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Ingrouille, Kristina. ***Effect of Caffeinated Beverages upon Breakfast Meal Consumption of University of Wisconsin-Stout Undergraduate Students***

Abstract

The purpose of the study was to determine if caffeinated beverages were replacing breakfast meals among UW-Stout undergraduate students. Data were collected through an online Qualtrics survey. There were 16 questions pertaining to estimated frequencies and percentages of breakfast intake, food groups students chose to consume for breakfast meals, factors affecting breakfast consumption, the caffeinated beverages consumed, and whether breakfast was being replace with caffeinated beverages.

Results from the study indicate that grains (83%) were the most consumed food group at breakfast meals, followed by dairy (68%), fruit (57%), protein (52%), and vegetable (8%). The most commonly consumed caffeinated beverage included coffee (41%), followed by soda and energy drinks (19%), and tea (15%). Influences for students' breakfast consumption indicated "time" to be the largest factor (81%), followed by "convenience" (69%), "taste preference" (59%), and "health" (57%). Overall the study found 60% of the students consumed breakfast meals four to seven days a week. Only one percent replaced breakfast with caffeinated beverages 6-7 times per week and 2% four to five times a week. Thus, it was concluded UW-Stout students are not replacing breakfast with caffeinated beverages to any great extent.

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I would like to thank my extended family and dear friends that have supported me along the path and walked beside me through my highs and lows.

Last, to thank my Lord and Savior Jesus Christ who is the foundation in my life. For the everlasting love, faith, and hope I have received through him.

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Chapter I: Introduction

Breakfast has always been considered the most important meal of the day. The phrase is being verified by scientific research. Studies are finding that eating breakfast can have multiple health benefits including better nutritional status, lower body mass index, reduced chronic degenerative disease such as cardiovascular disease and type 2 diabetes. Breakfast consumption is also associated with regular exercise patterns, and healthier food choices (Kamada, Truman, Bold, & Mortimore, 2011).

Caffeine has been used for medicinal and therapeutic purposes for many years and can be traced back to the sixth century B.C. (Reid, n. d.). Coffee beans, kola nuts, and cacao contain caffeine, and coffee shops started to gain popularity in Europe in 1820. (Reid, n.d.). In 1987 Red Bull was the first energy drink introduced in Austria and entered the USA market in 1997 (Sadowska, 2012). Consumption of caffeinated beverages in the US has been increasing yearly. Health claims for caffeinated beverages include increased energy, alertness, and mood. There are many sources of caffeinated beverages: tea, soda, coffee, and energy drinks are just a few that fall into this category.

Statement of the Problem

Caffeinated beverages have long been used for added energy and alertness and have allowed people to live by the clock rather than natural sleep cycles. Over recent years the caffeine beverage industry has been growing at rates faster than at any other time. With demands of school, work, breakfast choices, and students' social lives, energy drinks, soda, and coffee beverages seem to be an alternative readily available to replace breakfast for energy and alertness. The importance of eating a healthy breakfast is crucial in promoting optimal energy balance throughout the day and keeping blood glucose levels stable. The MyPlate guidelines

through the USDA recommend the five food groups to be consumed at every meal (USDA, 2013). Concerns of skipping breakfast would include overeating in the later part of day, high caffeine intake in place of food, lacking crucial nutrients in daily intake, fatigue, lack of focus, and length of time without food which could be from dinner the previous day until lunch if breakfast was skipped.

Purpose Statement and Objectives

The purpose of this study was to determine whether or not caffeinated beverages are replacing breakfast meals among UW-Stout undergraduate college students through measuring college students' breakfast and caffeine intake.

An increase of caffeinated beverage marketing and consumption over the years has been particularly geared toward the adolescent population. The main objectives of the study were to:

1) Determine the frequency of breakfast consumption of UW-Stout undergraduate students
2) Determine factors affecting breakfast consumption among UW-Stout undergraduate students.
3) Determine food groups consumed at breakfast meals among UW-Stout undergraduate students.
4) Determine if caffeinated beverage are consumed during breakfast meals among UW-Stout undergraduate students.
5) Determine if caffeinated beverages are replacing breakfast meals among UW-Stout undergraduate students.

Definition of Terms

The following terms are provided for clarity in understanding the thesis:

Caffeinated beverage. A drink which contains caffeine, a stimulant which is legal in most countries.

Caffeine. Is a bitter, white crystalline xanthine alkaloid which acts as a stimulant drug and is used medicinally as a stimulant and diuretic. It is found in seeds, leaves, and fruit of certain plants.

Recommended daily allowance. Refers to the overall average of daily dietary intake needed to meet nutrient requirements of 98% of healthy individuals.

Energy drinks. Refers to food products in which the main source of energy are carbohydrates, whose energy value is not lesser than 80kJ/100ml, and which contain one or more of the following compounds: caffeine, guarana, inositol, glucuonolactone, or taurine. (Sadowska, 2012)

Jolt and crash episodes. Reference to a feeling of increased alertness and energy (the jolt) followed by a sudden drop in energy (the crash). (Malinauskas, Aeby, Overton, Aeby-Carpenter, & Heidal-Barber, 2007)

Lower glycemic index foods. Glycemic index is a measure of how quickly levels of glucose will raise in blood after eating a type of food. It measures how each gram of carbohydrate in a specific food raises an individual's blood sugar levels. Lower glycemic foods release glucose slower than high glycemic foods.

Stimulant. Class of drugs which increase feelings of well-being, elevate mood, and increase alertness and energy.

Assumptions and Limitations

It is assumed that students answered the survey questions truthfully and to the best of their knowledge. It was assumed that college students consume breakfast meals in the morning

and possibly replace meals with caffeinated beverages. Limitations include a sample population taken from western Wisconsin and a population of small sample size, which limit the generalization of the findings to other college student populations.

Chapter II: Literature Review

The chapter will discuss USDA dietary guidelines, breakfast intake recommendations, benefits of breakfast intake, and breakfast eating patterns among college students. Trends in caffeine consumption and caffeine intake of college students will also be covered.

Dietary Guidelines

The USDA has provided food guidance on healthful dietary patterns since 1916. The Dietary Guidelines for Americans are issued and updated every five years by the Department of Agriculture (USDA) and the Department of Health and Human Services (HHS) (USDA, 2013). The guidelines were first implemented in 1980 and have been revised and updated seven times. The Dietary Guidelines for Americans are for Americans two years of age and older. Dietary guidelines are set in order to provide Americans with professional advice on making informed food choices and on being physically active. The goals of the dietary guidelines are to promote overall health by maintaining a healthy weight while reducing the risk of chronic disease. The most recent guidelines were set in 2010 and emphasize three main goals:

1. Balance calories with physical activity to manage weight
2. Consume more of certain foods and nutrients such as fruits, vegetables, whole grains, fat-free and low-fat dairy products, and seafood
3. Consume fewer foods with sodium (salt), saturated fats, trans fats, cholesterol, added sugars, and refined grains (USDA, 2013)

While these goals are to help people towards healthy lifestyle and food choices there are two main concepts that are presented through the dietary guidelines 1) maintain calorie balance over time to achieve and sustain a healthy weight and 2) focus on consuming nutrient-dense foods and beverages (USDA, 2011).

Breakfast Consumption

It has been found that up to 30% of adults in the West typically skip breakfast meals and many of the reasons include: time restraints, sleeping in, lack of motivation to prepare foods, weight loss, smoking, and low appetite (Halsey et al., 2011). There is not a basic consensus on what foods should be consumed at breakfast, and many factors play a role in dietary decisions of individuals. Research has found that over the past 20 years the frequency of breakfast consumption has dropped dramatically. This drop has been proposed to parallel the increase in obesity, with evidence offered that the frequency of skipped breakfast is 75% for overweight and older adults (Affenito, 2007). Utilizing data from NHANES 1999-2002, it has been found that young adults had higher nutrient intake and better diet quality than those who skipped breakfast (Deshmukh-Taskar, Radcliffe, Liu, & Nicklas, 2010).

The time lapse between the meal from the previous night to when an individual wakes is approximately twelve hours, during this time the body is continuously burning energy. When breakfast is skipped in the morning, the body relies upon body stores of glucose, which may mean less energy reaches the brain (Ozdogan, Ozcelik, & Surucuoglu, 2010). Blood glucose levels are an important factor in maintaining energy throughout the day. Low glucose release from body stores has the potential to decrease energy levels. The type of food eaten at breakfast also impacts energy level during the day. Kamada et al. (2011) researched if low glycemic foods eaten at breakfast aided in increased and sustained energy levels. It was found that consumption of lower glycemic foods such as rolled oats and whole grains along with protein at breakfast meals aided in higher energy levels in the day keeping blood glucose levels more controlled (Kamada et al., 2011). Zeng, Li, Xiong, Su, & Wan, (2011) advised that in respect to energy expenditure, protein has the highest and most sustained thermic effect out of the macronutrients,

with carbohydrate and fat following. Protein has also been shown to increase satiety more so than carbohydrates and fat which in return may reduce overall energy intake.

Benefits of Breakfast Intake

Studies have shown that eating breakfast has multiple health benefits, Gibson and Gunn (2011) determined that overall eating breakfast was associated with higher carbohydrate and lower fat intake over a 24-hour period when compared to adults who skipped breakfast. When going without food from the previous dinner meal to a breakfast meal the next day, the body goes through a long span of time without nutrients. It has been found that breakfast consumed in the morning is particularly satiating when compared to other meals and can also aid in the reduction of overall energy intake in the day (de Castro, 2004). The study found that participants who did not eat breakfast foods in the morning had lower micronutrient intake when compared to participants who consumed breakfast (de Castro, 2004). Food intake plays a large part in mental health as well. Lombard (2000) maintained that breakfast consumption is associated with elevated moods and cognitive performance. Bamber, Stokes, and Stephen (2007) reported that dietary patterns including meal times and eating locations can have an influence on overall mental health, and depressive symptoms. Consumption of breakfast, lunch, and dinner were found to be health promoting behaviors that had negative associations on depressive symptoms. Similar findings were also reported by (Fulkerson, Sherwood, Perry, Neumark-Sztainer, & Story, 2004).

College students represent a significant part of the population. Adolescents are trending towards caffeinated beverage intake, fast food restaurants, and convenient ready to eat options. Adaption from high school to college can be a challenge for students along with added stressors of homework deadlines, work schedules, living arrangements, extracurricular activities, and

social demands which can weigh heavily on food choices and food intake. With the changes of environment, college students' routine meal times and lifestyles change from that experienced in high school. Class schedules may interfere with regular meal times from day to day. The new environment faced by college students brings new tasks and while trying to adapt, they may also change previous habits as well as diet patterns and intake.

Many factors influence college students' decisions on food choices which include: convenience, time, location, cost, energy, taste, and health. Because of the change of environment, taste, time or cost may be more important to students than the nutritional value of what they eat or drink (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). The diet intake of students can have an impact on future risk factors associated with poor food choices including cancers, diabetes, hypertension, obesity, and cardiovascular disease. The college age is one of the more crucial times for specific nutrients to be consumed for health in later years. Calcium is one nutrient among many others which can have a lasting impact on overall health. When studying overall meal intake throughout the day, breakfast was found to be the most skipped meal (Felinic, Nola, & Matanic, 2008).

Breakfast Eating Patterns of College Students

Breakfast habits are formed in the early stages of children's lives and are carried through into adulthood. In a study conducted on college female students, it was found that 44.1% of 145 women ate breakfast every day of the week, and 11% ate breakfast only on weekends (Ozodogan, Ozcelick, & Surucuoglu, 2010). With more than half of the female students in the study skipping breakfast, there is concern that crucial nutrients not being consumed. Inadequate nutrients and energy could lead to difficulties in maintaining cognitive functioning for studying and an inability to maintain energy levels throughout the day. Other studies show even higher

incidence of breakfast skipping. Felinic, Nola, & Matanic (2008) conducted a study that found 77.5% of college students skip breakfast meals, and breakfast was the most skipped meal of the day.

Sun and Yang (2013) found that Mongolian Medical students in their first year of education were more likely to consume breakfast meals than those students who were in their second to fourth years. A study at Ankara University looked at breakfast eating habits of the female college students. Ozodogan, Ozcelick, & Surucuoglu (2010), found that 45.5% of female students had three meals a day, and 44.8% had regular breakfast consumption. The female students were asked the reasons why they skipped breakfast and lack of time showed to be the leading cause (20.7%), followed by sleeping in (17.2%), and disliking eating early in the morning caused 11.1% to of students to skip breakfast meals

Negative effects associated with breakfast skipping varies among students. Ozodogan, Ozcelick, & Surucuoglu (2010) found in the study conducted that 75.3% of students skipping breakfast experienced hunger, 71.6% of students experienced weariness, and 48.1% experienced attention deficit. Wesnes, Pincock, Richardson, Helm, & Hails (2003) also concluded that skipping breakfast caused memory loss and attention deterioration. Skipping breakfast was seen to decrease the amount of daily vitamin D and calcium intake of a group of Brazilian students ages 16 to 20 (Peters, Verly, Marchioni, Fisberg, & Marini, 2011). The students who consumed breakfast meals (88.1%) had significantly higher ($P < 0.001$) mean calcium and vitamin D intake than those who skipped breakfast meals.

The time of day food is consumed was seen to have an effect on individuals' overall daily food intake. A study by de Castro (2003) discovered that the proportion of food intake in the

morning was negatively correlated with the overall food intake throughout the day, and the proportion of food intake late at night had a positive correlation with overall intake.

Caffeine Beverage Trends

The caffeinated beverage market has grown over the last decade. Red bull was first introduced to the energy drink market in 1997, with 500 new energy drinks being introduced worldwide in 2006 (Malinauskas et al., 2007). A leading target population for these beverages has been focused on young adult consumers. Lack of regulatory oversight has given rise to aggressive marketing in many countries. Energy drinks typically contain 80 to 141 mg of caffeine per 8 fluid ounces, this amount is equivalent to a cup of coffee or two 12-ounce cans of caffeinated Mountain Dew (Malinauskas et al., 2007). Energy drinks contain large doses of caffeine which is often accompanied by large doses of sugar. In an 8-ounce Monster energy drink there are up to 24 grams of sugar (12% sugar concentration). Recently there has been an increase in sugar-free options among energy drinks and caffeinated beverages. (Malinauskas et al., 2007).

Caffeinated Beverage Risks and Benefits

There is evidence that caffeine can benefit cognitive performance (Scholey & Kennedy, 2004). In the study conducted by Scholey and Kennedy (2004), a caffeinated beverage improved secondary memory and accuracy of attention performance. Positive effects from caffeine consumption normally occur post-consumption, with increase of attention, enhanced arousal and mood states, and enhanced motor activity (Keast, Sayompark, Sacks, Swinburn, & Riddel, 2011).

The caffeine provided in energy drinks can exceed the necessary amount needed to gain the beneficial effects. Smit and Rogers (2000) found 12.5 to 100mg of caffeine giving the

beneficial effects. Once this threshold is passed negative affects begin to take place within the body. The study conducted by Malinauskas et al. (2007) found that fifty percent of the college students consuming energy drinks drank two or more energy drinks while working on a major project or studying for an exam. The study also found about thirty-six percent of students drank two or more energy drinks due to insufficient sleep, driving long periods of time, or for energy. Side effects among the college student participants drinking energy drinks included heart palpations, jolt and crash episodes, and headaches (Malinauskas et al., 2007).

Although caffeinated beverages have been found to have benefits, there are a number of adverse effects associated with their consumption. Malinauskas et al. (2007) found that weekly jolt and crash episodes among college students consuming caffeinated beverages were experienced by twenty nine percent of the consumers with headaches and heart palpations among the symptoms reported. The research indicated that many caffeine beverage and energy drink users do not know the ingredients or caffeine content within the beverages they consume. Media messages were the leading source of information for one third of college students when choosing caffeinated beverages including energy drinks (Attila & Cakir, 2011). A study conducted by Clauson, Shields, McQueen, and Persad (2003), found that adverse effects of insomnia, nervousness, headache, and tachycardia were associated with caffeine from energy drink consumption. Another study also discovered four documented reports of caffeine-associated deaths, as well as four other cases of energy drink induced seizures (Iyadurai & Chung, 2007). An added risk factor associated with caffeinated beverage intake includes the high amount of added sugars. McGartland et al. (2003) states that caffeine in beverages suppress the sweetness in sugar-sweetened beverages, and due to this, more sugar is needed to maintain the equivalent sweetness. A study conducted by Keast et al. (2011) further discovered that removal of caffeine

from sugar-sweetened beverages allowed a reduction of sucrose by 10.3% without affecting the overall taste. Sugar is added to caffeinated beverages in order to mask the caffeine flavor or bitterness. According to NHANES, the excess energy sugar-sweetened beverages contain due to added caffeine is equivalent to 1.1 years of secular weight gain for children and 2.08 years for adults. A reduction of 10.3% of sucrose from the caffeinated sugar-sweetened beverages would result in a 56kJ/day energy reduction (Keast, et al, 2011).

The amount of caffeine in a caffeinated beverage is difficult to determine, especially if it was purchased at a coffee house, or depending on the way it was brewed. Many herbal ingredients included in energy drinks have therapeutic effects. Guarana is another form of caffeine that is not always included in the caffeine content on labels of energy drinks (Seifert, Schaechter, Hershorin, & Lipshultz, 2011). Through behavioral studies caffeine has also been shown to promote a dependence with consumption (Hughes, Oliveto, Bickel, Higgins, & Badger, 1993).

Caffeine Intake Patterns Among College Students

Many students tend to try caffeinated beverages during adolescent years, and college offers a time when caffeine is readily available. Attila and Cakir (2011) found that sixty percent of first time energy drink users were in their college years. In a study conducted by Malinauskas et al. (2007) fifty-one percent of participants (n=253) had consumed more than one energy drink each month during the semester. The study concluded that sixty-seven percent of the students were consuming caffeinated beverages, specifically energy drinks, due to insufficient sleep, and sixty-five percent due to needing an increase in energy. Frequency of energy drink consumption among college students was examined by Attila and Cakir (2011). The study found that energy drink consumption among fourth-year college students was higher among art marjors, athletics,

and those who did not consume breakfast meals regularly. Reasons the college students claimed to be consuming energy drinks included gaining energy, staying awake, and boosting sports performance.

Kucer (2010) conducted a study on Turkish University students and found a significant increase of fatigue, headache, sleepiness, drowsiness, and irritability among students consuming daily caffeine amounts of > 200 mg, while students with < 200 mg of caffeine daily intake did not. In the study, students' caffeine consumption ranged from 0 mg to 500 mg per day, with forty- nine percent drinking 200 mg to 500 mg of caffeine per day. This amount of caffeine far exceeds the amount needed for beneficial affects to take place and gives rise to increased adverse effects. There is no requirement of caffeine for humans, but studies have shown that low quantities of 12.5 to 100 mg of caffeine have shown improvements on mood and cognitive performance (Smit, & Rogers, 2000).

Chapter III: Methodology

This study examines whether University of Wisconsin Stout students are replacing breakfast meals with caffeinated beverages. College students are faced with daily stressors and time management is a large part of accomplishing tasks such as school projects, homework, and extracurricular activities. Caffeinated beverages consumption has been increasing within the last years, and with the target population being young adults, college students can find convenient ways to gain quick energy. For that added boost of energy, students have been increasingly turning to caffeinated beverages to achieve the benefits they claim to provide. With breakfast being one of the most important meals of the day and also one of the most skipped meals throughout the day this study examines whether or not breakfast meals are being replaced by caffeinated beverages and if so, the reasons for this.

Subject Selection and Description

The study was approved by the UW-Stout Institutional Review Board before data was collected from the subjects (Appendix A). Subjects selected for the study consisted of undergraduate students attending the University of Wisconsin-Stout. The sample size was a 15% stratified random sample including freshmen, sophomores, juniors, and seniors, eighteen years of age or older. Utilizing this method there was approximately 1200 students invited to take the survey. With the response rate at 20-30% the anticipated responses would be between 240 and 360. Students were sent an on-line survey with a consent form (Appendix B) to read prior to taking the study and proceeded to participate voluntarily. A total of 190 participants entirely completed the survey.

Instrumentation

The survey for the study was developed using the University of Wisconsin survey tool Qualtrics (Appendix C). The 16-question survey was developed in order to research if UW-Stout students are supplementing breakfast meals with caffeinated beverages. Demographics were collected consisting of age, gender, year in school, undergraduate major, and living status on or off campus. Data were be collected through an online Qualtrics survey distributed to undergraduate students of 18 years and older. The 16 questions pertained to estimated frequencies and percentages of breakfast intake, caffeine intake, and behaviors as to why they have made those choices and if economic, financial, or personal choices were involved in these choices. Students were asked to take the 5-10 minute survey and submit their answers.

Students were asked how often they eat breakfast during the week, and what food groups were primarily eaten. Students were informed to select all the food groups that applied. Questions on caffeine intake were asked including if caffeinated beverages were consumed with breakfast. The primary focus of the study was asked of the students in the question of how often they drank caffeinated beverages in place of breakfast meals. Students were then asked the type of caffeinated beverages they preferred to replace breakfast meals with and to select all that applied. A general question was asked as to what the students preferred in the morning, eating breakfast, drinking caffeinated beverages, both, or neither. In determining reasons why students skipped breakfast during the week, they were asked to select all the options that applied including time restraints, cost, not convenient, sleeping in, early classes, work, and other reasons. In understanding how much caffeinated beverages were consumed with breakfast, students were asked to select the amount drank with ranges from less than one cup to more than six cups. Influences of food and beverage choices at breakfast meals were asked and students were to

select all that applied including time, money, convenience, location, taste preferences, and health reasons. To further understand why college students chose caffeinated beverages in the morning with breakfast, students were asked to select all the reasons that applied, including stress, energy, taste, convenience, location, habit, calories, and other reasons.

Data Collection

Students received an email prompting them to the online survey through Qualtrics and were first directed to the implied consent form for full understanding of the survey. Surveys were emailed on February 27th 2013. A reminder was sent via email on March 7th, 2013 reminding students to take the survey if they had not done so yet. Data were collected until March 25th, 2013. Students were presented with an implied consent form prior to taking the survey, which provided information about the study, the time commitment for taking the survey, the students confidentiality, and the rights to withdraw at any time. Students were provided with contact information for both the researcher and advisor of the study.

Data Analysis

The descriptive statistics of frequencies and percentages were conducted through Qualtrics. Data were based off of total responses for the specific question asked. Frequencies and percentages were obtained for the following: How often do you eat breakfast during the week, what food groups do you normally eat at breakfast, do you drink caffeinated beverages with your breakfast, how often do you drink caffeinated beverages in place of breakfast meals, what type of caffeinated beverages do you replace breakfast meals with, what do you prefer in the morning, do you skip breakfast during the week due to the following, how many cups of caffeinated beverages do you drink with breakfast, what influences your food and beverage breakfast choices, and what are the main reasons you choose to drink caffeinated beverages in the morning

with breakfast? Data collected for student demographics were obtained through percentages and frequencies for the following questions: do you live on or off campus, what is your age, what is your gender, what year of school are you in, and what is your major?

Limitations

A limitation to the study was the knowledge base of the students taking the study as students may not be aware of what constitutes a "healthy" or appropriate servings sizes. Another limitation was that the questionnaire was not pre-tested with a similar group to identify problem questions. An example would be Question 11 which stated "What age did you start consuming caffeinated beverages." This question could have been more effective if worded differently and if more descriptive forms of caffeinated beverage had been provided. The sample was based on one population of University of Wisconsin-Stout undergraduate students which limits the generalization to other college students. Another limitation is that the study is based in only one geographical area of Wisconsin and thus the data cannot be widely generalized to other college campuses.

Chapter IV: Results

The study was conducted to determine if UW-Stout undergraduate students are replacing caffeinated beverages for breakfast meals. The study measured students' caffeine beverage and breakfast intake, as well as influences upon these choices. An on-line survey was sent to a random selection of students who were 18 years or older. Results were then analyzed through the on-line survey program Qualtrics.

Demographics

There were 206 on-line surveys started and 190 on-line surveys completed. One half of the sample resided on campus and the other half resided off campus. Ninety (47%) of the participants were males and 100 (53%) were females. The number of participants by year of school classification as freshmen, sophomore, junior, and senior were 47, 37, 37, and 71, respectively. Ages of the students ranged from 18-20 years (*n*=88/46%), 21-23 years (*n*=75/39%), 24-26 years (*n*=21/11%) and 27 years and older (*n*=7/4%). Forty-one of the undergraduate majors on the UW-Stout campus as of June 2012 were represented. Only three majors were not represented. Graphic Design (*n*=13), Applied Science (*n*=12), Hotel, Restaurant and Tourism Management (*n*=11), Business Administration (*n*=9), Dietetics (*n*=9), Engineering Technology (*n*=9), Human Development (*n*=9) and Family Studies (*n*=9), were the majors that had the largest number of participants.

Influences on Food and Beverage Choices

Influences upon food and beverage choices were requested of participants. Participants were to mark all the influences that applied to them. The top response influencing beverage choice was "time" with 153 responses (81%), followed by "convenience" with 131 responses

(69%), “taste preference” with 111 responses (59%), “health” with 108 responses (57%), “money” with 97 responses (51%), and the last choice was “location” with 53 responses (28%).

Breakfast Intake

Students were asked how often they ate breakfast during the week. Figure 1 shows that 22 (12%) never ate breakfast, 53 (28%) ate breakfast 1-3 times/week, and 56 (29%) ate breakfast 4-6 times/week. Sixty (31%) ate breakfast daily.

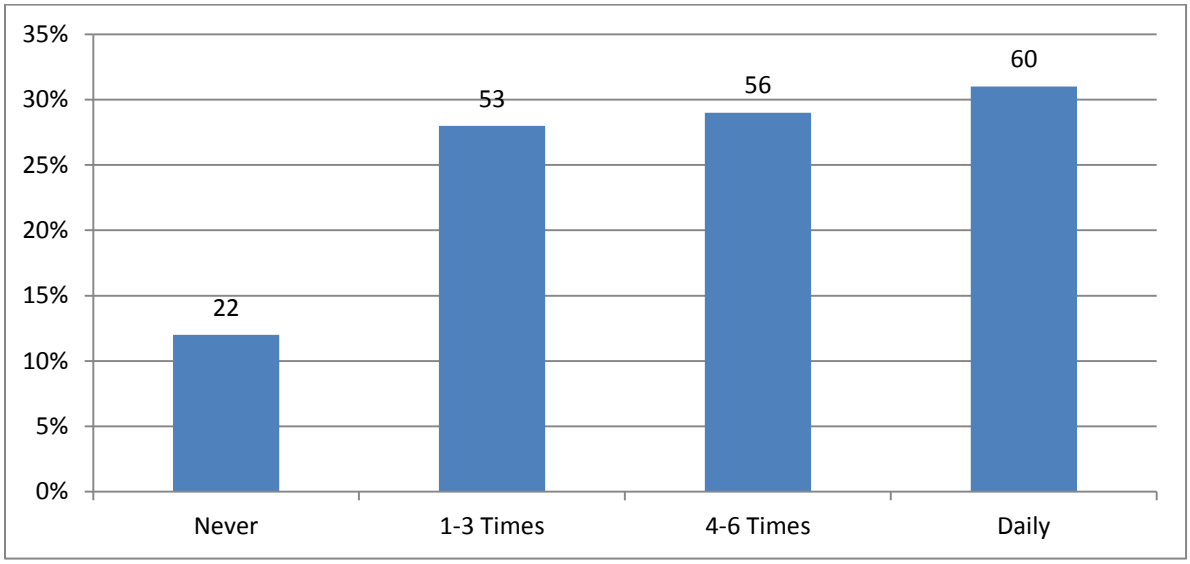

Figure 1. Frequency that undergraduates ate breakfast during the week (*n*=191).

The students were asked if they skipped breakfast during the week due to the reasons listed and students were to check all that applied. Figure 2 shows participants’ responses. The reasons for skipping breakfast were as follows: time restraints (*n*=101, 69%), sleeping in (*n*=78, 53%), early classes (*n*=78, 53%), not convenient (*n*=50, 34%), cost (*n*=27, 18%), work (*n*=25, 17%), and (*n*=11, 7%) selected other reasons for skipping breakfast. Students who selected other reasons were not asked to provide those reasons.

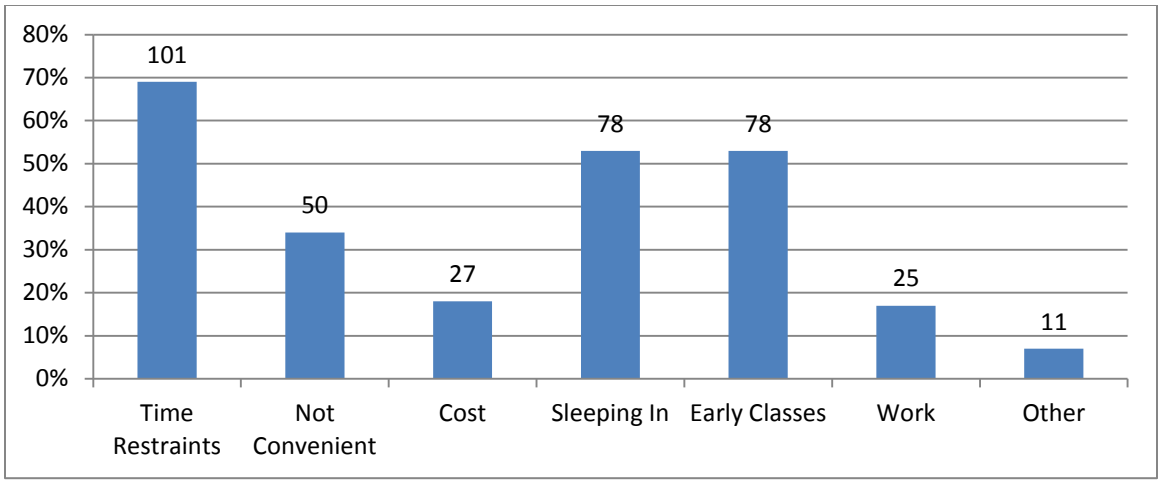

Figure 2. Frequency of reasons why undergraduates skipped breakfast. Students were asked to select all that apply.

Students were asked what food groups they normally ate for breakfast meals and were asked to select all that applied. Figure 3 shows participants' consumption of the food groups. Some 159 (83%) consumed grains, 130 (68%) consumed dairy, 108 (57%) consumed fruit, 100 (52%) consumed protein, 15 (8%) consumed vegetable, and 11 (6%) consumed none of the food groups.

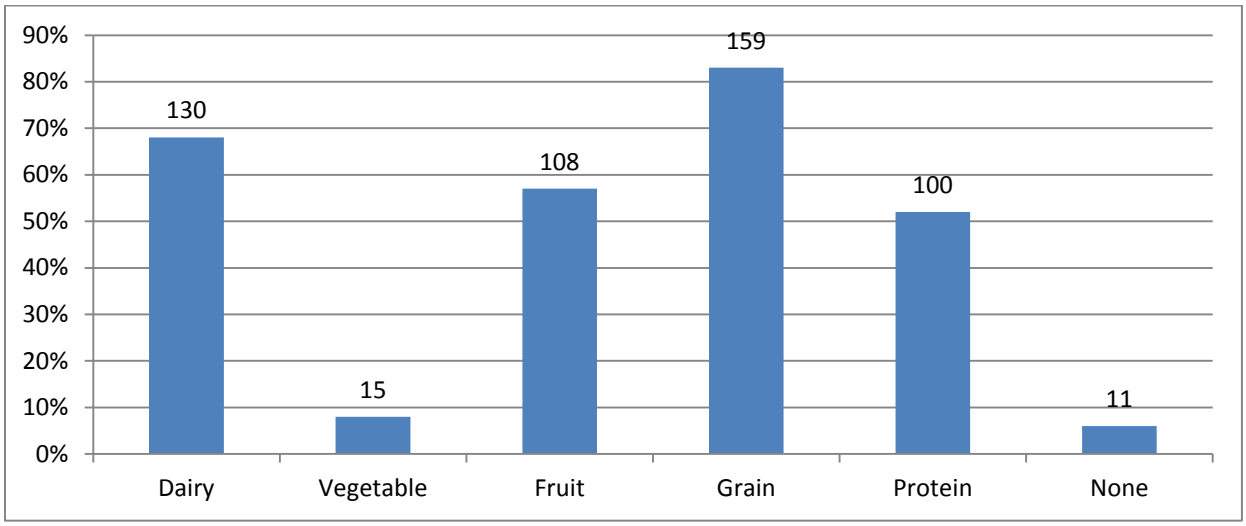

Figure 3. Frequency of food groups normally eaten at breakfast (*n*=191).

Caffeinated Beverage Intake

Students were asked their preference in the morning: eating breakfast, drinking caffeinated beverages, neither, or both. Figure 4 shows 94 (49%) preferred eating breakfast, 70 (36%) preferred both, 17 (9%) preferred drinking caffeinated beverages, and 11 (6%) preferred neither.

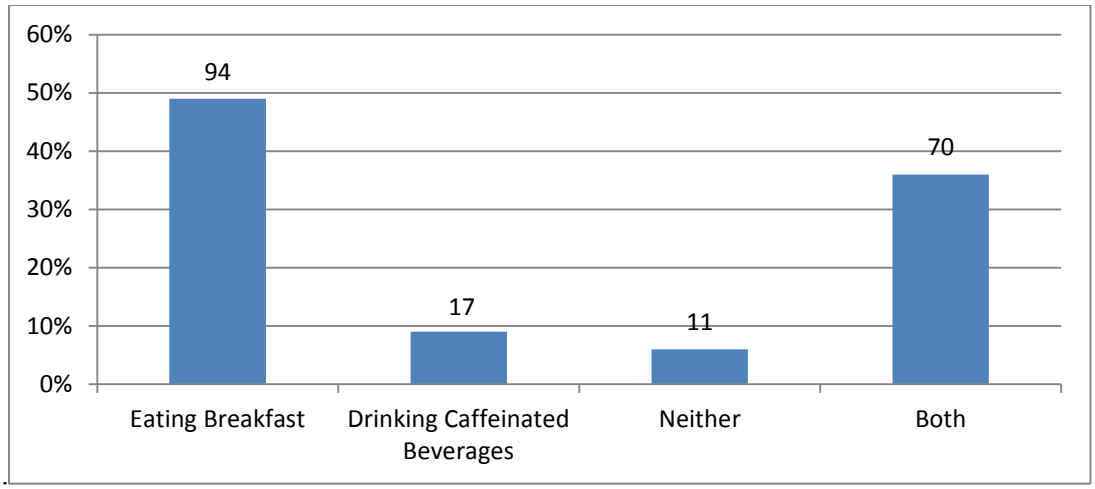

Figure 4. Frequency of eating breakfast or drinking caffeinated beverages in the morning (*n*=192).

Students were asked if they drank caffeinated beverages with breakfast. Eighty-one students (42%) reported drinking caffeinated beverages with breakfast and 110 (58%) did not consume caffeinated beverages at breakfast.

Students were asked how often caffeinated beverages were consumed in place of breakfast meals. Table 1 shows the frequencies of times caffeinated beverages replace breakfast. Some 129 (69%) never consumed caffeinated beverages in place of breakfast meals, 22 (12%) replaced breakfast meals with caffeinated beverages once a month, 14 (7%) replaced breakfast meals with caffeinated beverages once a week, 18 (10%) replaced breakfast meals with caffeinated beverages 2-3 times a week, 4 (2%) replaced breakfast meals with caffeinated

beverages 4-5 times a week, and 1 (1%) replaced breakfast meals with caffeinated beverages 6-7 times a week.

Table 1

Frequency of how often Drinking Caffeinated Beverages Replaced Breakfast Meals (n=188)

Answer	Number	Percent
Never	129	69%
Once a month	22	12%
Once a week	14	7%
2-3 times a week	18	10%
4-5 times a week	4	2%
6-7 times a week	1	1%
Total responses for this question	188	100%

Students were asked how many cups of caffeinated beverages are consumed with breakfast meals. Table 2 shows 93 participants (49%) reported drinking less than 1 cup (8 oz.) of caffeinated beverages with breakfast, 46 (24%) drank 1 cup (8 oz.), 40 (21%) drank 2 cups (16 oz.), 7 (4%) consumed 3 cups (24 oz.), and 2 (1%) consumed 4 cups (32 oz.). Only 2 (1%) consumed more than 6 cups (48 oz.) of caffeinated beverages with breakfast.

Table 2

Frequency of how many Cups of Caffeinated Beverages Participants Drank with Breakfast (n=190)

Answer	Response	Percentage
Less Than 1 Cup (8 oz.)	93	49%
1 cup (8 oz.)	46	24%
2 cups (16 oz.)	40	21%
3 cups (24 oz.)	7	4%
4 cups (32 oz.)	2	1%
5 cups (40 oz.)	0	0
6 cups (48 oz.)	0	0
More Than 6 cups	2	1%
Total responses for this question	190	100%

Table 3 shows the reasons participants chose to drink caffeinated beverages in the morning with breakfast. Students responses show 110 (76%) chose energy as the main reason for drinking caffeinated beverages. Seventy-two (50%) chose taste, 48 (33%) chose habit, 30 (21%) chose convenience, some 23 (16%) selected other reasons, 16 (11%) chose stress, 9 (6%) chose calories, and 8 (6%) chose location. Participants were instructed to check all the reasons that applied, and those who selected other reasons were not asked to provide specific reasons.

Table 3

Frequency of Reasons Participants Chose to drink Caffeinated Beverages in the Morning with Breakfast (n=145)

Answer	Response	Percent
Stress	16	11%
Energy	110	76%
Taste	72	50%
Convenience	30	21%
Location	8	6%
Calories	9	6%
Habit	48	33%
Other Reasons	23	16%
Total responses for this question	145	

Students were asked what type of caffeinated beverage replaced the breakfast meal and to select all that applied. Table 4 shows the types of caffeinated beverages participants chose in replacing breakfast meals. Fifty-eight (41%) replaced the meal with coffee, 27 (19%) with soda, 21 (15%) with tea, 14 (10%) with espresso, 8 (6%) with Monster energy drinks, 5 (4%) with Red Bull energy drinks, 5 (4%) with 5 Hour energy drinks, 5 (4%) with other caffeinated beverages, 4 (3%) with AMP energy drinks, 2 (1%) with NOS energy drinks, and 1 (1%) with Full Throttle energy drink. Sixty-three participants (45%) stated the question did not apply to them.

Table 4

Frequency of Caffeinated Beverages Replacing Breakfast Meals (n=141)

Answer	Response	Percent
Question does not apply to me, I don't replace breakfast with caffeinated beverages	63	45%
Coffee	58	41%
Soda	27	19%
Tea	21	15%
Espresso	14	10%
Monster Energy Drink	8	6%
Red Bull Energy Drink	5	4%
5 Hour Energy Drink	5	4%
Other	5	4%
AMP Energy Drink	4	3%
NOS Energy Drink	2	1%
Full Throttle Energy Drink	1	1%
Total responses for this question	141	

This concludes the results section on breakfast intake and caffeinated beverage intake. The significance of these findings and a comparison to other research conducted in this field will be discussed in Chapter 5.

Chapter V: Discussion

The objective of this study was to determine if UW-Stout undergraduate college students were replacing breakfast meals with caffeinated beverages and what types of caffeine beverages were consumed. The study also determined if breakfast was consumed, the food groups consumed at breakfast and factors that affected breakfast and caffeine consumption. The study was conducted through an online survey through Qualtrics to further assess students' breakfast and caffeine patterns and intake. The data were collected over a two-week time period and analyzed through Qualtrics to examine students' breakfast and caffeinated beverage intake.

Limitations

A limitation to the study was the knowledge base of the students completing the questionnaire as students may not be aware of what constitutes a "healthy" breakfast or appropriate serving sizes. Another limitation was that the questionnaire was not pre-tested with a similar group to identify problem questions. An example would be question 11 which stated "What age did you start consuming caffeinated beverages." This question could have been more effective if worded differently and included descriptive forms of caffeinated beverages. The sample was based on one population of University of Wisconsin-Stout undergraduate students which limits the generalization to other college students. Another limitation is that the study is based in only one geographical area of Wisconsin and thus the data cannot be widely generalized to other states.

Discussion

All classifications of years in college were represented in the study with thirty-seven percent of students being of senior status and twenty-four percent of students being freshmen. Almost all majors in the undergraduate program from 2012 were represented within the study.

The first research question posed for this study was how often the college students ate breakfast during the week. Surprisingly, data showed that the frequency of students eating breakfast seven days a week was thirty-one percent, while twenty-nine percent ate breakfast four to six times a week. Thus sixty percent of the college students ate breakfast four to seven times a week. The present study showed similar results to the Deshmukh-Taskar et al. (2010) study which found 63% of 19-29 year olds and 74% of 30-39 year olds consumed breakfast. In the study conducted by Felinic, Nola, and Matanic (2008) breakfast was shown to be the meal most often skipped during the day among participants at 77.5% when compared to lunch and supper meals; the study also found most students eating only two meals per day with only 22.5% of students consuming breakfast regularly (Felinic, Nola, & Matanic, 2008). Therefore the students in this study did not skip breakfast as often as reported by Felinic et al. (2008).

The second question posed by this research was the factors affecting breakfast consumption. The reasons students chose to skip breakfast meals during the week was mainly due to time restraints. Sleeping in and early morning classes also played a role in students skipping breakfast. Ozodogan, Ozcelick, and Surucuoglu (2010) found in a female college student population that lack of time was the leading cause (20.7%) of skipping breakfast, followed by sleeping in (17.2%), and disliking eating early in the morning (11.1%). The largest influences on student's food and beverage choices for breakfast in the present study included: time, convenience, and taste preferences. Surprisingly over half of the students stated health to be a large factor in food and beverage choices for breakfast. Glanz et al. (1998) proposed that taste, time or cost may be more important to students than the nutritional value of their food or drink. Thus finding that health was a factor in this population's choices for breakfast was enlightening.

The third research question was to determine the food groups consumed at breakfast meals among UW-Stout undergraduate students. Research by Gibson and Gunn (2011) reported that the most commonly consumed breakfast items were hot beverages (such as tea or coffee) followed by milk, grains (such as breakfast cereal) and then fruit**.** In the present study it was determined that the most common food group eaten at breakfast was the grains group, followed by the dairy, fruit, and protein groups. Vegetables were the lowest consumed of the food groups at breakfast meals. Although this present study did not examine specific foods eaten at breakfast meals, ready-to-eat breakfast cereals have been shown to be a large source of grains and micronutrients and provide the largest amounts of calcium, vitamin D, thiamin, riboflavin, iron, and folate intake throughout the day (Halsey et al., 2011).

The fourth research question was whether students consumed caffeinated beverages with breakfast. The present study found that just over half, at fifty-eight percent, of students did not drink caffeinated beverages with breakfast meals. An additional question asked for the reasons that the students drank caffeinated beverages with breakfast. Seventy-six percent of students replied that the main reason they drank caffeinated beverages with breakfast meals was for energy, with taste, habit and convenience as additional reasons. The study conducted by Malinauskas et al., (2007) found the majority of users consumed caffeinated drinks for insufficient sleep (67%) and to increase energy (65).

The fifth research question posed was if caffeinated beverages are replacing breakfast meals among UW-Stout undergraduate students. The present study found that only 12% of the students drank caffeinated beverages in place of breakfast meals within the last month and only 7% once a week. The students were asked the type of caffeinated beverages that replaced

breakfast meals. The types of caffeinated beverages replacing breakfast were 41% coffee, 19% soda, 19% energy drinks, and 15% tea.

UW-Stout students prefer eating breakfast in the morning rather than nothing at all or only drinking caffeinated beverages. Only 1% were replacing breakfast with caffeinated beverages six to seven times a week. Students replacing breakfast chose to replace with energy drinks 19% of the time similar to the frequency found for soda. Pettit and Debarr (2011) found that participants with higher levels of perceived stress had reported more days of consuming at least one energy drink containing caffeine during the past thirty days. Malinauskas et al. (2007) reported college students consumed one energy drink with a frequency of one to four days per month in order to alleviate insufficient sleep and to increase energy**.** The UW-Stout students appear to be using energy drinks at a lessor frequency than the students studied by Malinauskas et al. (2007).

Overall it was found that sixty-nine percent of students never drink caffeinated beverages in place of a breakfast meal, and only one percent replaced breakfast meals with caffeinated beverages daily. The researcher had anticipated a greater number of students consuming caffeinated beverages in place of breakfast meals, but this was not found. And the researcher anticipated finding a greater number of students consuming energy drinks, but found that coffee was the preferred caffeinated beverage.

Conclusions

Based on this study, the majority of breakfast consumption among UW-Stout undergraduate students is not being replaced with caffeinated beverages. The study found sixty percent of students consuming breakfast meals four to seven days a week, and only three percent of students replacing caffeinated beverages for breakfast meals from 4 to 7 days a week. Students

who consumed breakfast meals consumed the grain food group most frequently followed by dairy, fruit, protein, and lastly vegetables. The study found the main reason influencing students food and beverage choices to be time, followed by convenience, taste, health, money, and location. In conclusion the study demonstrates that UW-Stout undergraduate students are primarily choosing foods to eat for breakfast meals rather than supplementing with caffeinated beverages.

Recommendations

Due to the results of the study, it is evident that students find breakfast meals to be important. The sample selected to take part in the study was small, and did not include all types of age groups and student populations. It would be beneficial to include a larger sample size among other schools as well determine if breakfast consumption is similar or different in other populations.

Although caffeinated beverages are widely used today, it is important for students to have an understanding of potential side effects which may occur by consuming high doses of caffeine. There is a threshold that is considered optimal in order to gain the benefits of caffeine, and when this threshold is passed benefits are limited and adverse effects can take place.

Students should also be advised as to what constitutes a healthy breakfast. The study did not give a clear definition of what a "healthy" breakfast was, and many students may not follow what is considered to be a healthy breakfast by the MyPlate standards (USDA, 2013). As new food and beverage products are being marketed and accessible in stores, the importance of increasing the students' awareness of the health benefits breakfast meals have on overall performance throughout the day is continually needed.

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Appendix A: Approval by University of Wisconsin-Stout Institutional Review Board

February 6, 2013

Kristina Ingrouille

RE: "To Examine if Caffeinated Beverage Intake is Replacing Breakfast Meal Consumption among UW-Stout Undergraduate College Students"

Dear Kristina,

In accordance with Federal Regulations, your project, "*To Examine if Caffeinated Beverage Intake is Replacing Breakfast Meal Consumption among UW-Stout Undergraduate College Students*" was reviewed on **2/5/2013,** by a member of the Institutional Review Board and was approved under Expedited Review through **2/4/2018.**

If your project involves administration of a survey or interview, please copy and paste the following message to the top of your survey/interview 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.

If you are conducting an **online** survey/interview, please copy and paste the following message to the top of the form:
"This research has been approved by the UW-Stout IRB as required by the Code of Federal regulations Title 45 Part 46."

Responsibilities for Principal Investigators of IRB-approved research:

1. No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date. (Principal Investigators and Sponsors are responsible for initiating Continuing Review proceedings.)
2. All unanticipated or serious adverse events must be reported to the IRB.
3. All protocol modifications must be IRB approved prior to implementation, unless they are intended to reduce risk.
4. All protocol deviations must be reported to the IRB.
5. All recruitment materials and methods must be approved by the IRB prior to being used.
6. Federal regulations require IRB review of ongoing projects on an annual basis.

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

Should you have any questions regarding this letter or need further assistance, please contact the IRB office at 715-232-1126 or email foxwells@uwstout.edu.

Sincerely,

Susan Foxwell

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

Appendix B: Consent to Participate In UW-Stout Approved Research

Description:
The study seeks to determine whether or not caffeinated beverages are replacing breakfast meals among UW-Stout undergraduate students. Participants agreeing to participate are invited to take an online survey of 16 questions pertaining to breakfast meals and caffeine beverage intake.

Risks and Benefits:
Risks that may be involved when taking the survey include embarrasment or anxiety due to the questions being asked. However, there is little risk of participants feeling harassed or losing self respect. If questions arise about your diet, you are invited to contact the university dietitian through the dining services. Benefits resulting from the research include a further understanding of students eating patterns during breakfast meals. Significant results may help give a clearer understanding on how to properly educate undergraduate college students on the breakfast meal. The potential benefit of this research is adding to the existing body of knowledge of caffeine intake and breakfast meals among undergraduate college students.

Time Commitment
The online survey is anticipated to take between 5 to 10 minutes to complete and submit.

Confidentiality:
Your name will not be included on any documents. We do not believe that you can be identified from any of this information.

Right to Withdraw:
Your participation in this study is entirely voluntary. You may choose not to participate without any adverse consequences to you. You have the right to stop the survey at any time. However, should you choose to participate and later wish to withdraw from the study, there is no way to identify your anonymous document to withdraw the survey.

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.

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Statement of Consent:

By completing the linked survey you agree to participate in the project entitled, "To examine if caffeinated beverage intake is replacing breakfast meal consumption among UW-Stout undergraduate college students."

Appendix C: Survey

Q1 How often do you eat breakfast during the week?

- ❍ Never
- ❍ 1-3 times
- ❍ 4-6 times
- ❍ 7 times

Q2 What food groups do you normally eat at breakfast? Check all that apply

- ❑ Dairy
- ❑ Vegetable
- ❑ Fruit
- ❑ Grain
- ❑ Protein
- ❑ None

Q3 Do you skip breakfast during the week due to the following? Check all that apply

- ❑ Time restraints
- ❑ Not convenient
- ❑ Cost
- ❑ Sleeping in
- ❑ Early classes
- ❑ Work
- ❑ Other

Q4 Do you drink caffeinated beverages with your breakfast?

- ❍ Yes
- ❍ No

Q5 What do you prefer in the morning?

- ❍ Eating breakfast
- ❍ Drinking caffeinated beverages
- ❍ Neither
- ❍ Both

Q6 How many cups of caffeinated beverages do you drink for breakfast?

- ❍ Less than 1 cup (8 oz)
- ❍ 1 cup (8 oz)
- ❍ 2 cups (16 oz)
- ❍ 3 cups (24 oz)
- ❍ 4 cups (32 oz)
- ❍ 5 cups (40 oz)
- ❍ 6 cups (48 oz)
- ❍ More than 6 cups (48 oz)

Q7 What are the main reasons you choose to drink caffeinated beverages in the morning for breakfast? Check all that apply

- ❑ Stress
- ❑ Energy
- ❑ Taste
- ❑ Convenience
- ❑ Location
- ❑ Calories
- ❑ Habit
- ❑ Other reasons

Q8 How often do you drink caffeinated beverages in place of breakfast meals?

- ❍ Never
- ❍ Once a month
- ❍ Once a week
- ❍ 2-3 times a week
- ❍ 4-5 times a week
- ❍ 6-7 times a week

Q9 If so, what type of caffeinated beverages do you replace breakfast meals with? Check all that apply

- ❑ Monster energy drink
- ❑ Red Bull energy drink
- ❑ NOS energy drink
- ❑ Full Throttle energy drink
- ❑ 5-Hour energy drink
- ❑ Coffee
- ❑ Espresso
- ❑ Tea
- ❑ Soda
- ❑ AMP
- ❑ Other

Q10 What influences your food and beverage breakfast choices? Check all that apply

- ❑ Time
- ❑ Money
- ❑ Convenience
- ❑ Location
- ❑ Taste preferences
- ❑ Health

Q11 At what age did you start consuming caffeinated beverages?

Q12 Do you live on or off campus?

- ❍ On campus
- ❍ Off campus

Q13 What is your age?

- ❍ 18-20 years
- ❍ 21-23 years
- ❍ 24-26 years
- ❍ 27 and older

Q14 What is your gender?

- ❍ Male
- ❍ Female

Q15 What year of school are you in?

- ❍ Freshmen
- ❍ Sophomore
- ❍ Junior
- ❍ Senior

Q16 This list of undergraduate majors was provided by the Provost's Office and was last revised on June 1, 2012: Please indicate your major:

- ❑ Apparel Design & Development
- ❑ Applied Mathematics & Computer Science
- ❑ Applied Science
- ❑ Applied Social Science
- ❑ Studio Art (was Art)
- ❑ Art Education
- ❑ Business Administration
- ❑ Career, Technical Education & Training (was VTAE)
- ❑ Cognitive Science
- ❑ Computer Engineering
- ❑ Construction
- ❑ Dietetics
- ❑ Early Childhood Education
- ❑ Engineering Technology (was Industrial Technology)

- ❑ Family & Consumer Sciences Education
- ❑ Food Systems & Technology
- ❑ Game Design & Development
- ❑ Golf Enterprise Management
- ❑ Graphic Communications Management
- ❑ Health, Wellness and Fitness
- ❑ Hotel, Restaurant & Tourism Management
- ❑ Human Development & Family Studies
- ❑ Information & Communication Technology
- ❑ Information Technology Management (was TS)
- ❑ Management (was Industrial Management)
- ❑ Manufacturing Engineering
- ❑ Marketing & Business Education
- ❑ Packaging
- ❑ Plastics Engineering
- ❑ Professional Communication and Emerging Media (was Technical Communication)
- ❑ Property Management
- ❑ Psychology
- ❑ Retail Merchandising & Management
- ❑ Science Education
- ❑ Special Education
- ❑ Supply Chain Management
- ❑ Sustainable Management
- ❑ Technology Education
- ❑ Technology & Science Education
- ❑ Vocational Rehabilitation
- ❑ Undeclared/ Undecided
- ❑ Entertainment Design
- ❑ Graphic Design
- ❑ Industrial Design
- ❑ Interior Design