW-Stout students who live off campus. Not all students living off campus visit the Memorial Student Center, and there may be factors associated with the students who do visit that will provide biased results.

Chapter IV: Results

The purpose of this study was to investigate the meal preparation habits of college students as it relates to the quality of their diet. This study was conducted by use of a 20 question survey, which was administered to 30 students living off campus. This chapter discusses the survey findings, which includes information relating to demographics, meal habits/cooking skills, and food frequency of fruits, vegetables, whole grains, and low-fat dairy.

Gender, Age, Grade Level

The participants were asked for their gender, age, and grade level in survey questions numbers 2-4. Thirteen female and seventeen male students participated in the study. The subjects ranged in age from 19 to 53 years (mean=24.33). The participant's grade levels broke down as follows; three freshman, one sophomore, seven juniors, twelve seniors, and seven graduate students.

Meal Location

Subjects were asked where they usually eat breakfast, lunch, and dinner in survey question number 5. Available responses were "At home", "At school", "Don't eat this meal", and "Other". Seventy percent of participants eat breakfast at home, while 56.7% usually eat lunch at school. Ninety percent of students say they eat dinner at home. This information is found in Table 2.

Table 2

Location for Breakfast, Lunch, and Dinner

Location	Breakfast	Lunch	Dinner
At home	21	10	27
At school	2	27	0
Don't eat this meal	7	1	0
Other	0	1	1

Meal Preparation Habits

Participant's meal preparation habits were assessed by survey question number 6, which asked how many times subjects usually eat meals prepared away from home. Responses ranged from "Never/almost never" to "5 or more times per week". Table 3 contains these results.

Table 3

Usually Eat Meals Prepared Away from Home

Frequency	Breakfast	Lunch	Dinner
Never/almost never	11	3	4
1-2 times per week	12	11	14
3-4 times per week	2	6	5
5 or more times per week	4	8	5

The mean occasions that subjects usually eat breakfast, lunch, and dinner prepared away from home is 1.5, 2.58, and 2.11 times per week, respectively. Of note, 20% of participants eat breakfast prepared away from home three or more times per week, 47% of participants eat lunch

prepared away from home three or more times per week, and 33% of participants eat dinner prepared away from home three or more times per week.

Correlations between meals eaten prepared away from home and intakes of fruit, vegetable, whole grains, and low fat dairy were computed. There was a negative non-significant correlation ($r = -.266$, $p = .179$) between intake of meals prepared away from home and vegetable consumption. A positive non-significant correlation was found between meals eaten prepared away from home and fruit intake ($r = .151$, $p = .453$), low fat dairy intake ($r = .309$, $p = .117$), and whole grain intake ($r = .219$, $p = .272$).

Fast Food

The frequency of fast food intake was assessed by survey question number 7. Subjects were asked how often they eat meals from a fast food restaurant. Responses ranged from “Never/almost never” to “5+ times per week”. The results from the question are found in Table 4.

Table 4

Fast Food Intake

Responses	Frequency	Percent
Never/almost never	7	23.3
1-3 times per month	8	26.7
1-2 times per week	11	36.7
3-4 times per week	3	10.0
5+ times per week	1	3.3

In addition, correlations between fast food intake and fruit, vegetable, whole grains, and low fat dairy intakes were computed. Results showed that there was a negative non-significant

correlation between fast food frequency and vegetable intake ($r = -.192$, $p = .309$), fruit intake ($r = -.084$, $p = .660$), and low fat dairy intake ($r = -.003$, $p = .989$). There was a positive non-significant correlation between fast food frequency and whole grain intake ($r = .017$, $p = .929$).

Cooking Skills

In questions 8 and 9, participants were asked about their perceived cooking skills. Twenty-seven respondents (90%) believe that they have adequate cooking skills to prepare their own meals on a regular basis. Only three participants believed that they did not have adequate cooking skills to prepare their own meals on a regular basis. The majority of participants (66.7%) stated that limited resources did not have an impact when deciding to not prepare their own meals. Limited time was reported as one of most important reason why subjects did not prepare their own meals, as 73% rated it as having some, moderate, a big, or a major influence on their habits. Also, limited money was a top factor in meal preparation habits. Seventy-seven percent of the respondents stated that money had a least some impact on their meal preparation frequency. Fifty-three percent of students said that not wanting to prepare their own meals was somewhat of a factor. Seventy percent of participants claimed that their limited cooking skills were not a factor. In addition, an independent samples t-test was run to determine if the participants who perceived they had adequate cooking skills had higher mean intakes of fruits, vegetables, whole grains, and low fat dairy than those students who did not believe they had adequate cooking skills. The t-value for mean vegetable intake was 1.419 with a significance of .167, meaning there is no significant difference between the mean vegetable intake of the group that believe they have adequate cooking skills and the group that does not. The t-value for fruit intake was .522 with a significance of .606, showing that there is no significant difference in mean fruit intake between the two groups. As for whole grain intake, the t-value was .032 with a

significance of .974. This also shows no significant difference between whole grain intakes for the two groups. Lastly, the t-value for low fat dairy intake was .663 with a significance of .513, which also shows that there was not a significant difference in low fat dairy intake between the groups.

Vegetable Intake

Based on the food frequency questionnaire, the mean total vegetable intake that the participants eat each week was 9.70 cups. The top three most consumed vegetables among respondents were lettuce with a mean intake of 2.27 cups/week, potatoes with a mean intake of 1.84 cups/week, and carrots with a mean intake of 1.79 cups/week. Beets, zucchini, summer squash, eggplant, and yams/sweet potatoes were the least consumed vegetables.

Fruit Intake

Participants consume an average of 12.01 cups of fruit each week. The three most consumed fruits among the participants were apple juice with a mean intake of 2.12 cups/week, apples or applesauce with a mean intake of 1.91 cups/week, and orange juice with a mean of 1.78 cups/week. Plums, peaches, raspberries, blueberries, and blackberries were the fruits that respondents consumed least often.

Grain Intake

The mean grain intake per week among participants was 43.25 ounces. Of this, less than half of these ounces were found to be derived from whole grain sources (mean = 20.17). Rice (mean = 7.27 ounces/week), bread (mean = 6.61 ounces/week), and hot breakfast cereal (mean = 3.09 ounces/week) were the most frequently consumed grain foods. Fifty-five percent of participants are consuming whole grain bread, while only 6.7% of participants are eating whole grain rice. In addition, just 21.8% of participants are eating whole grain cold breakfast cereals.

Dairy Intake

The mean dairy intake per week for respondents was 20.56 cups. Over half (mean = 11.75 cups) of this intake comes from low fat dairy sources. The most consumed dairy products for the subjects were milk with a mean intake of 9.04 cups/week, cheese with a mean intake of 5.42 slices/week, and yogurt with a mean intake of 3.22 cups/week. Over half of all milk (66%) and yogurt (61%) that respondents are using is low fat or fat free. Thirty-seven percent of participants are using low fat cheese.

Chapter V: Discussion

This study looked at the meal preparation habits of college students as it relates to the quality of their diet. In addition, this study looked at fast food intake, barriers to meal preparation, and fruit, vegetable, whole grain, and low fat dairy intakes of college students. By completing this study, the researcher intended to meet the following objectives;

1. To determine if there is a positive/negative relationship between home meal preparation and the quality of the diet, including fruits, vegetables, whole grain, and low fat dairy intake, for students living off campus.
2. To determine if fast foods contribute to a significant portion of the diets of students living off campus.
3. To determine if there is a relationship between students' perceived cooking skills and dietary quality.
4. To determine if students living off campus feel that they have the adequate resources (time, money, equipment, and skills) to prepare meals at home.

A survey was completed by 30 students living off campus, which included information about demographics, meal preparation habits, fast food intake, and food frequency. This chapter will discuss the limitations to this study, the conclusions that can be drawn from the data analysis, and recommendations for further research in this area of interest.

Limitations

A main limitation to this study's results is the small sample size (n=30). Larger sample sizes tend to be much more reflective of the population, and therefore the results of this study should be viewed cautiously. Another large limitation was the nature of the survey used because it utilized a food frequency questionnaire. Participants may have overestimated or

underestimated their actual intakes of the foods examined. Also, the survey was self-administered, which relied on the fact that the participants would be able to understand the questions asked and answer honestly. Lastly, this study was conducted on one college campus, which means results cannot be generalized to all college students nationwide.

Conclusions

The results of this study show that off-campus college students largely rely on meals prepared away from home in order to meet their dietary needs. In this study, 20% of participants eat breakfast prepared away from home three or more times per week, while 47% eat lunch and 33% eat dinner prepared away from home three or more times per week. These results are similar to the finding of the study done by Soliah, Walter, and Antosh (2006) where 41% of the collegiate participants were eating out three or more times per week.

Results showed that there was a negative non-significant correlation between consumption of meals prepared away from home and vegetable intake ($r = -.266$, $p = .179$). Although the correlation is weak, the finding shows that intake of away from home meals reduces the amount of vegetables consumed in the diet. When it comes to fruits, whole grain, and low fat dairy intake, results showed weak non-significant positive correlations with consumption of away from home prepared meals. These results are in opposition of those found by Larson, Story, Eisenberg, and Neumark-Sztainer (2006) and Larson, Perry, Story, and Neumark-Sztainer (2006), which found that greater meal preparation habits were associated with greater fruit, vegetable and whole grain consumption. Discrepancies could be attributed to the limitations of this study, such as small sample size, limitations of the survey, or lack of understanding of the subjects.

When it comes to fast food in particular, this study revealed that 50% of the participants eat fast food at least once per week. Of these participants, 13.3% are eating fast food three or more times per week. Much like these results, Davy, Benes, and Driskell (2006) found that 15% of students typically eat fast food for lunch, while 9% of students typically eat fast food for dinner.

The correlations between fast food intake and intakes of fruits, vegetables, whole grains, and low dairy, revealed that there were negative non-significant correlation between fast food intake and fruit, vegetable, and low fat dairy intakes. Although the strength of all three correlations were weak, it can be shown that greater fast food intake lessens the amount of fruit, vegetable, and low fat dairy that is obtained in the diet. These findings are similar to those found by Paeratakul et al. (2003) and Bowman and Vinyard (2004), which showed higher intakes of fast food led to lower intakes of milk, fruits, and non-starchy vegetables.

When it comes to the consumption of fruits, vegetables, and low fat dairy in their diets, this study reveals that subjects are not meeting their USDA dietary recommendations each week. Also, this study shows that when it comes to fruit, vegetable, and dairy choices, participants are not making the healthiest decisions. As for grain selections, this study showed that subjects are consuming an adequate amount. Likewise, students are making good decisions by choosing nearly half of their grains to be from whole grain selections.

According to the Dietary Guidelines for Americans 2005 (USDA/HHS, 2005), adults should be consuming two cups of fruit per day. This would require an intake of 14 cups of fruit per week. Subjects in this study are consuming an average of 12.01 cups of fruit per week. Of note, two of the highest consumed fruit choices are derived from apples and orange juice. Dietary guidelines state that whole fruit intake is important, while fruit juices should be

consumed in moderation. Since fruit juices are high in sugar and low in fiber and other key micronutrients, it is concerning that college students are not only falling short on recommended fruit servings, yet they are also choosing less nutritious sources.

Two and a half cups of vegetables are recommended for adult consumption each day (USDA/HHS, 2005). Variety is important, as dark green, orange, legumes, starchy and non-starchy vegetables should all be consumed each week. In this study, the average intake of vegetables was 9.70 cups per week. This number falls short of the suggested 17.5 cups per week, as participants are only consuming 55% of their recommended amount. Variety also seems to be lacking when it comes to vegetable consumption in these subjects, as many vegetable choices, such as beets, zucchini, summer squash, egg plant, and sweet potatoes/yams, were reported as being consumed very infrequently. Lettuce and potatoes, two vegetables that lack substantial micronutrient content, make up 42% of all vegetable intakes for participants each week.

Whole grain choices should make up half of all adults grain servings for each day. This means that a minimum of three whole grain servings should be consumed each day by adults (USDA/HHS, 2005). According to this, adults should have at least 21 ounces of whole grains each week. Participants in this study are consuming adequate grain servings, with a mean intake of 43.25 ounces per week. Also, participants claim to be choosing almost half of those servings to be whole grain selections, as the mean intake of whole grain selections were 20.17 ounces per week.

Adults should be consuming three cups of low fat milk or dairy equivalents each day (USDA/HHS, 2005). This study showed that participants were consuming almost three daily servings of dairy each day, as the mean weekly intake was 20.46 cups. Yet, only 11.75 cups were

from low fat options. Over one fourth of the total dairy intake in these participant's diets is coming from cheese and only 37% of participants reported using low fat cheese.

Results from this study are similar to the findings of the 1999 USDA Economic Research Service, which showed that adults are not consuming enough fruit servings, potatoes are a primary source of vegetable selections, and that cheese accounts for a large part of dairy intake (Mathai, 2004).

Although the results of this study show that many students rely on away from home prepared meals, 90% of respondents believe they have adequate skills to prepare their own meals on a regular basis. Limited time, resources, and money were rated by most participants as having an impact on the meal preparation habits. Results from this study somewhat differed from those results found by Larson, Perry, Story, and Neumark-Sztainer (2006), which found that nearly one fourth of male and one fifth of female participants did not believe they had adequate cooking skills. Likewise, these participants reported that limited time and money had less of an impact on meal preparation habits.

In addition, a t-test showed that there were not significant differences in fruit, vegetable, whole grain, and low fat dairy intake between those students who claimed to have adequate cooking skills and those who did not. This finding could show that students who claim to have adequate cooking skills are not actually preparing their own meals more frequently than those who claim to not have adequate cooking skills. This could also be attributed to the fact that those who feel they have adequate cooking skills may not be preparing healthy, balanced meals.

In conclusion, this study finds that the diets of the college student participants in this study are lacking in the recommended intakes of fruits, vegetables, and low fat dairy. In addition, these subjects are not making healthy choices when it comes to variety of these foods and

choosing the most nutritious sources. This study has also shown that although the majority of respondents claim to have adequate cooking skills, they rely heavily on meals prepared away from home in order to meet their dietary needs. Previous studies have shown that there is a link between consumption of meals prepared away from home and lesser intakes of fruits, vegetables, whole grains, and dairy. In this study, time, money, and resources were listed as major barriers for not performing home meal preparation tasks. In order for nutrition professionals to help improve this population's eating habits, measures should be taken to educate young adults on how to make quick, simple, inexpensive, healthy meals. Nutrition education in high school or the first year of college should be required in order to teach this population how to overcome their meal preparation barriers in order to improve the quality of their diets as they transition into adulthood.

Recommendations for Future Studies

- Include a larger sample size of college students
- Utilize food diaries in order to obtain dietary habits instead of the food frequency questionnaire
- Administer the surveys on a one-to-one basis to help participants to better understand the questions
- Include further survey questions on meal preparation habits to explore the habits of participants more in-depth
- Include further survey questions on meals eaten away from home to explore where participants are eating
- Include further survey questions on nutritional knowledge of participants

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Appendix A: Consent Form

Consent to Participate in UW-Stout Approved Research

Title: Meal Preparation Habits and Diet Quality of College Students

Investigator: Michelle Ann Jensen
651-341-9366

Description: The purpose of this study is to identify food preparation and eating habits of college students in order to help health care professionals, especially in the field of nutrition, aid this age group in improving dietary quality. Data will be collected from UW-Stout students living off campus by use of a 20 question survey. The survey will include information on demographics, dining habits, and food frequency.

Risks and Benefits: This survey has the potential to cause emotional distress to participants due to the sensitive nature of some questions involving eating habits. The survey was designed to cause as little emotional risk as possible and the risk is minimal to participants. This survey will benefit society, as it will help health care professionals to be more informed on the eating habits of college students. In turn, these professionals will be better equipped to educate and counsel persons of this age group on improving eating habits to provide for a healthier future.

Time Commitment and Payment: The time to complete this survey will be approximately 10 minutes. The time committed by participants is greatly appreciated.

Confidentiality: Participants' names will not be included on any of the documents. Some demographic information may have the potential to provide identifying information about participants, but efforts will be made to ensure this does not happen. All data will be collected and coded only by the investigator and no specific information about a participant will be discussed or shared. Following the data analysis, the surveys will be shredded and disposed of.

Right to Withdrawal: Participation in this study is completely voluntary. The choice not to participate will not result in any adverse consequences. However, should you choose to participate and wish to later withdraw from the study, there is no way to positively identify your document after it has been turned in.

IRB Approval: This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

Investigator: Michelle Ann Jensen
651-341-9366
jensenmi@uwstout.edu

IRB Administrator
Sue Fowell, Director, Research Services
152 Vocational Rehabilitation Bldg.
UW-Stout Menomonie, WI 54751
715-232-2477
foxwells@uwstout.edu

Advisor: Dr. Carol Seaborn
715-232-2216
seabornc@uwstout.edu

Statement of Consent: All participants in this study must be 18 years of age or older. By completing this following survey you state that you are at least 18 years of age and you agree to participate in the project, Meal Preparation Habits and Diet Quality of College Students

Appendix B: Survey

This research has been approved by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46.

By completing this survey, you agree to participate in the project, Meal Preparation Habits and Diet Quality of College Students. In addition, by completing this survey, you are stating that you are 18 years of age or older and that you live off campus.

Please place a check mark next your answer. Please write short answer response on the line provided for questions prompting you to do so.

General Information

1. Do you live off campus? YES NO
2. Gender? FEMALE MALE
3. Age? _____ years
4. Grade level?
- Freshman Junior Graduate Student
- Sophomore Senior

Eating Habits

Please put an X mark under your answer of choice.

Example: If you usually eat breakfast at school, then your answer should look like this;

	At home	At school	Don't eat this meal	Other
Breakfast		X		

5. Where do you usually eat the following meals. Check the location for each meal.

	At home	At school	Don't eat this meal	Other
Breakfast				
Lunch				
Dinner				

6. How many times (including weekdays and weekends) do you usually eat each of the following meals prepared away from home?

	Never/almost never	1-2 times per week	3-4 times per week	5 or more times per week
Breakfast				
Lunch				
Dinner				

7. How often do you eat meals from a fast food restaurant?

_____ Never/less than once per month _____ 1-2 times per week _____ 5+ times
per week
_____ 1-3 times per month _____ 3-4 times per week

8. Do you feel that you have adequate cooking skills to prepare your own meals on a regular basis?

_____ YES _____ NO

9. What is your main reason for not preparing meals for yourself? Rank each choice from 1-5, with 1 representing a factor that has no impact on your meal preparation habits and 5 representing a large factor that impacts your food preparation habits.

	1 (not a factor)	2 (some factor)	3 (moderate factor)	4 (big factor)	5 (major factor)
Limited resources (kitchen space, appliances, transportation)					
Limited time					
Limited money					
Limited skills (grocery shopping, cooking, etc.)					
Do not want to					
Other (specify) _____					

How often do you eat the following foods?

Considering the past year, how often do you eat the following foods?

Place an X under your answer of choice. Use the serving size that follows each food in parentheses to guide how often/how much of each food you eat.

10. Vegetables	Never/less than 1 per month	1-3 per month	1 per week	2-4 per week	5+ per week
01. Tomatoes (1 medium, 1/2 cup sliced)					
02. Tomato/spaghetti sauce (1/2 cup)					
03. String beans (1/2 cup)					
04. Broccoli (1/2 cup)					
05. Beets (1/2 cup)					
06. Corn (1 ear, 1/2 cup)					
07. Peas or lima beans (1/2 cup)					
08. Mixed vegetables (2/3 cup)					
09. Greens (spinach) (1 cup raw, 1/2 cup cooked)					
10. Peppers (red, yellow, green) (1/2 cup)					
11. Yams/sweet potatoes (1 small, 1/2 cup)					
12. Potatoes (baked, boiled,					

11. Noodles/pasta (1 cup cooked)								
12. Other whole grains (kasha, couscous, bulgur) (1 cup cooked)								
13. Popcorn (3.5 cups popped)								
14. Crackers (5 medium)								

13. Dairy	Never/less than 1 per month	1-3 per month	1 per week	2-3 per week	4-5 per week	1 per day	2-3 per day	4+ per day
01. Milk (8 ounces)								
02. Chocolate milk (8 ounces)								
03. Instant breakfast drink (8 ounces)								
04. Yogurt (1 cup)								
05. Frozen yogurt (1/2 cup)								
06. Pudding (1/2 cup)								
07. Cottage cheese (1 cup)								
08. Ricotta cheese (1/2 cup)								
09. Cheese (1 slice)								

14. What TYPE of milk do you usually use?

Whole milk 1% milk Don't know
 2% milk Skim or nonfat Never use milk

15. What TYPE of yogurt, pudding, cottage cheese, and other dairy products do you usually use?

Regular Nonfat Never use these foods
 Low fat Don't know

16. What breakfast cereal do you usually eat?

17. What TYPE of bread, pita bread, biscuit/rolls, English muffins, and bagels do you usually use?

White Whole wheat/whole grain Never use these
 foods
 Wheat Don't know

18. What TYPE of pancakes or waffles do you usually use?

Regular Multigrain Never use these foods
 Wheat Don't know

19. What TYPE of rice or noodles/pasta do you usually use?

White Never use these foods

_____ Brown/whole wheat _____ Don't know

20. What TYPE of crackers do you usually use?

_____ Regular _____ Whole wheat/whole grain _____ Never use
these foods _____ Wheat _____ Don't know

**THANK YOU FOR YOUR TIME. YOUR CONTRIBUTION IS GREATLY
APPRECIATED!**

Appendix B: IRB Approval



Research Services
152 Voc Rehab Building

University of Wisconsin-Stout
P.O. Box 790
Menomonie, WI 54751-0790

715/232-1126
715/232-1749 (fax)
<http://www.uwstout.edu/rs/>

Date: October 5, 2007

To: Michelle A. Jensen

Cc: Carol Seaborn

From: Sue Foxwell, Research Administrator and Human Protections Administrator, UW-Stout Institutional Review Board for the Protection of Human Subjects in Research (IRB)

Subject: Protection of Human Subjects

Your project, "*Meal Preparation Habits and Diet Quality of College Students*," has been approved by the IRB through the expedited review process. This protocol has been approved provided the item stated below is addressed. Then the measures you have taken to protect human subjects are adequate to protect everyone involved, including subjects and researchers.

Overall reviewer comment:

There is a concern about participants being provided "baked goods" following their participation in the survey. One is an issue about how the baked goods are being paid for (cannot use University Funds) and the other is a liability issue regarding the safety of the baked goods. Please remove all reference to baked goods being offered to participants in your documents. Send your revision to Research Services - 152 Voc Rehab. or email it to Lou Simpson at simpsonl@uwstout.edu.

Please copy and paste the following message to the top of your survey form before dissemination:

This research has been approved by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46.

This project is approved through September 27, 2008. Future modifications to this approved protocol need to be approved by the IRB. Research not completed by this date must be submitted again outlining changes, expansions, etc. Federal guidelines require annual review and approval by the IRB.

Thank you for your cooperation with the IRB and best wishes with your project.

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