Exploring Caffeine Consumption Factors for College Students

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Abstract

Caffeine consumption is widespread among college students, but the factors involving their consumption habits are largely unknown. This quantitative study examined basic consumption habits, expectations, social settings and influences, and effects awareness of caffeine in undergraduate students at a small liberal arts college in Ohio. Caffeine consumption habits showed that most students consume at least two kinds of caffeinated beverages either one to three times a week or two to three times a day, and often in the morning. Positive effects of caffeine were the most anticipated, especially that caffeine would decrease sleepiness and increase energy and alertness. The most prevalent situations for caffeine consumption were when students lacked sleep or were driving long distances, and the strongest social influences on caffeine purchases involved pricing and brand loyalty. Awareness of caffeine's health effects was modest, and the most recognized effects were alterations in heart rate and insomnia. Health practitioners should continue to learn and educate others about the factors that influence caffeine consumption, and further research efforts should examine consumption habits related to expectations and effect awareness.

Chapter I

Caffeine is the most widely used psychoactive substance in the world, with more than 85% of adults and children consuming caffeine regularly (Kee, Hayes, & McCuistion, 2012; American Psychological Association [APA], 2013). There are no purchasing restrictions, age limitations, or consumption limitations for caffeine, and most cultures find caffeine consumption to be socially acceptable. All of these factors contribute to its widespread use. While caffeine is a popular drug, many people are not aware of its many health effects. Some of the negative effects are quite harmful in spite of the perception that caffeine is a safe stimulant. College students are largely unaware of the negative effects of caffeine, even though they have been identified as a population at risk for caffeine-related problems (APA, 2013).

Prior research has focused on the health effects and basic consumption patterns of caffeine. What is not known is what influential factors for college students to consume caffeine, including their expectations of caffeine, social influences on caffeine consumption, and effect awareness of caffeine. These gaps in research prevent health professionals from being able to understand and address underlying motivators for caffeine consumption. This study addressed these factors of caffeine consumption using Azjen and Fishbein's (2006) Theory of Planned Behavior.

Research Questions

The purpose of this research was to understand and analyze the caffeine consumption habits, expectations, social settings and norms, and effect awareness among undergraduate students. The information brought to light by this study could then be used by health care professionals to recognize students' awareness of caffeine's potential

effects and factors that contribute to the unhealthy consumption of caffeine. The

following research questions were used to address caffeine consumption factors among

college students:

1. What are the basic caffeine consumption patterns among college students,

   including forms of caffeine consumed, frequency of consumption, and timing of

   consumption?

2. What are college students' most common expectations for caffeine use?

3. What social expectations and settings related to caffeine use are common among

   college students?

4. Which caffeine side effects are college students aware of?

Theoretical Framework: Theory of Planned Behavior

In studying the relationship between college students and their caffeine

consumption, the following factors were addressed: caffeine consumption in terms of

frequency and sources utilized; attitudes and perceptions of caffeine including

expectations of use; societal settings and influences on consumption; and awareness of

caffeine effects. Given these topics within the relationship between college students and

caffeine consumption, Ajzen and Fishbein's Theory of Planned Behavior (TPB) was

utilized as a theoretical framework for the study (see Figure 1).

As described by Ajzen (2006), three belief-influenced factors determine the

individual's intention to perform a behavior. (Intention is defined as the indication of the

individual's readiness to perform a behavior.) These factors are attitudes toward the

behavior, subjective norms concerning the behavior, and perceived control of the

Figure 1. The Theory of Planned Behavior Model (Ajzen, 2006).
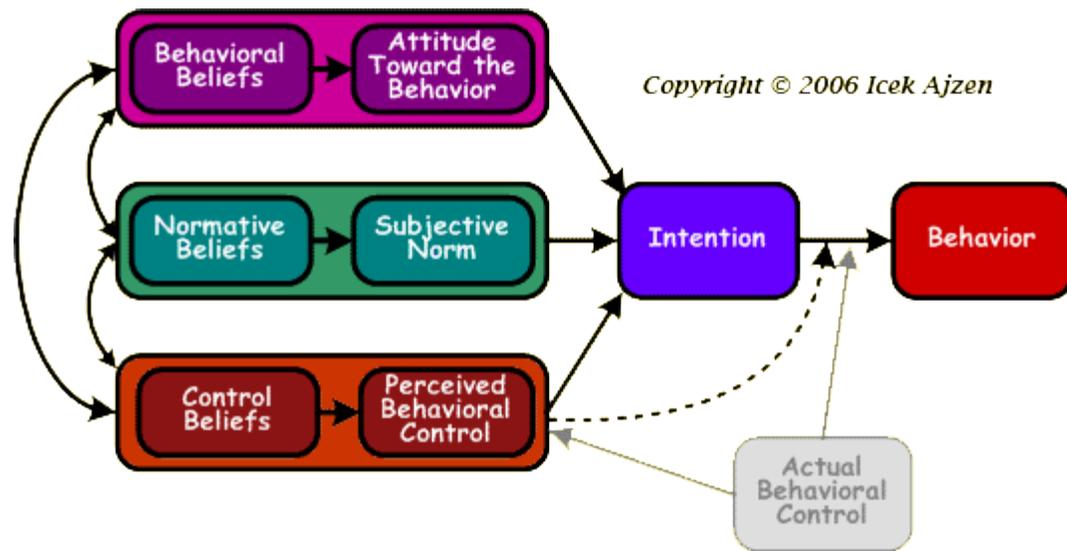
behavior (Ajzen, 2006). The factors will be discussed in the following sections, as well as several studies that have examined caffeine in light of these factors.

Behavioral beliefs and attitudes toward behaviors. Behavioral beliefs are the subjective probability that the behavior will produce a given outcome. Attitudes toward behaviors are determined by behavioral beliefs, and are defined as the degree to which the behavior is positively or negatively valued (Ajzen, 2006). In this study, behavioral beliefs and attitudes concerning caffeine consumption were studied as the expectations for using caffeine. Similar research has been done by Heinz et al. (2009) and Irons et al. (2014). Heinz et al. (2009) found expectations for caffeine use were grouped into four categories: withdrawal symptoms,

positive effects, acute negative effects, and mood effects. Irons et al. (2014) categorized motivations for caffeine consumption into four categories: cognitive enhancement, negative affect relief (emotional coping), reinforcing effects (nonemotional coping), and weight control.

Ludden and Wolfson (2010) examined adolescent consumption of caffeine, usage reasons and expectations of caffeine, and sleep patterns. Generally, the adolescents were unaware of caffeine's effects, though a few "mixed users" that consumed both coffee and soda recognized sleep disturbances and energy enhancement as possible caffeine effects. Females had higher expectancy rates of appetite suppression and withdrawal occurrence. Concerning consumption patterns, males generally consumed more soda and energy drinks than females. The most common reason to use caffeine was to have the energy to make it through the day (Ludden & Wolfson, 2010).

Other studies have examined perceptions concerning energy drinks and soft drinks, many of which contain caffeine. Bunting, Baggett, and Grigor (2013) studied energy drink perceptions among young adults in New Zealand ages 16 to 35. They found that perceptions were influenced by a number of different factors, including advertising, age, alcohol, brand, efficacy, energy seeking, gender, health, peer influence, product attributes, and safety. Among the entire age group, taste was the greatest influence in attitudes concerning energy drinks. Interestingly, younger participants found the "energy kick" to be the second greatest influence, while older participants desired energy drinks as a last resort for gaining energy.

Young adult perceptions of soft drinks were studied by Hattersley, Irwin, King, and Allman-Farinelli (2009). With participants ages 18 to 30 recruited from Australia's University of Sydney, the researchers found a general lack of awareness concerning the negative health effects of soft drinks and a social stigma for replacing soft drinks with healthier beverages. Influences on young adults' perceptions of soft drinks included

social cues for consumption, environmental settings, intrinsic qualities like taste, health-related beliefs, and readiness for change in consumption habits (Hattersley et al., 2009).

Normative beliefs and subjective norms. Normative beliefs are the individual's perceived behavioral expectations of others considered to be important, such as family, friends, and coworkers. These normative beliefs, combined with the individual's wish to follow others' expectations, yield the prevailing subjective norms (Ajzen, 2006). Subjective norms are the perceived social pressure concerning a behavior. In this study, normative beliefs and subjective norms were surveyed as the social settings and social influences that affect caffeine consumption.

Olsen (2013) surveyed students of the University of New Hampshire regarding reasons for and influences on caffeine usage. Students most often consumed caffeine when they were sleep-deprived, were driving long distances, or were studying for an exam. Olsen also found students to be very price-sensitive in purchasing caffeine and not typically influenced by their peers or the media in their caffeine choices.

Control beliefs and perceived behavioral control. Control beliefs are impacted by the factors that may help or hinder the performance of a behavior (Ajzen, 2006). The beliefs form the perceived behavioral control, or individual's level of confidence that a behavior can be performed without negative consequences (Ajzen, 2006; University of Twente, 2014). In this study, control beliefs and perceived behavioral control were examined through surveying college students' awareness of various caffeine effects. Other researchers have studied perceived behavioral control through examining withdrawal phenomena, such as Juliano, Huntley, Harrell, and Westerman et al. (2012). These researchers found seven generalized clusters of withdrawal symptoms:

fatigue/drowsiness, low alertness/difficulty concentrating, mood disturbances, low sociability/motivation to work, nausea/upset stomach, flu-like symptoms, and headache.

Actual behavioral control. Actual behavioral control is influenced by the skills and resources to perform the behavior. The combination of actual behavioral control and the belief-influenced factors that lead to intentions form the individual's ability and likelihood to perform the behavior (Ajzen, 2006). In this study, actual behavioral control was assessed as the habits of caffeine consumption, including the forms, frequency, and timing of caffeine consumption.

An Italian study of 550 adults worked to identify individual traits that could indicate caffeine consumption patterns (Penolazzi, Natale, Leone, & Russo, 2012). The study examined variables such as personality, socio-demographic factors, and smoking habits in relation with caffeine consumption amounts, beverage types, and the time of day caffeine was typically consumed. Male gender, older age, and smoking were individual variables that correlated with increased caffeine consumption. Personality traits associated with increased caffeine consumption included impulsivity, sensation-seeking, and BAS-drive. (BAS-drive was measured on the Behavioral Approach Scale as the determination in the pursuit of a reward.) Generally, people consumed more caffeine during their preferred circadian time (i.e., morning people consumed more caffeine in the morning, evening people consumed more caffeine in the evening). Interestingly, coffee was the only source of caffeine affected by age and personality traits (Penolazzi et al., 2012).

Skinner et al. (2014) examined fitness-related effects on caffeine. They explored the effects of peak serum caffeine concentrations in different levels of habitual caffeine

consumption, overall fat mass of the body, and trained athletes compared to active individuals. They found that habitual caffeine consumption did not affect serum concentrations, while higher fat mass was associated with higher caffeine serum concentration over the first four hours after consumption. Finally, they found trained male athletes generally had lower serum caffeine levels compared to active males.

Summary

The growing caffeine consumption among college students is a cause for concern. Many factors involving caffeine consumption habits for college students are still unknown. Using the Theory of Planned Behavior, this study looked at the basic consumption patterns, expectations, social settings and influences, and effects awareness of caffeine.

Chapter II: Review of the Literature

Introduction

The review of the literature provides the theoretical foundations, current background, and research evidence related to the study of caffeine consumption factors for college students. This literature review begins with a description of the beneficial and harmful effects of caffeine as a drug. The next portion of the literature review describes social influences and developments with caffeine including calls for research, manufacturer labeling, involvement with the Food and Drug Administration (FDA) and development of assessment tools. The literature review will then describe prior research on caffeine with college students. The literature review will conclude with a summary of the literature presented and its relevance to this study.

Health Effects of Caffeine

A large body of research has examined the drug properties and health effects of caffeine. As a drug, caffeine can cause tolerance, dependence, and withdrawal phenomena. Caffeine can also affect multiple body systems, including the cardiovascular, digestive, reproductive, and neurological systems.

Pharmacology and pharmacokinetics of caffeine. Caffeine is a plant alkaloid chemically known as 1,3,7-trimethylxanthine. It is easily absorbed through the gastrointestinal tract and metabolized in the liver by the 1A2 isozyme of the CYP450 system (Alpert, 2012; Schellack, 2012). The drug reaches peak plasma levels within 30-45 minutes, and the half-life ranges from three to seven hours depending on the individual's metabolism rate and liver function (Schellack, 2012).

Because caffeine is both water-soluble and fat-soluble, it crosses the blood-brain barrier easily. Once in the brain, caffeine acts as an adenosine antagonist and as a phosphodiesterase inhibitor (Schellack, 2012). The elevated adenosine serum levels work to increase alertness and improve attentiveness (Alpert, 2012). As a phosphodiesterase inhibitor, the breakdown of cyclic adenosine monophosphate (cAMP) is delayed to allow for enhanced neurotransmission of signals and central nervous system stimulation. Caffeine also increases serotonin levels in brainstem regions that innervate spinal motor neurons, which increases self-sustained firing of the connected skeletal muscle motor units. This sensitization of the motor units produces caffeine's effects of postponing fatigue and increasing physical endurance (Glade, 2010).

Outside the brain, caffeine and its metabolites paraxanthine, theobromine, and theophylline stimulate other functions. Cardiac tissue is stimulated by caffeine to increase the heart rate. Paraxanthine increases lipolysis so the body can use fatty acids and glycerol to fuel energy. Theobromine dilates blood vessels and influences the kidneys as a mild diuretic. Theophylline, which is also prescribed for respiratory conditions, relaxes smooth muscles in the bronchi to allow for easier respiration (Alpert, 2012).

Beneficial caffeine effects. Several benefits of caffeine are well known: With moderate consumption, it increases energy and decreases fatigue; it increases alertness and cognitive function; and it enhances motor and physical function (Glade, 2010; Ulbricht et al., 2012; Schellack, 2012; Seifert, Schaechter, Heshorin, & Lipschultz, 2011). It also has been shown to enhance selective attention, mood, working memory, and reaction time (Addicott & Laurienti, 2009; Ulbricht et al., 2012; Schellack, 2012; Seifert et al., 2011). Some of these benefits, however, may be less effective in habitual

caffeine consumers who have developed tolerance to or dependence upon caffeine

(Addicott & Laurienti, 2009; Rogers, Heatherley, Mullings, & Smith, 2013; Seifert et al.,

2011). Regardless of caffeine's effectiveness, these stimulatory effects are often the

reason many people choose to consume caffeine.

Caffeine also has been proven to help with certain medical conditions, including

treating apnea in infants, relaxing airways in persons with asthma and COPD, and

relieving pain from headaches and certain migraines (Ulbricht et al., 2012; Schellack,

2012). Caffeine is also included in medications used to treat drowsiness or tiredness, and

can be added to pain medications to increase their effectiveness (Food and Drug

Administration [FDA], 2007). A lesser known benefit of caffeine is its effect in lowering

the risk for kidney stones. Ferraro, Taylor, Gambaro, and Curhan (2014) performed a

prospective cohort study with over 215,000 participants, and found that participants with

the highest caffeine intake had a kidney stone risk reduction of more than 25%. From the

24-hour urine samples of 6,033 participants, caffeine intake was associated with higher

urine volume, higher urine calcium and potassium, and lower urine oxalate, calcium

oxalate, and uric acid (Ferraro et al., 2014). These findings demonstrate that caffeine

alters the urine volume and content to lessen the risk of kidney stones.

Harmful caffeine effects. Unfortunately, there are many negative aspects of

caffeine consumption, especially when more than a moderate amount is consumed. The

FDA suggests 100 to 200 milligrams as a safe daily amount, and advises people not to

consume more than 600 milligrams in a day (2007). When a drug is taken in excess,

harmful side effects and adverse reactions are more likely to occur, especially with

intoxication and dependence/withdrawal cycles. Caffeine intoxication may occur with

ingestion of 0.5 grams (Kee et al., 2012), and death may occur with ingestion of 5 grams

(Seifert et al., 2011; Schellack, 2012). As defined by the Diagnostic and Statistical

Manual of Mental Disorders Fifth Edition (DSM-V), caffeine intoxication occurs with

recent consumption of caffeine (typically a high dose of more than 250 milligrams), and

manifests with at least five of the following symptoms experienced during or shortly after

ingestion: restlessness, nervousness, excitement, insomnia, flushed face, diuresis,

gastrointestinal disturbance, muscle twitching, rambling flow of thought and speech,

tachycardia or cardiac arrhythmia, periods of inexhaustibility, and psychomotor agitation

(APA, 2013). Additional symptoms found in research studies include irritability, anxiety,

gastric hyperacidity, tremors, confusion, chest pain, and panic attacks (Kee et al, 2012;

Seifert et al., 2011).

 Drug properties. Caffeine also has the drug properties of tolerance, dependence,

and withdrawal. Tolerance occurs when the body has been repeatedly exposed to a drug

and the usual dose is no longer effective; the dose must be increased to give the desired

effect. Dependence occurs when the body requires a drug to maintain its function, and

withdrawal symptoms occur when the drug is no longer supplied to the dependent body

and the body must re-learn to function without it.

 Physical dependence may occur in adults who consume as little as 100 milligrams

of caffeine daily (Kee et al., 2012). According to the DSM-V, caffeine withdrawal occurs

when individuals with prolonged daily caffeine consumption abruptly reduce or

discontinue their caffeine use. Within 24 hours, these individuals experience three or

more of the following symptoms: headache, marked fatigue or drowsiness, dysphoric

mood, depressed mood, irritability, difficulty concentrating, and flu-like symptoms such

as nausea, vomiting, and muscle pain or stiffness (APA, 2013). These symptoms have

been confirmed in many other research studies, and additional possible symptoms include

transient depression and lethargy (Kee et al., 2012; Hering-Hanit & Gadoth, 2003; FDA,

2007; Alpert, 2012). Withdrawal symptoms may also occur after a short-term, high dose

of caffeine (Seifert et al, 2011). The symptoms typically peak twenty to fifty-one hours

after abstinence, and can last anywhere from two to nine days (Juliano & Griffiths, 2004).

Within an hour of caffeine ingestion most withdrawal symptoms will resolve, but

unfortunately the quick fix only reinforces caffeine dependence patterns. Gradual

reduction of caffeine consumption can lessen the occurrence and severity of withdrawal

symptoms, but the best way to avoid caffeine dependence and withdrawal is to either

consume low amounts of caffeine daily or avoid consuming caffeine in moderate

amounts for more than two days in a row (APA, 2013). Apart from these side effects

related to intoxication and withdrawal, caffeine may also cause a number of physical and

psychological disturbances.

Cardiovascular effects. Cardiovascular side effects include tachycardia,

dysrhythmias, and hypertension. For this reason, people with heart conditions and a

history of stroke or transient ischemic attacks are advised to lower their caffeine intake or

avoid it entirely (FDA, 2007; Schellack, 2012). Caffeine may also increase the risk for or

mediate atrial fibrillation, but research thus far has been inconclusive (Mattioli, 2014).

Digestive and nutritional effects. Gastrointestinal side effects of caffeine

consumption include diarrhea, nausea, abdominal pain, hyperacidity, and ulcer formation

(Ulbricht et al., 2012; FDA, 2007). Persons with peptic ulcer disease are advised to avoid

caffeine due to its side effect of gastric hyperacidity (Shellack, 2012). Nutritional side

effects include dehydration and reduced serum levels of potassium and B vitamins

(Ulbricht et al., 2012; Schellack, 2012).

  Reproductive effects. Reproductive side effects are often overlooked in reference

to caffeine, but they can be serious. General side effects include increased frequency and

severity of premenstrual syndrome, shortened menstrual cycle, delayed conception, and

reduced semen quality (Ulbricht et al., 2012). One study analyzing 259 women for eight

weeks found that caffeine intake alters free estradiol levels. Higher caffeine intake was

related to decreased free estradiol levels in Caucasian women and increased levels in

Asian women, and caffeinated soda and green tea intake was related to increased total

and free estradiol in all races (Schliep et al., 2012). These findings are of concern because

higher levels of estradiol are typically found in women with endometriosis and are related

to an increased risk of breast, endometrial, and ovarian cancer (Schliep et al., 2012).

Because of the alterations in estradiol levels as a result of caffeine consumption,

postmenopausal women and women who have a higher risk for breast cancer are advised

to limit their caffeine intake. Men who have a higher risk for prostate cancer are also

encouraged to reduce their caffeine intake (Alpert, 2012).

  When mothers choose to consume caffeine, the drug may also hurt their unborn

and breastfeeding infants. Daily consumption of more than 200 milligrams of caffeine

has been linked to an increased risk for miscarriage (Weng, Odouli, & Li, 2008). Caffeine

consumption during pregnancy has also been linked to neural tube defects, increased risk

for premature delivery, impaired skeletal growth, and reduced birth weight. Breastfeeding

infants whose mothers consume caffeine may experience irritability, jitteriness,

restlessness, overstimulation, wakefulness, poor feeding, and mild iron deficiency. As a

result, pregnant and breastfeeding mothers are advised to consume no more than 200

milligrams of caffeine in a day (Ulbricht et al., 2012; Weng et al., 2008).

Additional physical effects. Significant sleep disturbances have been shown to

occur with 400 milligrams of caffeine ingested within six hours prior to bedtime (Drake,

Roehrs, Shambroom, & Roth, 2013). Other physical side effects include airway

inflammation, daytime sleepiness, insomnia, fatigue, lack of energy, headaches,

dizziness, sweating, tremors, overactive reflexes, increased levels of stress hormones, and

immunosuppression (Ulbricht et al., 2012; FDA, 2007; Schellack, 2012).

Mental health effects. Psychological side effects of caffeine include agitation,

anxiety, depression, hyperactivity, impaired alertness and attention, impaired cognitive

function and memory, increased risky behavior, irritability, jitteriness, nervousness,

restlessness, and panic attacks (Ulbricht et al., 2012; FDA, 2007; Schellack, 2012). Even

just 200 milligrams of caffeine may result in insomnia, anxiety, and increased irritability

(Kee et al., 2012). Due to the possible anxiogenic effects of caffeine, people with anxiety

problems, panic attacks, bipolar mood disorders, or schizophrenia are encouraged to

reduce their caffeine intake (FDA, 2007; Schellack, 2012).

While both physical and psychological side effects are highly individualized due

to differences in metabolism and sensitivity among individuals, they still are causes for

concern. Additionally, there are a whole host of medications that react with caffeine,

including medications that affect dopamine or the cytochrome-P enzyme system, central

nervous system depressants, vasodilators and vasoconstrictors, bronchodilators,

antidepressants, antiepileptic medications, corticosteroids, certain antibiotics, sympathetic

nervous system stimulants, electrolytes, and oral contraceptives (Ulbricht et al., 2012;

FDA, n.d.; Schellack, 2012; Alpert, 2012). Contrary to popular belief, caffeine does not

counteract the effects of alcohol (Schellack, 2012).

Social Influences and Developments

With the growing body of research on caffeine's health effects and the growing

consumption of caffeine by the general population, professionals from different fields are

realizing that more research and regulations concerning caffeine are needed in today's

society. In 2011, the Mary Ann Liebert, Inc. Publishers launched the Journal of Caffeine

Research, the only peer-reviewed journal dedicated to caffeine science (Mary Ann

Liebert, Inc. Publishers, 2012). While other journals have included caffeine studies, the

Journal of Caffeine Research is the first journal that exclusively studies caffeine and its

health effects.

The APA recently expanded the number of recognized caffeine-related disorders

in the DSM-V (2013). The fourth edition only included caffeine intoxication, caffeine-

induced anxiety disorder, caffeine-induced sleep disorder, and caffeine-related disorder

not otherwise specified (APA, 2000). The fifth edition added caffeine withdrawal and

named caffeine use disorder as a condition requiring further study for prevalence and

validity (APA, 2013).

Manufacturers. Some manufacturing organizations have voluntarily increased

caffeine labeling on their products. The American Beverage Association (ABA) has

many members that provide the caffeine content of their products. The ABA also

developed guidelines for its members concerning energy drinks that included rules for

quantitative caffeine labeling, advisory statements, and marketing and sale prohibitions

(ABA, n.d.). Two other organizations of the dietary supplements industry, the Council for

Responsible Nutrition and the American Herbal Products Association, provide guidelines

for their members on caffeine labeling. These guidelines recommend quantitative

labeling of caffeine and warning labels that caution use by children, pregnant women,

and people who are sensitive to caffeine (Rosenfeld, Mihalov, Carlson, & Mattia, 2014).

The Food and Drug Administration. The FDA has influenced caffeine safety

measures for over fifty years. In 1958, the Administration listed caffeine as a GRAS

(generally-recognized-as-safe) substance and allowed carbonated beverages to include up

to 200 parts per million (ppm) of caffeine. This 200 ppm is equivalent to about 71

milligrams of caffeine in a 12 ounce serving of a carbonated beverage. However, the

GRAS caffeine regulation does not address any other beverage types or foods that may

include caffeine. The Code of Federal Regulations requires all ingredients, including

caffeine, to be listed by their common name in the product label's ingredient list, and in

descending order by weight. Concerning food nutrient labels, the FDA does not consider

caffeine to be a nutrient and therefore does not require caffeine to be listed. Dietary

supplements, however, must list caffeine if it is used as a dietary ingredient (Rosenfeld et

al., 2014).

In the more recent past, the FDA has been reevaluating its caffeine regulations to

determine if the growing variety of caffeine sources and increased consumer intake

warrant new regulations. Since 2009, the FDA has been reviewing studies that provide

estimates of caffeine intake, scientific caffeine studies and reviews, adverse events

related to caffeine, and other public health agency activities related to caffeine (Rosenfeld

et al., 2014). The Administration has also been restricting the production of new

caffeinated products. In 2010, the FDA placed a ban on caffeinated alcoholic beverages

that prohibited the four beverage manufacturers from selling their product In 2013, a caffeinated gum manufacturer agreed to stop production while the FDA performed further evaluations of the product (Rosenfeld et al., 2014; FDA, 2010).

In 2013, the FDA had a conference with the Institute of Medicine in order to obtain scientific data related to caffeine. The conference goals were to evaluate previous literature to describe caffeine health hazards, discuss vulnerable populations with a higher risk for unhealthy caffeine intake, determine safe caffeine intake levels for both the general and vulnerable populations, and identify missing information on the stimulatory effects of caffeine in different body systems (Rosenfeld et al., 2014). This conference provided the FDA with scientific evidence that could form the basis for further reevaluations of caffeine regulations.

Questionnaires. Researchers have also begun to develop surveys concerning caffeine. Two studies used college student populations to develop caffeine questionnaires, primarily due to the convenience of the sample and the assurance that many college students consume caffeine. Heinz, Kassel, and Smith (2009) surveyed college students of Midwestern psychology classes to develop their Caffeine Expectations Questionnaire. The survey items assessed were divided into four broad categories: withdrawal symptoms, positive effects, acute negative effects, and mood effects (Heinz et al., 2009). More recently, Irons et al. (2014) surveyed college students to develop their Caffeine Motives Questionnaire. The survey items assessed were part of four categories: cognitive enhancement, negative affect relief, reinforcing effects, and weight control (Irons et al., 2014).

Additionally, Juliano et al. (2012) created the Caffeine Withdrawal Symptoms Questionnaire, developed using a sample of 213 adults who typically consume caffeine at least five days a week. After a sixteen-hour abstinence period, the participants completed the questionnaire. The researchers were able to group caffeine withdrawal symptoms into seven clusters: fatigue/drowsiness, low alertness/difficulty concentrating, mood disturbances, low sociability/motivation to work, nausea/upset stomach, flu-like symptoms, and headache (Juliano et al., 2012).

Research with the College Population

While much of the research on caffeine's effects has focused on the adult population, very little has exclusively examined the young adult, college-age subpopulation. College students are an especially vulnerable group for caffeine's negative effects for several reasons. While in college, many students are learning to live independently and begin to form lifelong habits as they make health and diet decisions for themselves. They also are one of the highest-consuming groups of caffeine. Influences upon the college population include daily routines of morning caffeine consumption, numerous social events that serve caffeinated beverages, ease of access to caffeinated beverages in cafeterias and vending machines on college campuses, and busy study schedules that often lead to long nights fueled by caffeine. The DSM-V even mentions college students as a population at higher risk for caffeine use problems (APA, 2013). These reasons support the need for research among college populations to determine perceptions, awareness, and consumption patterns in young adults attending universities.

Norton, Lazev, and Sullivan (2011) specifically studied college students and their caffeine use patterns. The goals of their study were to characterize patterns of caffeine consumption and demographic differences in these patterns, specifically the prevalence of caffeine consumption and the frequency of caffeine use according to source and situation (Norton et al., 2011). Eighty-nine percent of students reported using caffeine in the past month, which is much higher than national surveys' reports of college students smoking (22%) and using alcohol (50%). They found that older students generally consumed more caffeine, and that males consumed more caffeine from soft drinks and energy drinks or shots than females. Among college students of all types, soft drinks were consumed most often while coffee provided the largest amount of caffeine consumed. Approximately one-third of individual caffeine consumption situations were with meals and one third of consumption instances were on a daily or regular basis. About one fourth of consumption instances occurred while studying for exams and working on school projects. This finding contradicts popular beliefs that the most common use for caffeine among college students is binge-drinking before long, sleepless nights of studying. The least common caffeine consumption instance was with exercise, which deflates the promotion of many energy drinks (Norton et al., 2011).

Olsen (2013) surveyed students of the University of New Hampshire regarding caffeine consumption and purchasing patterns, as well as reasons for and influences on use. Students most often consumed caffeine when they were sleep-deprived, were driving long distances, or were studying for an exam. Olsen also found students to be very price-sensitive in purchasing caffeine and not typically influenced by the media or their peers

when making caffeine choices. Students had a basic understanding of caffeine effects and health concerns, though this topic was not studied in detail (Olsen, 2013).

Summary

There is a substantial body of research concerning caffeine's physical and mental health effects, which can be both helpful and harmful. In recent years, different professionals have begun to recognize the growing instances of unhealthy caffeine consumption, resulting in a few product restrictions, several tools developed for caffeine research, basic research among college student populations, and calls for more research both within the young adult and general populations. This study served to expand the body of research concerning caffeine and college students.

Chapter III: Methodology

Introduction

This chapter will present the study's design, setting, sample, and instrument used to answer the research questions, as well as data collection and analysis methods. Description of the study design will include its methodology and sampling method. Development of the instrument will be described in terms of the four sections utilized to examine the different phenomena of caffeine consumption. The description of data collection and analysis will include participant recruitment and enrollment, measures taken for participant protection, participant incentives, and programs used for data analysis.

Research Design

This study quantitatively explored caffeine consumption habits, expectations, social settings and influences, and effects awareness among a convenience sample of undergraduate college students. The benefits of a quantitative study include the ability to describe phenomena and study the strength and reliability of relationships between different phenomena (Polit & Beck, 2012). The convenience sampling method was used in order to provide a large pool of possible participants.

Setting and Sample

The institution selected for this study was a Christian liberal arts university in northeast Ohio. The university had approximately 1,700 students in its undergraduate, degree completion, and graduate programs. Nearly 1,400 of those students were completing undergraduate degrees, and these students were the sample for this study. Women represented sixty percent of the student body and men represented forty percent

(personal communication). About 84% of the entire student body was Caucasian, and about 9% of students were African American and about 2% of students were Hispanic (personal communication).

Instrumentation

In performing the research, a four-part survey was administered to undergraduate students. Demographics assessed included participant age, gender, ethnicity, employment status, school year, school or college enrolled in, and major. Part one assessed pattern of caffeine consumption. Participants who said they did not consume caffeine were not asked questions concerning caffeine expectations or perceived social norms and settings/situations with caffeine consumption.

Part two assessed expectations with caffeine consumption. An adaptation of the Caffeine Expectancy Questionnaire (CEQ) by Heinz et al. (2009) was used with permission from the authors (personal communication). The CEQ contains 37 items for respondents to rate on a 4-point Likert scale. Each item belongs to one of four categories, based on the type of effect caffeine causes: positive, acute negative, withdrawal, and mood. When Heinz et al. developed the CEQ, they confirmed the structural, substantive, content, and external validity of the tool. The alpha coefficients were also considered good to excellent for all four categories of caffeine effects assessed by the CEQ.

Part three assessed social settings and influences for caffeine consumption. Questions were adapted with permission from Olsen's (2013) undergraduate honors thesis survey (personal communication). The researcher developed her instrument using two focus groups to ensure relevance to the college student population. Items in this

section utilized a 5-point Likert scale for participants to rate their use of settings and strength of influence.

Part four surveyed general awareness of various caffeine effects. This researcher-generated 20-item section gave statements for participants to evaluate as true, false, or "I don't know." Thirteen of the statements were true, five statements were false, and two statements were false and gave the direct opposite of caffeine's true effects (see Appendix A for a copy of the survey).

Data Collection and Analysis

Recruitment for the survey included class announcements, mass emails to the undergraduate students, a notice in the table tents of the cafeteria, and flyers posted on bulletin boards on campus. The survey was administered using the program Survey Monkey in a computer lab over two days, and the initial response was inadequate. The researcher then gained IRB approval to send the survey by email to the undergraduate student body, in order to obtain a larger sample size. The survey was not changed in any way between the first and second administration. The survey did not ask for any identifying information in order to provide participant confidentiality. The survey also did not have any known risks to participants. Benefits of participating included learning about caffeine effects after finishing the caffeine effects awareness section. Upon submission of the survey, each participant was provided with the correct answers to part four of the survey.

Incentives offered for completing the survey included baked goods and a drawing for three $10 gift cards to a local restaurant. Students who completed the survey in the computer lab turned in a slip of paper with their school email address to be used as a

raffle ticket for the drawing. Students who completed the survey through the email link were instructed to email the researcher with the subject line, "COMPLETED CAFFEINE SURVEY," in order for their emails to be included in the gift card drawing. Winners were notified using their school email addresses.

The Survey Monkey program provided basic analysis of the data. Additional tools that were used for coding and analyzing the survey results data were IBM Corp's SPSS software (2010) and Microsoft Excel 2010. The information gathered was primarily studied in descriptive terms, in an effort to gain knowledge of how college students perceive, understand, and use caffeine.

Chapter IV: Results

Introduction

The purpose of this study was to examine basic factors in the relationship between college students and caffeine consumption. This chapter provides a description of the study sample, followed by findings specific to the research questions. For the first three research questions, the findings are given for both the general sample and the subpopulations of gender and classes. Findings for the third question also examine differences in caffeine expectations between daily and less-than-daily consumers Findings for the fourth question are given for the general sample and for students in the School of Nursing in Health Sciences, who may have more educational experiences with caffeine and its effects.

Participant Demographics

Two hundred and seventeen undergraduate students participated in the survey. Of the 217 surveys, 195 were included in the data analysis of the study. Four surveys were excluded because the participants were under the age of eighteen, and this survey was not approved for use with minors. An additional eighteen surveys were excluded because the participants withdrew from the survey before completing it, leaving questions unanswered. Participant demographics are described in Tables 1 through 4.

Table 1.

Participants and Caffeine Consumption

	Count	Percent
Yes	171	87.7
No	24	12.3

Table 2.

Participants by Gender

	Count	Percent
Female	159	81.5
Male	36	18.5

Table 3.   Table 4.

Participants by Class   *Participants by College and School*

Class	Count	Percent
Freshman	46	23.6
Sophomore	46	23.6
Junior	45	23.1
Senior	47	24.1
Super Senior *	11	5.6

*Super seniors are students who are enrolled in their fifth year of school as an undergraduate student.

College or School	Count	Percent
College of Theology, Arts, & Sciences	86	44.1
School of Business & Leadership	19	9.7
School of Education & Human Development	23	11.8
School of Nursing & Health Sciences	65	33.3
Undeclared Major	2	1

Research Question 1: Basic Caffeine Consumption Patterns

Among the caffeine consumer participants, it was most common for students to consume caffeine one to three times a week (27.7 percent), followed by two to three times a day (24.1 percent) (see Figure 2). Both genders were most likely to consume caffeine one to three times a week (see Table 5 in Appendix B), as were sophomores, seniors, and super seniors. Freshmen and juniors were more likely to consume caffeine two to three times a day (see Table 6 in Appendix B).

When asked to select the times during which they regularly consume caffeine, students were most likely to say in the morning (66.2%) or in the afternoon (44.1%) (see Figure 3). The same pattern was found for both genders (see Table 7 in Appendix B), as well as for sophomores, juniors, seniors, and super seniors. The freshmen had a tie between morning and afternoon (64.1%) for times of regular caffeine consumption (see Table 8 in Appendix B).

Figure 2. Overall Frequency of Caffeine Consumption
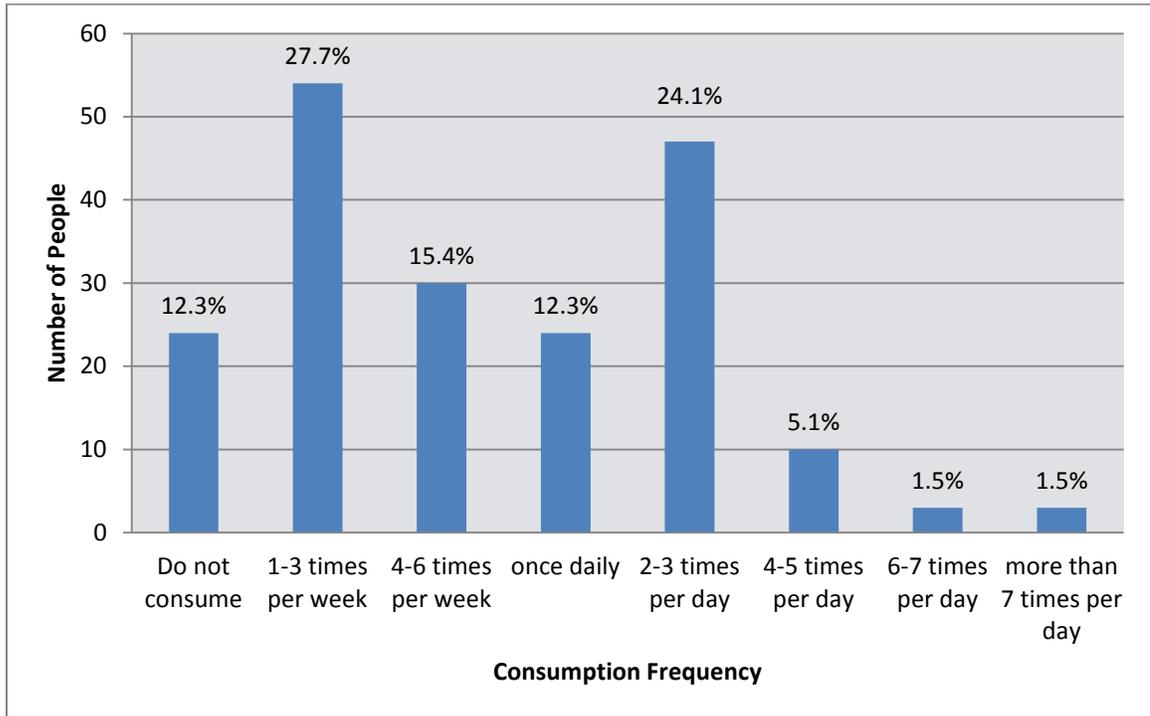
Figure 3. Timing of Regular Caffeine Consumption
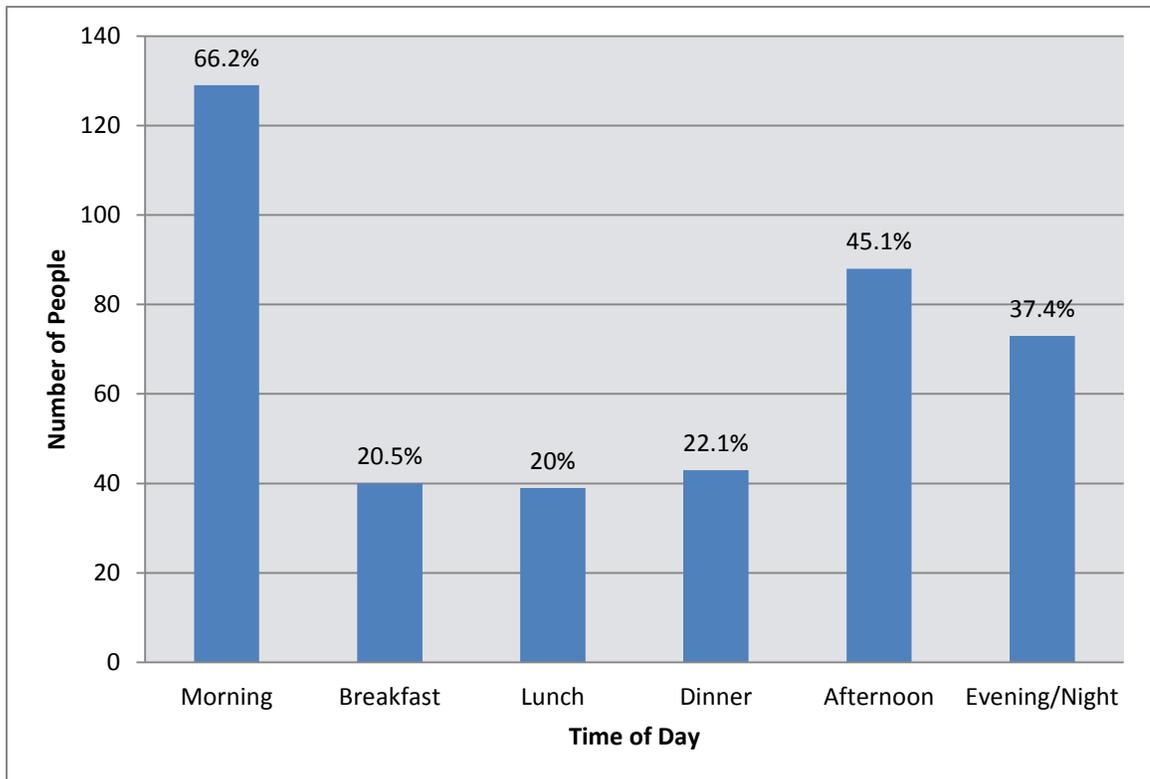
The majority of students consumed two different types of caffeinated products on a regular basis (34.9%), with coffee as the most popular product (67.2%) (see Figures 4 and 5). These findings did not change with gender or class. The second most popular caffeinated product for females, freshmen, sophomores, and seniors was tea. Males and juniors chose caffeinated soft drinks as their second product, and super seniors chose chocolate beverages such as chocolate milk or hot chocolate (see Tables 9 through 12 in Appendix B).

Figure 4. Number of Caffeine Product Types Regularly Consumed
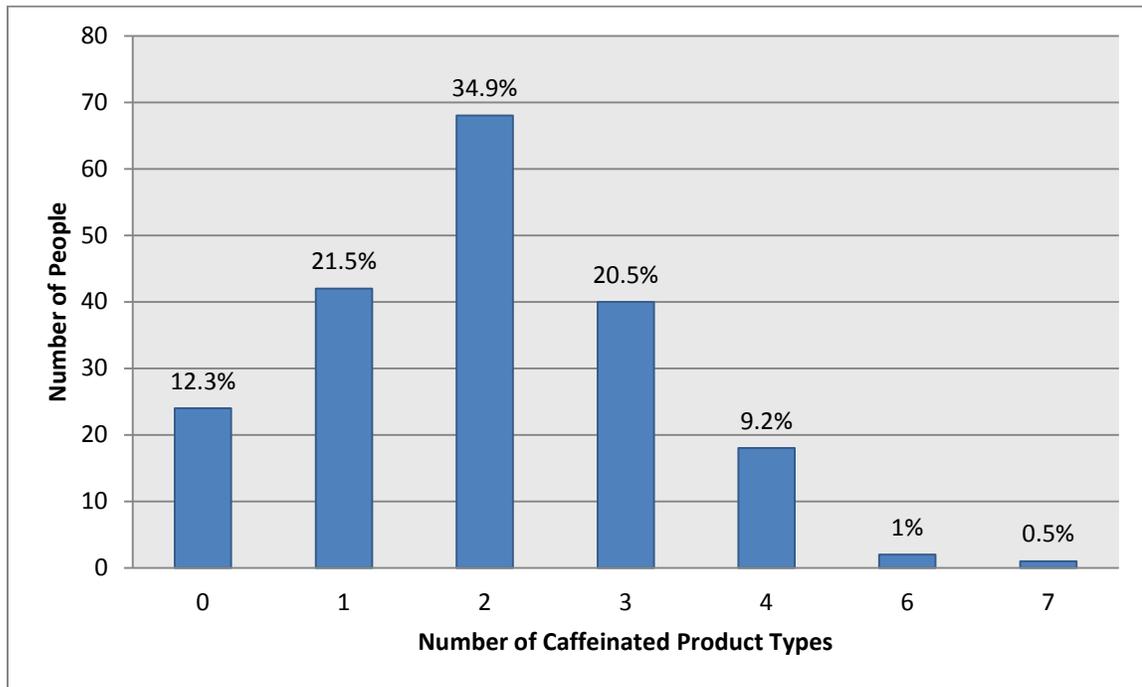
Figure 5. Popularity of Caffeinated Products
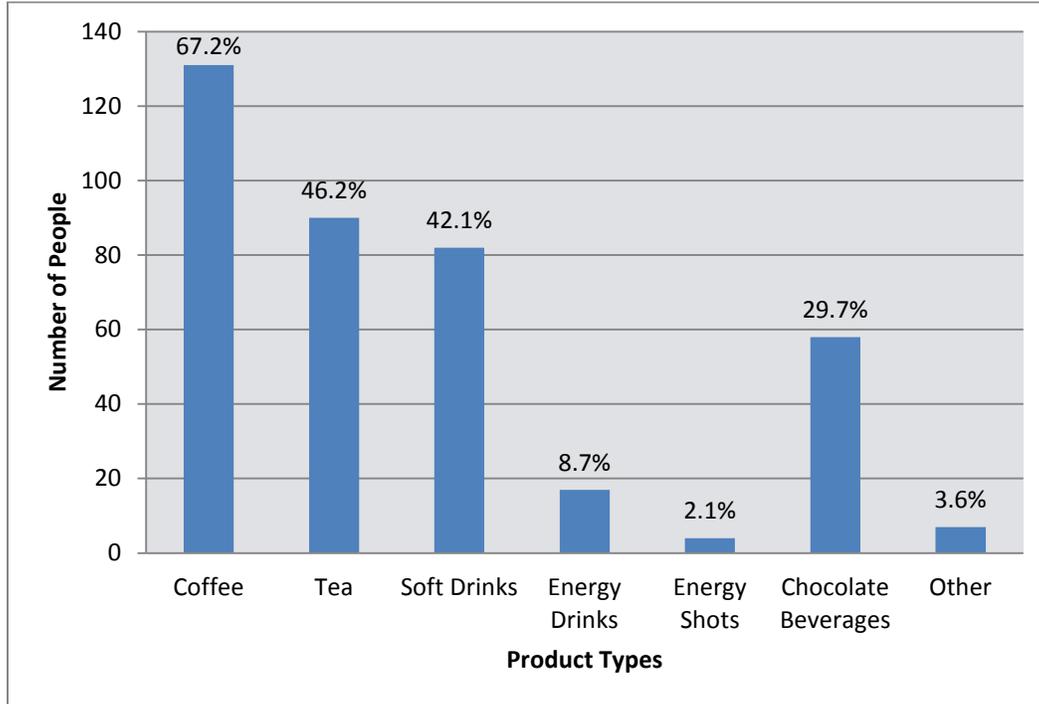
Research Question 2: Expectations of Caffeine Consumption

When asked about positive expectations of caffeine consumption, participants most often answered that they expected to be less sleepy, with 42.7% saying it was somewhat likely and 42.7% saying it was extremely likely. Feeling more energized was the second most common expectation, with 38.6% saying it was somewhat likely and 45.6% saying it was extremely likely. Feeling more alert was close in popularity, with 40.4% saying it was somewhat likely and 43.9% saying it was extremely likely (see Table 13). Regardless of gender, class, or frequency of consumption, these three expectations were the most popular, though order of prevalence varied slightly across groups (see Tables 14 through 16 in Appendix B).

Participants least expected caffeine to sharpen their memory, with 39.8% saying it was somewhat unlikely and 27.5% saying it was extremely unlikely. Feeling hyper or

Table 13

Positive Expectations of Caffeine

	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Feel more alert	10 (5.8)	17 (9.9)	69 (40.4)	75 (43.9)
Feel more energized	11 (6.4)	16 (9.4)	66 (38.6)	78 (45.6)
Feel less sleepy	9 (5.3)	16 (9.4)	73 (42.7)	73 (42.7)
Feel more talkative	26 (15.2)	48 (28.1)	69 (29.8)	28 (16.4)
Feel hyper or "jacked"	46 (26.9)	55 (32.2)	54 (29.8)	19 (11.1)
Feel more excited	26 (15.2)	65 (38.0)	59 (44.4)	21 (15.2)
Think more clearly	26 (15.2)	43 (25.1)	76 (44.4)	26 (15.2)
Pay attention more efficiently	24 (14.0)	41 (24.0)	76 (44.4)	30 (17.5)
Help sharpen memory	47 (27.5)	68 (39.8)	41 (24.0)	15 (7.7)

"jacked" was the second lowest expectation, with 32.2% saying it was somewhat unlikely and 26.9% saying it was extremely unlikely. The third lowest expectation was feeling more talkative or chatty, with 28.1% saying it was somewhat unlikely and 15.2% saying it was extremely unlikely (see Table 13). These three expectations were consistently the least expected for both genders, freshmen, and seniors. Sophomores, juniors, super seniors, and daily consumers expected caffeine would make them more excited less often than it would make them more talkative or chatty. Less-than-daily consumers expected caffeine would make them think more clearly less often than it would make them talkative or chatty (see Tables 14 through 16 in Appendix B).

Overall, none of the acutely negative expectations of caffeine were substantially prevalent among students. The most common expectation was restlessness, with 28.1% of

students saying it was somewhat likely and 5.8% saying it was extremely likely. Feeling

shaky or jittery was the second most prevalent expectation, with 25.7% saying it was

somewhat likely and 3.5% of students saying it was extremely likely. The third most

common expectation, causing the heart to race, had similar instances of expectancy with

25.7% saying it was somewhat likely and 2.9% saying it was extremely likely (see Table

17). These expectations were the most prevalent for all of the subpopulations (see Tables

18 through 20 in Appendix B).

Table 17

Acute Negative Expectations of Caffeine

	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Feel shaky or jittery	79 (46.2)	42 (24.6)	44 (25.7)	6 (3.5)
Feel tense	107 (62.6)	51 (29.8)	16 (7.6)	0 (0.0)
Heart race	68 (39.8)	54 (31.6)	44 (25.7)	5 (2.9)
Feel flushed	99 (57.9)	58 (33.9)	13 (7.6)	1 (0.6)
Feel anxious	86 (50.3)	55 (32.2)	28 (16.4)	2 (1.2)
Have trouble concentrating	100 (58.5)	54 (31.6)	17 (9.9)	0 (0.0)
Thoughts race	89 (52.0)	54 (31.6)	26 (15.2)	2 (1.2)
Restlessness	77 (45.0)	36 (21.1)	48 (28.1)	10 (5.8)

Of the acute negative expectations, participants least expected to feel tense, with

62.6% saying it was extremely unlikely and 29.8% saying it was somewhat unlikely.

Feeling flushed was the second least expected effect, with 57.9% saying it was extremely

unlikely and 33.9% saying it was somewhat unlikely. The third lowest expectation was

having trouble concentrating, with 58.5% saying it was extremely unlikely and 31.6%

saying it was somewhat unlikely (see Table 17). These three expectations were the lowest

for all of the subpopulations (see Tables 18 through 20 in Appendix B).

In general, withdrawal expectations were also less common among the

participants. Of the withdrawal expectations, participants were most likely to expect

caffeine would make them feel more content, with 18.1% saying it was extremely likely

and 49.2% saying it was somewhat likely. The next highest expectation was feeling that

the more participants used caffeine, the more addicted they would become, with 15.8%

saying it was extremely likely and 32.2% saying it was somewhat likely. Similar to the

second highest expectation, the third highest was the belief that the longer participants

used caffeine the harder it would be to quit, with 17.5% saying it was extremely likely

and 28.7% saying it was somewhat likely (see Table 21). These three expectations were

the most common for both genders, sophomores, juniors, seniors, and less-than-daily

consumers. Freshmen, super seniors, and daily consumers kept feelings of contentment as

their highest withdrawal expectation, but their second and third expectations varied.

Freshmen chose headaches and drowsiness with lack of regular consumption as their

second and third expectations. Super seniors and daily consumers had headaches without

regular consumption as their second highest expectation. Super seniors had the belief that

the more they consumed caffeine, the harder it would be to quit as their third expectation,

while daily consumers had the belief that prolonged use would lead to difficulty quitting

caffeine consumption (see Tables 22 through 24 in Appendix B).

The least common withdrawal expectation was nausea occurring without regular

caffeine consumption, with 22.2% saying it was somewhat unlikely and 69.0% saying it

Table 21

Withdrawal Expectations of Caffeine

	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Feel more content	15 (8.8)	41 (24.0)	84 (49.2)	31 (18.1)
The more I drink it, the more addicted I become	38 (22.2)	51 (29.8)	55 (32.2)	27 (15.8)
Nausea if not consumed regularly	118 (69.0)	38 (22.2)	10 (5.8)	5 (2.9)
Muscle pain or stiffness if not consumed regularly	127 (74.3)	27 (15.8)	14 (8.2)	3 (1.8)
Headaches if not consumed regularly	69 (49.4)	37 (21.6)	43 (25.1)	22 (12.9)
Drowsiness if not consumed regularly	62 (36.3)	50 (29.2)	43 (25.1)	16 (9.4)
Trouble focusing if not consumed regularly	80 (46.8)	54 (31.6)	28 (16.4)	9 (5.3)
Fatigue if not consumed regularly	76 (44.4)	45 (26.3)	34 (19.9)	16 (9.4)
Irritability if not consumed regularly	80 (48.6)	47 (27.5)	32 (18.7)	12 (7.0)
Less motivation if not consumed regularly	83 (48.5)	40 (23.4)	40 (23.4)	8 (4.7)
The longer I drink it, the harder it will be to quit	58 (33.9)	34 (19.9)	49 (28.7)	30 (17.5)

was extremely unlikely. Muscle pain or stiffness without regular caffeine consumption was the second least common expectation, with 15.8% saying it was somewhat unlikely and 74.3% saying it was extremely unlikely. Trouble focusing without regular caffeine consumption was the third least common expectation, with 31.6% saying it was somewhat unlikely and 48.6% saying it was extremely unlikely (see Table 21). These three expectations were at the bottom for females, all classes except the freshman class, and both less-than-daily and daily consumers. Males and freshman were less likely to

expect irritability without regular caffeine consumption than trouble focusing without

regular caffeine consumption (see Tables 22 through 24 in Appendix B).

When asked about mood expectations of caffeine, participants gave the highest

ratings for mood improvement, with 46.2% saying it was somewhat likely and 16.4%

saying it was extremely likely. Relaxation was the second most common expectation,

with 29.8% saying it was somewhat likely and 10.5% saying it was extremely likely. The

third most popular expectation was being more outgoing, with 28.7% saying it was

somewhat likely and 10.5% saying it was extremely likely (see Table 25). These three

expectations were the most common for females, all classes except the freshman class,

and both less-than-daily and daily consumers. Males had feeling carefree as their second

highest mood expectation, followed by relaxation. The freshmen had calming down as

their third highest expectation instead of being more outgoing (see Tables 26 through 28

in Appendix B).

The overall lowest mood expectation feeling centered, with 35.1% saying it was

somewhat unlikely and 38.0% saying it was extremely unlikely. Dealing with boredom

was the next lowest expectation, with 28.1% saying it was somewhat unlikely and 44.4%

saying it was extremely unlikely. The third lowest expectation was calming down, with

35.7% saying it was somewhat unlikely and 34.5% saying it was extremely unlikely (see

Table 25). These three expectations were the least common among males and the junior

and senior classes. Females, the freshman class, the sophomore class, the super senior

class, and both the less-than-daily and daily consumers expected to feel carefree less

often than calm with caffeine consumption (see Tables 26 through 28 in Appendix B).

Table 25

Mood Expectations of Caffeine

	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Help me relax	51 (29.8)	51 (29.8)	51 (29.8)	18 (10.5)
Feel more carefree	63 (36.8)	55 (32.2)	42 (24.6)	11 (6.4)
Help me calm down	59 (34.5)	61 (35.7)	42 (24.6)	9 (5.3)
Center me	65 (38.0)	50 (35.1)	36 (21.1)	10 (5.8)
Improve my mood	34 (19.9)	30 (17.5)	79 (46.2)	28 (16.4)
Make me more outgoing	62 (36.3)	42 (24.6)	49 (28.7)	18 (10.5)
Help me deal with boredom	76 (44.4)	48 (28.1)	34 (19.9)	13 (7.6)

Research Question 3: Social Settings and Influences

Participants most often consumed caffeine after they did not get adequate sleep, with 41.5% saying they often and 20.5% saying they always consume caffeine in this situation. The second most prevalent situation was while driving long distances, with 33.9% saying they often and 18.7% saying they always consumed caffeine during long drives. The third most prevalent situation for caffeine consumption was while participants were out with friends, with 42.7% saying they often and 8.2% saying they always consume caffeine in this situation (see Table 29). Females and the freshman students had the same top three social settings. Males were more likely to consume caffeine on a date than while out with friends. Sophomores were more likely to consume caffeine as part of their morning routine than while out with friends. Seniors consumed caffeine while doing homework more often than out with friends. Juniors and super seniors did not have

Table 29

Social Settings of Caffeine Consumption

	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)
Not enough sleep	8 (4.7)	16 (9.4)	41 (24.0)	71 (41.5)	35 (20.5)
Studying for exams	12 (7.0)	16 (9.4)	65 (28.0)	52 (30.4)	26 (15.2)
Driving long distances	13 (7.6)	23 (13.5)	45 (26.3)	58 (33.9)	32 (18.7)
With alcohol while partying	138 (80.7)	11 (6.4)	13 (7.6)	6 (3.5)	3 (1.8)
When hungover	145 (84.8)	10 (5.8)	8 (4.7)	3 (1.8)	5 (2.9)
When you have a headache	55 (32.2)	30 (17.5)	35 (20.5)	36 (21.1)	15 (8.8)
At work	34 (19.9)	18 (10.5)	57 (33.3)	47 (27.5)	15 (8.8)
Exercising or playing sports	114 (66.7)	35 (20.5)	11 (6.4)	6 (3.5)	5 (2.9)
Doing homework	15 (8.8)	21 (12.3)	59 (34.5)	62 (36.3)	14 (8.2)
On a date	45 (26.3)	28 (16.4)	56 (32.7)	32 (18.7)	10 (5.8)
Shopping	34 (19.9)	36 (21.1)	58 (33.9)	37 (21.6)	6 (3.5)
Out with friends	10 (5.8)	19 (11.1)	55 (32.2)	73 (42.7)	14 (8.2)
At a restaurant	25 (14.6)	49 (11.1)	45 (26.3)	37 (21.6)	15 (8.8)
In class	31 (18.1)	33 (19.3)	53 (31.0)	45 (26.3)	9 (5.3)
Morning routine	30 (17.5)	36 (21.1)	28 (16.4)	35 (20.5)	42 (24.6)

caffeine consumption during long drives as one of the top three consumption situations.

Instead, juniors consumed caffeine more often while doing homework and super seniors

consumed caffeine more often while studying for exams (see Tables 30 through 35 in

Appendix B).

The least common setting for caffeine consumption was during hangovers, with 84.8% saying they never and 5.8% saying they rarely consume caffeine in that situation. Similarly, the second least common setting was with alcohol while partying, with 80.7% saying they never and 6.4% saying they rarely consume caffeine in that setting. The third least common setting was while exercising or playing sports, with 66.7% saying they never and 20.5% saying they rarely consume caffeine with physical activity (see Table 29). These social settings were the least common for both genders and all classes except super seniors, who were less likely to consume caffeine in restaurants than at parties with alcohol (see Tables 30 through 35 in Appendix B).

Among social influences on caffeine consumption habits and purchases, participants were most likely to agree (33.9%) or strongly agree (12.3%) that discounts and promotions were influential. The second top influence was price, with 20.5% of participants in agreement and 7.2% in strong agreement. The third most common influence was brand loyalty, with 21.1% of participants agreeing and 6.4% strongly agreeing they were loyal to a specific brand (see Table 36). These influences were the top three for males and juniors, and the influence of discounts and promotions remained the most prevalent for females, freshmen, sophomores, and seniors. The second and third influences for those groups varied greatly, and included favorite brands for females and seniors, buying caffeinated products at any price if needed for freshmen and super seniors, returning to the same store for sophomores, and generally consuming caffeine only around other people for super seniors (see Tables 37 through 41 in Appendix B).

The least effective influence for participants was media and celebrity endorsers, with 28.1% disagreeing and 58.5% strongly disagreeing that they influenced caffeinated

Table 36

Social Influences on Caffeine Consumption

	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
You generally consume caffeine only when you're with other people.	38 (22.2)	57 (33.3)	37 (21.6)	29 (17.0)	10 (5.8)
Your peers or friends influence which type of caffeine you consume.	58 (33.9)	50 (29.2)	30 (17.5)	28 (16.4)	5 (2.9)
The media and celebrity endorsers influence which type of caffeinated beverage you prefer.	100 (58.5)	48 (28.1)	13 (7.6)	10 (5.8)	0 (0.0)
TV advertisements have persuaded you to buy certain caffeinated products.	86 (50.3)	39 (22.8)	16 (9.4)	28 (16.4)	2 (1.2)
Online advertisements have persuaded you to buy certain caffeinated products.	94 (55.0)	51 (29.8)	13 (7.6)	13 (7.6)	0 (0.0)
Promotions and discounts are important to you when buying a caffeinated beverage.	42 (24.6)	16 (9.4)	34 (19.9)	58 (33.9)	21 (12.3)
Price is the most important factor for you in making a caffeinated product choice.	38 (22.2)	37 (21.6)	47 (27.5)	35 (20.5)	14 (7.2)
If you need caffeine, you will buy a caffeinated product at any price.	58 (33.9)	48 (28.1)	30 (17.5)	24 (14.0)	11 (6.4)
You buy products with caffeine strictly for the effects of caffeine.	52 (30.4)	61 (35.7)	34 (19.9)	17 (9.9)	7 (4.1)
You consider yourself brand loyal for specific caffeinated beverages.	44 (25.7)	43 (25.1)	37 (21.6)	36 (21.1)	11 (6.4)
You will go out of your way to purchase your favorite brand of caffeinated product.	49 (28.7)	43 (25.1)	36 (21.1)	33 (19.3)	10 (5.8)
You always go to the same store to get caffeinated products.	59 (34.5)	45 (26.3)	35 (20.5)	27 (15.8)	5 (2.9)

beverage preferences. The second lowest influence was online advertising, with 29.8%

disagreeing and 55.0% strongly disagreeing that online advertisements influence

caffeinated beverage purchases. Similarly, the third lowest influence was television

advertising, with 22.8% disagreeing and 50.3% strongly disagreeing that television

commercials influence caffeinated beverage purchases (see Table 36). These three social

influences were also the least effective for females, freshmen, sophomores, and seniors.

Males and super seniors were less influenced by peers and friends in making caffeinated

beverage decisions than by television advertisements. Juniors were less often persuaded

to buy needed caffeine regardless of price than to be influenced by television

advertisements (see Tables 37 through 41 in Appendix B).

Research Question 4: Awareness of Caffeine Effects

Participants were most often aware that caffeine can cause a fast or abnormal

heart rate (91.3%), followed by insomnia (79.0%) and that caffeine does not have fewer

effects for those under the age of 30 (61.0%). They were least aware that caffeine does

not change the effectiveness of antihistamine decongestants (3.6%), followed by

caffeine's ability to reduce the risk of kidney stones (5.6%) and that caffeine is linked to

miscarriage and premature births (25.1%). Participants most often would incorrectly

assume caffeine causes constipation (37.9%), followed by the belief that caffeine does

not reduce the risk of kidney stones (33.8%) and that caffeine affects antihistamine

decongestants (30.3%). The most ignorance was seen with caffeine's lack of effects on

antihistamine decongestants (66.2%), followed by the link between caffeine and

miscarriages and premature births (65.6%) and caffeine's inability to help skin wounds

heal (64.6%) (see Table 42).

Generally, the participants had a moderate grasp of caffeine's health effects, with

50.2% of the participants correctly acknowledging at least half of the provided

statements. Students in the School of Nursing and Health Sciences generally had better

scores, with 61.5% of students who correctly acknowledged at least half of the statements

compared to 44.9% of other students (see Tables 44 and 45 in Appendix B). The

ignorance of caffeine effects, however, is still substantial with 41.5% of all participants

admitting they did not know how to respond to at least half of the statements

Table 42

Overall Caffeine Effect Awareness

	Number Correct (%)	Number Incorrect (%)	Number who Didn't Know (%)
Relieves headache pain	99 (50.8)	35 (17.9)	61 (31.3)
Reduces kidney stone risk	11 (5.6)	66 (33.8)	118 (60.5)
Prescribed to reduce drowsiness	103 (52.8)	29 (14.9)	63 (32.3)
Reduces severity of PMS	56 (28.7)	38 (19.5)	101 (51.8)
Helps skin wounds heal	57 (29.2)	12 (6.2)	126 (64.6)
Causes fast or abnormal heart rate	178 (91.3)	4 (2.1)	13 (6.7)
Lowers blood pressure	114 (58.5)	8 (4.1)	73 (37.4)
Increases stomach acid production	105 (53.8)	9 (4.6)	81 (41.5)
Causes constipation	63 (32.3)	74 (37.9)	74 (37.9)
Helps build muscle	113 (57.9)	5 (2.6)	77 (39.5)
Passes through breastmilk	102 (52.3)	6 (3.1)	87 (44.6)
Linked to miscarriage, premature births	49 (25.1)	18 (9.2)	128 (65.6)
Causes insomnia	154 (79.0)	4 (2.1)	37 (19.0)
Lowers stress hormone levels	65 (33.3)	28 (14.4)	102 (52.5)
Changes effectiveness of blood pressure meds	105 (53.8)	5 (2.6)	85 (43.6)
Changes effectiveness of antihistamine decongestants	7 (3.6)	59 (30.3)	129 (66.2)
Changes effectiveness of anti-seizure meds	78 (40.0)	6 (3.1)	111 (56.9)
Change effectiveness of antidepressants	93 (47.7)	6 (3.1)	96 (49.2)
Ingredient in some painkiller meds	107 (54.9)	4 (2.1)	84 (43.1)
Less effects for those under age 30	119 (61.0)	10 (5.1)	66 (33.8)

(see Table 43). Students outside the School of Nursing and Health Sciences often were more ignorant, with 48.4% not knowing how to respond to at least half of the statements compared to 27.7% of students in the School of Nursing and Health Sciences (see Tables 44 and 45 in Appendix B).

Table 43

Overall Caffeine Effect Awareness Scores

	≤25%	25% to <50%	50% to <75%	≥75%
Correct	30 (15.4%)	67 (34.5%)	80 (41.0%)	18 (9.2%)
Incorrect	173 (88.7%)	21 (11.3%)	1 (0.5%)	0 (0.0%)
Didn't Know	44 (22.6%)	70 (50.0%)	47 (24.1%)	34 (17.4%)

Summary

Caffeine consumption habits among college students showed about half of the students were less-than-daily consumers, and the other half were daily consumers. College students typically consumed at least two different types of caffeinated products, with coffee as the most popular product. Morning was the most common time of day for consumption, followed by the afternoon. Of the caffeine expectations, the positive effects were the most anticipated, with decreased sleepiness and increased energy as the most prevalent expectations. Restlessness and feeling shaky or jittery were the most common acute negative expectations. The most prevalent withdrawal expectation was feeling content, followed by addiction with increased caffeine usage and difficulty quitting with prolonged use. Mood improvement, relaxation, and becoming more outgoing were the most common mood expectations. The most common social settings for caffeine use were after times of inadequate sleep, during long drives, and while out with friends. The

most common social influences were promotions or discounts, price, and brand loyalty. The most recognized caffeine effects were tachycardia and dysrhythmia, insomnia, and caffeine's effects are not less severe for people under age 30. Students in the School of Nursing and Health Sciences were able to correctly answer questions about caffeine effects more often than other students.

Chapter V: Discussion and Implications for Further Work

Introduction

This chapter provides an interpretation of the study's findings and how they relate to prior research on caffeine and college students. Limitations of the study are discussed in terms of sampling methods and instrumentation. Implications for further research and nursing practice are given based on the findings of the study.

Review of the Research Results

Basic caffeine consumption patterns. In this study, caffeine consumers fell almost evenly into one of two groups: less-than-daily consumers (n=84) and daily consumers (n=87). Students were more likely to consume caffeine outside of meals, which contradicts Norton et al.'s (2011) findings in which mealtimes were the most common situations for caffeine consumption. There were no significant differences between gender and frequency of caffeine consumption, or between class and frequency of caffeine consumption. Unlike this study, Penolazzi et al. (2012) found in a general adult population that males had significantly higher caffeine intake than females. Similar to this study, Norton et al.'s (2011) research with a college population did not show a significant difference between genders and caffeine intake, but they did find that upperclassmen generally had higher intakes than underclassmen. In this study, high-density caffeinated beverages like energy drinks and energy shots were slightly more often used by freshmen than other classes, indicating their total caffeine intake may be slightly higher. However, statistical significance was not established in this finding. Perhaps in this study's sample, the similar situations faced by both genders and all classes

while in college did not influence any one group to consume caffeine in significantly higher amounts.

All classes and genders typically consumed at least two products on a regular basis, indicating that multiple caffeinated beverages are popular with college students. Coffee was the most popular among all groups, followed by tea, soft drinks, chocolate beverages, energy drinks, and energy shots. Penolazzi et al. (2012) found a similar order in product popularity among his adult population, as did Olsen (2013) among her college student population. Norton et al. (2011), however, found soft drinks to be the most popular product among his college-student population. Penolazzi et al. (2012) also found coffee consumption to be more prevalent among males and tea consumption among females. In this study, females chose tea as their second most prevalent beverage and males chose soft drinks.

Caffeine expectations. In general, the positive expectations of caffeine were the most prevalent, followed by mood expectations, withdrawal expectations, and acute negative expectations. Daily consumers generally had higher caffeine expectations related to withdrawal and mood effects, which is unsurprising due to their increased risk for dependence upon caffeine with increased consumption. Both genders and all of the classes had consistently similar ratings for each category of expectations. Other studies have found combatting fatigue and energy enhancement to be strong expectations for caffeine consumption (Bunting et al., 2013; Ludden & Wolfson, 2010; Olsen, 2013). Similar results were found in this study, with the expectations of feeling less sleepy and more energized consistently being reported as the most often expected in the general sample and among different subpopulations.

Social settings and influences. School-related situations were fairly common among all participants for caffeine use, with likelihoods of 40% or more. These situations included times when they lacked sleep, were studying for exams, or doing homework. Upperclassmen were slightly more inclined to consume caffeine when lacking sleep, which supports Norton et al.'s (2011) findings. Their other findings about upperclassmen being more likely to consume caffeine while studying or driving were not supported by this study. Norton et al. (2011) also found that men were more likely to use caffeine with alcohol or during long drives, while women were more likely to use caffeine after not getting enough sleep. Those findings also did not occur in this study. Norton et al. (2011) did not find significant differences between genders in the situations of exercising or going out with friends, but this study showed men as more likely to consume caffeine while exercising and women as more likely to consume caffeine while out with friends.

With the exception of being out with friends, other social situations were not as prevalent in this study. These situations, which often fell short of 35% likelihood, included while at work, at restaurants, on dates, shopping, and exercising or playing sports. All of these situation-related findings are similar to those in Olsen's (2013) work with college students. Alcohol-related situations were the lowest ranked, with both consistently having less than 10% likelihood. This finding is not surprising with the institution's no-alcohol policy, which likely increased the number of participants who do not consume alcohol regularly.

Price-related influences were the most significant among the participants, followed by brand loyalty. On the other hand, different forms of advertisements including celebrity endorsements, television advertisements, and online advertisements were the

least influential with caffeine purchases and decisions. Peer and friend influences were moderate among most subpopulations, with the exceptions of males and super seniors. All of these influence patterns in the general college population were similarly found in Olsen's (2013) work with college students.

Awareness of caffeine effects. Participants were the most accurate in responding to cardiovascular effects of caffeine, with all three statements achieving over 50% of correct responses. Caffeine's sleep effects of reducing drowsiness and causing insomnia were also better recognized among participants with over 50% achieving correct responses. The two gastrointestinal effects provided mixed results: Over half of the participants knew that caffeine increases gastric acid production, but only a third recognized that caffeine does not cause constipation. Reproductive effects also had mixed results: While about half of the participants recognized that caffeine can pass through breastmilk, only about a quarter recognized that caffeine can reduce the severity of PMS and that caffeine is linked to miscarriage and premature births. Medication effects were moderately recognized, with about half of the participants correctly identifying that caffeine can affect blood pressure medications and antidepressants and that caffeine is an ingredient in some pain medications. Only 40% of participants knew that caffeine affects anti-seizure medications and less than 5% knew that caffeine does not affect antihistamine decongestants.

As expected, the students in the School of Nursing and Health Sciences responded to more statements correctly than other students. The students in the School of Nursing and Health Sciences answered questions correctly about 15% more often than other students, and their "don't know" responses were 20% less often than other students. With

their training in health professions, it is important that they recognize how caffeine can affect many different body systems.

Study Limitations

Limitations of this study included difficulties with the cross-sectional design, study sample, instrument size, and the use of newer assessment tools. The cross-sectional design of the study caused the findings concerning caffeine consumption habits to rely entirely upon students' self-recall. While the use of caffeine intake journals would have provided a more reliable report of students' consumption patterns, that method is more in-depth and beyond the scope of this study.

Using a single site and a convenience sample easily results in samples that are homogenous, which hinders any kind of generalization made from the findings. The students of the university had a large Caucasian and Christian population, which limits any generalizations about the general college populations. Furthermore, the lack of male participants and the small representations of each class prevented any substantial, reliable conclusions from being made about those subpopulations.

In the survey development, the researcher recognized that the entire instrument was quite long, the developed section four was untested, and the adapted sections were previously used only once. With the length of the survey, participants may have experienced survey fatigue and carelessly answered some of the later questions as their interest waned. Downsizing the survey to a more manageable length would have prevented survey fatigue for some participants. While the CEQ developers demonstrated the validity of their instrument (Heinz et al., 2009), it has not been used repeatedly in different settings to establish reliability. Olsen's (2013) survey was developed using

focus groups to ensure relevancy to the college student population but did have

established validity or reliability. Further use of these assessment tools would help to

validate and show reliability with the results of this study.

Implications for Further Research and Nursing Practice

Further research needs to be done with each section of this study to see if the

results were reliable and reproducible and to add to the understanding of caffeine usage.

Caffeine consumption habits need to be studied prospectively to see whether a population

is overconsuming caffeine and experiencing any harmful health effects as a result.

Studies on caffeine expectations should be expanded to include different ages and

populations to see if differences exist. Cultural studies with caffeine should also be

performed to see if cultural and home influences affect caffeine expectations and reasons

for use. Studies on social settings and influences should be expanded to see if personal or

social influences encourage caffeine use in different settings. Possible deterrent

influences should also be studied in order to discover what motivates people to avoid

caffeine consumption. Effects awareness is an especially understudied area of caffeine-

related research and should be expanded. Discovering where people learn about different

effects of caffeine (i.e., personal experience, family or friends, school, or health

providers) could provide insights into which effects are emphasized and which are missed

in spreading awareness. Awareness of effects relevant to specific populations should be

studied to see if there are increasing health risks with unawareness.

The findings of this study should challenge nurses to examine the phenomena of

caffeine consumption in their own lives. As models for health behavior, nurses should be

aware of how much caffeine they consume, whether they have healthy expectations for

caffeine, and what social influences may affect their decisions to consume caffeine. They should recognize that patients' unhealthy caffeine use may be influenced by unhealthy expectations, such as withdrawal avoidance or dependence upon caffeine for combating fatigue or poor mood. Nurses should also be prepared to explain the effects of caffeine to patients at risk for health effects, including patients with cardiovascular disease or sleep disorders, female patients of childbearing age, and patients who take prescriptions that can be affected by caffeine.

Conclusion

The high consumption of caffeine among college students is a concern to health professionals, especially since little is understood about the expectations and effects awareness for caffeine among college students. This study provided a basic description of caffeine consumption factors using the Theory of Planned Behavior. Assessments of caffeine consumption habits showed that students could be evenly classified as less-than-daily and daily consumers, that students regularly consume at least two beverages, that coffee is the most popular beverage, and that caffeine consumption often occurs without regard for meals. Through the use of the Caffeine Expectations Questionnaire, it became evident that the majority of students expect the positive effects of caffeine such as decreased fatigue and increased energy. Daily consumers were also found to have stronger expectations than less-than-daily consumers for withdrawal and mood effects of caffeine. Common settings for caffeine consumption were most often related to school, followed by social settings with peers or friends. The strongest influences for caffeine consumption and purchases were price and brand loyalty. Caffeine effects awareness was moderate among college students, with cardiovascular and sleep effects as the most

recognized, followed by digestive, reproductive, and medication effects. Further research on caffeine should cover each of the areas outlined by the Theory of Planned Behavior in order to better understand the phenomena of caffeine consumption among college students. From these findings, the nursing profession should recognize the need to model healthy caffeine consumption behaviors and the need for improved education concerning caffeine side effects.

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Appendix A

Survey

<u>Consent from Participant</u>
This survey is a research component for the honors thesis written by Holly Kreis, and she is a senior nursing major at Malone University. Completing the survey will present minimal risk to you, since all research presents some degree of risk. The purpose of this research is to understand and analyze the caffeine consumption habits, expectations, social settings and norms, and effect awareness among Malone University students. Only the researcher, her advisor, and thesis committee members will have access to the data and the data will be reported in an aggregate format without using any names; in other words, participants will remain anonymous. Students who complete the survey may give their school email address to be entered in a drawing for one of three $10 gift certificates to Milk & Honey, a local diner and ice cream shop in Canton, Ohio. These email addresses will be collected separate from the survey data, to allow results to remain anonymous.
The following survey should take about 10 minutes to complete. If you would prefer not to participate and withdraw your answers, you may simply exit the web browser at any time. Your responses are anonymous; therefore, you should not include any identifying information on this survey. If you chose to complete the survey, your consent to use the survey response as part of the research data will be implied.
If you have any questions, you may contact the following individuals:
Research Director:
Holly Kreis
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Malone University's Human Research Committee of the Institutional Review Board [IRB] has approved the use of human subjects in this study. The committee is responsible for oversight of ethical practices in human research at Malone. If you have questions about your rights as a research subject you can contact Dr. Lauren Seifert, Professor of Psychology, who chairs the Human Research Committee of the IRB at Malone University. Dr. Seifert can be reached at lseifert@malone.edu, should you have any questions.

Start the Survey
Exit the Survey

Demographic Questions:
1. What is your age? (Note: If the participant selects "Under 18," the survey will automatically skip to the end and thank the participant for participating. Survey responses will not be collected from minors.)
    a. Under 18
    b. 18
    c. 19
    d. 20
    e. 21
    f. 22
    g. 23
    h. 24
    i. 25 or older
2. What is your gender?
    a. Male
    b. Female
3. What is your ethnicity?
    a. African American
    b. Asian
    c. Caucasian
    d. Hispanic/Latino
    e. American Indian or Alaska Native
    f. Native Hawaiian or other Pacific Islander
    g. Mixed race (specify): _____
    h. Other (specify): _____
4. What is your employment status?
    a. Full time
    b. Part time
    c. Student only
5. What year are you in college?
    a. 1st year/freshman
    b. 2nd year/sophomore
    c. 3rd year/junior
    d. 4th year/senior
    e. 5th year/super-senior
6. What college/school are you enrolled in?
    a. College of Theology, Arts & Sciences
    b. School of Business & Leadership
    c. School of Education & Human Development
    d. School of Nursing and Health Sciences
7. What is your primary major? _____

<u>Research Topic #1: Caffeine Consumption</u>

1. Do you consume caffeine?
   a. Yes
   b. No

(Note: If the answer is no, skip to section 4)

2. At what age did you start consuming caffeine?
   a. Under age 8
   b. 8-12
   c. 12-16
   d. 16-18
   e. 18-20
   f. Over age 20

3. How often do you consume caffeinated beverages?
   a. 1-3 times a week
   b. 4-6 times a week
   c. 1 time a day
   d. 2-3 times a day
   e. 4-5 times a day
   f. 6-7 times a day
   g. More than 7 times a day

4. What times of day do you usually consume caffeine? (select all that apply)
   a. In the morning
   b. At breakfast
   c. At lunch
   d. At dinner
   e. During the afternoon
   f. During the evening/night

5. What sources of caffeine do you regularly consume? (select all that apply)
   a. Coffee
   b. Tea (iced or hot)
   c. Caffeinated soft drinks (i.e., Pepsi, Coke, Mountain Dew, etc.)
   d. Energy drinks (i.e., Red Bull, Nos, Monster, etc.)
   e. Energy shots (i.e., 5 Hour Energy)
   f. Chocolate milk or hot chocolate

6. Where do you regularly get your caffeinated beverages? (select all that apply)
   a. Starbucks
   b. Dunkin' Donuts
   c. McDonalds or other fast food restaurants
   d. Panera Bread
   e. Other coffee or tea shop (Please specify: _____)
   f. Campus cafeteria or cafés
   g. Prepared at home (i.e., using a Keurig, coffee maker, instant coffee blends, or tea bags)
   h. Store bought (i.e., bottled coffee or tea, energy drinks, caffeinated soft drinks, energy shots)

Research Topics #2: Caffeine Expectations

Note: Questions regarding expectations of caffeine consumption will utilize an adapted version of the Caffeine Expectations Questionnaire by Heinz, Kassel, and Smith (2009). Below is a list of expectations from caffeine that one might have. Please read them carefully and check the number that corresponds to how likely you consume caffeine with these expectations in mind. Use the scale below:

1 = extremely unlikely
2 = somewhat unlikely
3 = somewhat likely
4 = extremely likely

I consume caffeine expecting:

1. I will feel more content   1 2 3 4
2. I will feel more alert   1 2 3 4
3. I will feel more energized   1 2 3 4
4. I will feel less sleepy   1 2 3 4
5. I will feel more talkative or chatty   1 2 3 4
6. I will feel more hyper or jacked   1 2 3 4
7. I will feel more excited   1 2 3 4
8. The more I drink, the more addicted I become   1 2 3 4
9. Nausea if I don't consume it regularly   1 2 3 4
10. Muscle pain/stiffness if I don't consume it regularly   1 2 3 4
11. Headaches if I don't consume it regularly   1 2 3 4
12. Drowsiness if I don't consume it regularly   1 2 3 4
13. Trouble focusing if I don't consume it regularly   1 2 3 4
14. Fatigue if I don't consume it regularly   1 2 3 4
15. Irritability/poor mood if I don't consume it regularly   1 2 3 4
16. Less motivation if I don't consume it regularly   1 2 3 4
17. The longer I drink it, the harder it will be to quit   1 2 3 4
18. I will be able to think more clearly   1 2 3 4
19. I will be able to pay attention more efficiently   1 2 3 4
20. It will help sharpen my memory   1 2 3 4
21. It will cause me to shake or be jittery   1 2 3 4
22. It will make me tense   1 2 3 4
23. It will make my heart race   1 2 3 4
24. It will make me feel flushed   1 2 3 4
25. It will make me feel anxious   1 2 3 4
26. It will make me have trouble concentrating   1 2 3 4
27. It will make my thoughts race   1 2 3 4
28. It will make me restless   1 2 3 4
29. It will help me relax   1 2 3 4
30. It will help me feel more carefree   1 2 3 4
31. It will help me calm down   1 2 3 4
32. It will help to center me   1 2 3 4
33. It will improve my mood   1 2 3 4
34. It will help me be more outgoing   1 2 3 4
35. It will help me deal with boredom   1 2 3 4

Research Topic #3: Social expectations and settings
Note: Parts of this section were developed using an adaptation of Olsen's (2013) survey of college students at the University of New Hampshire.

Use the following scale to answer the next set of questions:
0 = never
1 = rarely
2 = sometimes
3 = often
4 = always
How often do you consume a caffeinated beverage in the described circumstance or situation?
1. When you didn't get enough sleep   0 1 2 3 4
2. Studying for an exam   0 1 2 3 4
3. Driving long distances   0 1 2 3 4
4. Drinking with alcohol while partying   0 1 2 3 4
5. When hungover   0 1 2 3 4
6. When you have a headache   0 1 2 3 4
7. At work   0 1 2 3 4
8. Exercising or playing sports   0 1 2 3 4
9. Doing homework   0 1 2 3 4
10. On a date   0 1 2 3 4
11. Running errands or while shopping   0 1 2 3 4
12. Out with friends   0 1 2 3 4
13. At a restaurant   0 1 2 3 4
14. In class   0 1 2 3 4
15. As part of my morning routine   0 1 2 3 4
16. Other (please specify: _____)   0 1 2 3 4

Using the scale below, indicate how strongly these statements apply to you:
1 = strongly disagree
2 = disagree
3 = neutral
4 = agree
5 = strongly agree
1. You generally consume caffeine only when you are with other people   1 2 3 4 5
2. Your peers or friends influence which type of caffeine you consume   1 2 3 4 5
3. The media and celebrity endorsers influence which type of caffeine you prefer 1 2 3 4 5
4. TV advertisements have persuaded you to buy certain caffeinated products   1 2 3 4 5
5. Online advertisements have persuaded you to buy certain caffeinated products   1 2 3 4 5
6. Promotions and discounts are important to you when buying a caffeinated beverage 1 2 3 4 5
7. Price is the most important factor for you in the caffeine product choice   1 2 3 4 5
8. If you need caffeine, you will buy a caffeinated product at any price   1 2 3 4 5
9. You buy products with caffeine strictly for the effects of caffeine   1 2 3 4 5
10. You consider yourself brand loyal for specific caffeinated beverages   1 2 3 4 5
11. You will go out of your way to purchase your favorite brand of caffeinated product 1 2 3 4 5
12. You always go to the same store to get caffeinated products   1 2 3 4 5

Research Topic #4: Awareness of caffeine side effects
Note: Part of this section was developed using Olsen's (2013) survey of college students at the University of New Hampshire.
Using the scale below, indicate how strongly these statements apply to you:
1 = strongly disagree
2 = disagree
3 = neutral
4 = agree
5 = strongly agree

  1. You are addicted to caffeine   1 2 3 4 5
  2. You need caffeine to function throughout the day   1 2 3 4 5
  3. Consuming too much caffeine is unhealthy   1 2 3 4 5
  4. The benefits of consuming caffeine outweigh the risks   1 2 3 4 5
  5. You don't pay attention to how much caffeine is in the beverages you drink 1 2 3 4 5
  6. Mixing alcohol with caffeine is safe   1 2 3 4 5

Respond to the following statements with true, false, or don't know:
1. Caffeine has been proven to relieve headache pain   true   false   don't know
2. Caffeine can reduce the risk of kidney stones   true   false   don't know
3. Caffeine has been prescribed to reduce drowsiness   true   false   don't know
4. Caffeine can reduce the severity of premenstrual syndrome (PMS) true   false   don't know
5. Caffeine helps skin wounds heal more quickly   true   false   don't know
6. Caffeine can cause fast or abnormal heart rate   true   false   don't know
7. Caffeine lowers blood pressure   true   false   don't know
8. Caffeine increases acid production in the stomach   true   false   don't know
9. Caffeine can cause constipation   true   false   don't know
10. Caffeine helps build muscle   true   false   don't know
11. Caffeine can pass through the breastmilk to a baby   true   false   don't know
12. Caffeine has been linked to miscarriage and premature births true   false   don't know
13. Caffeine can cause insomnia   true   false   don't know
14. Caffeine lowers levels of stress hormones   true   false   don't know
15. Caffeine changes the effectiveness of blood pressure medications true false   don't know
16. Caffeine changes the effectiveness of antihistamine decongestants true false   don't know
17. Caffeine changes the effectiveness of anti-seizure medications true   false   don't know
18. Caffeine changes the effectiveness of antidepressants   true   false   don't know
19. Caffeine is an ingredient in some painkiller medications   true   false   don't know
20. Caffeine doesn't have as many effects on people under the age of 30 true false don't know

Actual Answers

Respond to the following statements with true, false, or don't know:
1. Caffeine has been proven to relieve headache pain	**true**
2. Caffeine can reduce the risk of kidney stones	**true**
3. Caffeine has been prescribed to reduce drowsiness	**true**
4. Caffeine can reduce the severity of premenstrual syndrome (PMS)	**true**
5. Caffeine helps skin wounds heal more quickly	**false**
6. Caffeine can cause fast or abnormal heart rate	**true**
7. Caffeine lowers blood pressure	**false**

(Caffeine can actually raise blood pressure.)
8. Caffeine increases acid production in the stomach	**true**
9. Caffeine can cause constipation	**false**
10. Caffeine helps build muscle	**false**
11. Caffeine can pass through the breastmilk to a baby	**true**
12. Caffeine has been linked to miscarriage and premature births	**true**
13. Caffeine can cause insomnia	**true**
14. Caffeine lowers levels of stress hormones	**false**

(Caffeine can actually raise stress hormone levels.)
15. Caffeine changes the effectiveness of blood pressure medications	**true**
16. Caffeine changes the effectiveness of antihistamine decongestants	**false**
17. Caffeine changes the effectiveness of anti-seizure medications	**true**
18. Caffeine changes the effectiveness of antidepressants	**true**
19. Caffeine is an ingredient in some painkiller medications	**true**
20. Caffeine doesn't have as many effects on people under the age of 30	**false**

Appendix B

Tables

Table 5

Gender and Caffeine Consumption Frequency

Frequency of Caffeine Consumption	Do not consume (%)	1-3 times per week (%)	4-6 times per week (%)	once daily (%)	2-3 times per day (%)	4-5 times per day (%)	6-7 times per day (%)	more than 7 per day (%)
Females (n=159)	19 (11.9)	45 (28.3)	24 (15.1)	20 (12.6)	40 (25.2)	9 (5.6)	1 (0.6)	1 (0.6)
Males (n=36)	5 (13.9)	9 (25)	6 (16.7)	4 (11.1)	7 (19.4)	1 (2.8)	2 (5.6)	2 (5.6)

Table 6

Class and Frequency of Caffeine Consumption

How often caffeine is consumed	Do not consume (%)	1-3 times per week (%)	4-6 times per week (%)	once daily (%)	2-3 times per day (%)	4-5 times per day (%)	6-7 times per day (%)	more than 7 times per day (%)
Freshman (n=46)	7 (17.9)	11 (23.9)	2 (4.3)	6 (13.0)	12 (26.1)	4 (8.7)	1 (2.2)	3 (6.5)
Sophomore (n=46)	9 (19.6)	13 (28.3)	6 (13.0)	7 (17.9)	10 (21.7)	1 (2.2)	0 (0.0)	0 (0.0)
Junior (n=45)	6 (13.3)	12 (26.7)	12 (26.7)	0 (0.0)	13 (28.9)	2 (4.4)	0 (0.0)	0 (0.0)
Senior (n=47)	2 (4.3)	13 (27.7)	9 (19.1)	8 (17.0)	12 (25.5)	2 (4.3)	1 (2.1)	0 (0.0)
Super Senior (n=11)	0 (0.0)	5 (4.5)	1 (9.1)	3 (27.3)	0 (0.0)	1 (9.1)	1 (9.1)	0 (0.0)

Table 7

Gender and Times of Regular Caffeine Consumption

Time of Day	Morning (%)	Breakfast (%)	Lunch (%)	Dinner (%)	Afternoon (%)	Evening or Night (%)
Females (n=140)	105 (75.0)	31 (22.1)	32 (22.9)	33 (23.6)	72 (51.4)	59 (42.1)
Males (n=31)	24 (77.4)	9 (29.0)	7 (22.6)	10 (32.3)	16 (51.6)	14 (45.2)

Table 8

Class and Times of Regular Caffeine Consumption

Times of Consumption	Morning (%)	Breakfast (%)	Lunch (%)	Dinner (%)	Afternoon (%)	Evening or Night (%)
Freshman (n=39)	25 (64.1)	12 (30.8)	13 (33.3)	13 (33.3)	25 (64.1)	19 (48.7)
Sophomore (n=37)	27 (73.0)	4 (10.8)	6 (16.2)	9 (24.3)	17 (45.9)	15 (40.5)
Junior (n=39)	31 (79.5)	7 (17.9)	6 (15.4)	7 (17.9)	20 (51.3)	18 (46.2)
Senior (n=45)	37 (82.2)	16 (35.6)	13 (28.9)	11 (24.4)	20 (44.4)	16 (35.6)
Super Senior (n=11)	9 (81.8)	1 (9.1)	1 (9.1)	3 (27.3)	6 (54.5)	5 (45.5)

Table 9

Gender and Number of Caffeine Sources Consumed Regularly

Number of Caffeine Sources	0 (%)	1 (%)	2 (%)	3 (%)	4 (%)	6 (%)	7 (%)
Female (n=140)	19 (11.9)	32 (20.1)	55 (34.6)	34 (21.4)	18 (11.3)	1 (0.6)	0 (0.0)
Male (n=31)	5 (13.9)	10 (27.8)	13 (36.1)	6 (16.7)	0 (0.0)	1 (2.8)	1 (2.8)

Table 10

Class and Number of Caffeine Sources Regularly Consumed

Number of Caffeine Sources	0 (%)	1 (%)	2 (%)	3 (%)	4 (%)	6 (%)	7 (%)
Freshman (n=39)	7 (15.2)	9 (19.6)	13 (28.3)	10 (21.7)	4 (8.7)	2 (4.3)	1 (2.2)
Sophomore (n=37)	9 (19.6)	10 (21.7)	16 (34.8)	7 (15.2)	4 (8.7)	0 (0.0)	0 (0.0)
Junior (n=39)	6 (13.3)	10 (22.2)	16 (35.6)	9 (20.0)	4 (8.9)	0 (0.0)	0 (0.0)
Senior (n=45)	2 (4.3)	11 (23.4)	18 (38.3)	11 (23.4)	5 (10.6)	0 (0.0)	0 (0.0)
Super Senior (n=11)	0 (0.0)	2 (18.2)	5 (45.5)	3 (27.3)	1 (9.1)	0 (0.0)	0 (0.0)

Table 11

Gender and Caffeinated Product Types

Caffeinated Product	Coffee (%)	Tea (%)	Soft Drinks (%)	Energy Drinks (%)	Energy Shots (%)	Chocolate Drinks (%)	Other (%)
Female (n=140)	111 (79.3)	77 (55.0)	64 (45.7)	13 (9.3)	2 (1.4)	51 (36.4)	4 (2.9)
Male (n=31)	20 (64.5)	13 (41.9)	18 (58.1)	4 (12.9)	2 (6.5)	7 (22.6)	3 (9.7)

Table 12

Class and Caffeinated Product Types

Class	Coffee (%)	Tea (%)	Soft Drinks (%)	Energy Drinks (%)	Energy Shots (%)	Chocolate Drinks (%)	Other (%)
Freshman (n=39)	26 (66.6)	22 (56.4)	21 (53.8)	7 (17.9)	3 (7.7)	18 (46.3)	3 (7.7)
Sophomore (n=37)	29 (78.4)	20 (54.1)	17 (45.9)	2 (5.4)	0 (0.0)	11 (29.7)	0 (0.0)
Junior (n=39)	29 (74.4)	18 (46.2)	20 (51.3)	3 (7.7)	1 (2.6)	12 (30.8)	2 (5.1)
Senior (n=45)	38 (84.4)	26 (57.8)	21 (46.7)	2 (4.4)	0 (0.0)	12 (26.7)	1 (2.2)
Super Senior (n=11)	9 (81.8)	4 (36.4)	3 (27.3)	3 (27.3)	0 (0.0)	5 (45.5)	1 (9.1)

Table 14

Gender and Positive Expectations of Caffeine

	Females (n=140)				Males (n=31)			
	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Feel more alert	10 (7.1)	13 (9.3)	55 (39.3)	62 (44.3)	0 (0.0)	4 (12.9)	14 (45.2)	13 (41.9)
Feel more energized	9 (6.4)	14 (10.0)	49 (35.0)	68 (48.6)	2 (6.5)	2 (6.5)	17 (54.8)	10 (32.3)
Feel less sleepy	9 (6.4)	12 (8.6)	58 (41.4)	61 (43.6)	0 (0.0)	4 (12.9)	15 (48.4)	12 (38.7)
Feel more talkative	18 (12.9)	39 (27.9)	60 (42.9)	23 (16.4)	8 (25.8)	9 (29.0)	9 (29.0)	5 (16.1)
Feel hyper or "jacked"	38 (27.1)	47 (33.6)	40 (28.6)	15 (10.7)	8 (25.8)	8 (25.8)	11 (35.5)	4 (12.9)
Feel more excited	23 (16.4)	54 (38.6)	46 (32.9)	17 (12.1)	3 (9.7)	11 (35.5)	13 (41.9)	4 (12.9)
Think more clearly	22 (15.7)	36 (25.7)	62 (44.3)	20 (14.3)	4 (12.9)	7 (22.6)	14 (45.2)	6 (19.4)
Pay attention more efficiently	20 (14.3)	35 (25.0)	61 (43.6)	24 (17.1)	4 (12.9)	6 (22.6)	15 (45.2)	6 (19.4)
Help sharpen memory	40 (28.6)	58 (41.4)	33 (23.6)	9 (6.4)	7 (22.6)	10 (32.3)	8 (25.8)	6 (19.4)

Table 15

Class and Positive Expectations of Caffeine

		Feel more alert (%)	Feel more energized (%)	Feel less sleepy (%)	Feel more talkative (%)	Feel hyper or "jacked" (%)	Feel more excited (%)	Think more clearly (%)	Pay attention more efficiently (%)	Help sharpen memory (%)
Freshman (n=39)	Extremely unlikely (%)	5 (12.8)	4 (10.3)	5 (12.8)	6 (15.4)	11 (28.2)	8 (20.5)	6 (15.4)	6 (15.4)	11 (28.3)
	Somewhat unlikely (%)	6 (15.4)	5 (12.8)	3 (7.7)	16 (41.0)	12 (30.8)	17 (43.6)	15 (38.5)	13 (33.3)	14 (35.9)
	Somewhat likely (%)	13 (33.3)	17 (43.6)	21 (53.8)	10 (25.6)	11 (28.2)	9 (23.1)	14 (35.9)	15 (38.5)	10 (25.6)
	Extremely likely (%)	15 (38.5)	13 (33.3)	10 (25.6)	7 (17.9)	5 (12.8)	5 (12.8)	4 (10.3)	5 (12.8)	4 (10.3)
Sophomore (n=37)	Extremely unlikely (%)	1 (2.7)	1 (2.7)	0 (0.0)	3 (8.1)	12 (32.4)	3 (8.1)	8 (21.6)	5 13.5)	9 (24.3)
	Somewhat unlikely (%)	2 (5.4)	3 (8.1)	5 (13.5)	7 (18.9)	9 (24.3)	15 (40.5)	4 (10.8)	9 (24.3)	13 (35.1)
	Somewhat likely (%)	12 (32.4)	13 (35.1)	12 (32.4)	17 (45.9)	10 (27.0)	15 (40.5)	19 (51.4)	16 (43.2)	13 (35.1)
	Extremely likely (%)	22 (59.5)	20 (54.1)	20 (54.1)	10 (27.0)	6 (16.2)	4 (10.8)	6 (16.2)	7 (18.9)	2 (5.4)
Junior (n=39)	Extremely unlikely (%)	1 (2.6)	2 (5.1)	1 (2.6)	5 (12.8)	6 (15.4)	4 (10.3)	4 (10.3)	5 (12.8)	8 (20.5)
	Somewhat unlikely (%)	2 (5.1)	3 (7.7)	2 (5.1)	7 (17.9)	15 (38.5)	13 (33.3)	11 (28.2)	8 (20.5)	16 (41.0)
	Somewhat likely (%)	20 (51.3)	13 (33.3)	15 (38.5)	22 (56.4)	13 (33.3)	15 (38.5)	17 (43.6)	16 (41.0)	8 (20.5)
	Extremely likely (%)	15 (41.0)	21 (53.8)	21 (53.8)	5 (12.8)	5 (12.8)	7 (17.9)	7 (17.9)	10 (25.6)	7 (17.9)
Senior (n=45)	Extremely unlikely (%)	3 (6.7)	3 (6.7)	3 (6.7)	10 (22.2)	16 (35.6)	10 (22.2)	8 (17.8)	8 (17.8)	15 (33.3)
	Somewhat unlikely (%)	7 (15.6)	5 (11.1)	5 (11.1)	15 (33.3)	15 (33.3)	15 (33.3)	9 (20.0)	7 (15.6)	20 (44.4)
	Somewhat likely (%)	17 (37.8)	17 (37.8)	19 (42.2)	15 (33.3)	12 (26.7)	16 (35.6)	21 (46.7)	24 (53.3)	8 (17.8)
	Extremely likely (%)	18 (40.0)	20 (44.4)	18 (40.0)	5 (11.1)	2 (4.4)	4 (8.9)	7 (15.6)	6 (13.3)	2 (4.4)
Super Senior (n=11)	Extremely unlikely (%)	0 (0.0)	1 (9.1)	0 (0.0)	2 (18.2)	1 (9.1)	1 (9.1)	0 (0.0)	0 (0.0)	4 (36.4)
	Somewhat unlikely (%)	0 (0.0)	0 (0.0)	1 (9.1)	3 (27.3)	4 (36.4)	5 (45.5)	4 (36.4)	4 (36.4)	5 (45.5)
	Somewhat likely (%)	7 (63.6)	6 (54.5)	6 (54.5)	5 (45.5)	5 (45.5)	4 (36.4)	5 (45.5)	5 (45.5)	2 (18.2)
	Extremely likely (%)	4 (36.4)	4 (36.4)	4 (36.4)	1 (9.1)	1 (9.1)	1 (9.1)	2 (18.2)	2 (18.2)	0 (0.0)

Table 16

Consumption Frequency and Positive Expectations of Caffeine

	Less-than-daily consumers (n=84)				Daily consumers (n=87)			
	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Feel more alert	9 (10.7)	11 (13.1)	31 (36.9)	33 (39.3)	1 (1.1)	6 (6.9)	38 (43.7)	42 (48.3)
Feel more energized	9 (10.7)	10 (11.9)	29 (34.5)	36 (42.9)	2 (2.3)	6 (6.9)	37 (42.5)	42 (48.3)
Feel less sleepy	8 (9.5)	9 (10.7)	35 (41.7)	32 (38.1)	1 (1.1)	7 (8.0)	38 (43.7)	41 (47.1)
Feel more talkative	16 (19.0)	24 (28.6)	30 (35.7)	14 (16.7)	10 (11.5)	24 (27.6)	39 (44.8)	14 (16.1)
Feel hyper or "jacked"	22 (26.2)	27 (32.1)	23 (27.4)	12 (14.3)	24 (27.6)	28 (32.2)	28 (32.2)	7 (8.0)
Feel more excited	13 (15.5)	29 (34.5)	29 (34.5)	13 (15.5)	13 (14.9)	36 (41.1)	30 (34.5)	8 (9.2)
Think more clearly	18 (21.4)	25 (29.8)	32 (38.1)	9 (10.7)	8 (9.2)	16 (18.4)	44 (50.6)	17 (19.5)
Pay attention more efficiently	16 (19.0)	25 (29.8)	29 (34.5)	14 (16.7)	8 (9.2)	16 (18.4)	47 (54.0)	14 (16.1)
Help sharpen memory	30 (35.7)	36 (42.9)	12 (14.3)	6 (7.1)	17 (19.5)	32 (36.8)	29 (33.3)	9 (10.3)

Table 18

Gender and Acute Negative Expectations of Caffeine

	Females (n=140)				Males (n=31)			
	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Feel shaky or jittery	63 (45.0)	34 (27.1)	38 (27.1)	5 (3.6)	16 (51.6)	8 (25.8)	6 (19.4)	1 (3.2)
Feel tense	89 (63.6)	40 (28.6)	11 (7.9)	0 (0.0)	18 (58.1)	11 (35.5)	2 (6.5)	0 (0.0)
Heart race	59 (42.1)	39 (27.9)	38 (27.1)	4 (2.9)	9 (29.0)	15 (48.4)	6 (19.4)	1 (3.2)
Feel flushed	86 (61.4)	44 (31.4)	9 (6.4)	1 (0.7)	13 (41.9)	14 (45.2)	4 (12.9)	0 (0.0)
Feel anxious	72 (51.4)	44 (31.4)	22 (15.7)	2 (1.4)	14 (45.2)	11 (35.5)	6 (19.4)	0 (0.0)
Have trouble concentrating	84 (60.0)	40 (28.6)	16 (11.4)	0 (0.0)	16 (51.6)	14 (45.2)	1 (3.2)	0 (0.0)
Thoughts race	75 (53.6)	39 (27.9)	24 (17.1)	2 (1.4)	14 (45.2)	15 (48.4)	2 (6.5)	0 (0.0)
Restlessness	64 (45.7)	28 (20.0)	38 (27.1)	10 (7.1)	13 (41.9)	8 (25.8)	10 (32.3)	0 (0.0)

Table 19

Class and Acute Negative Expectations of Caffeine

		Feel shaky or jittery (%)	Feel tense (%)	Heart race (%)	Feel flushed (%)	Feel anxious (%)	Have trouble concentrating (%)	Thoughts race (%)	Restlessness (%)
Freshman (n=39)	Extremely unlikely (%)	24 (61.5)	28 (71.8)	20 (51.3)	26 (66.7)	23 (59.0)	28 (71.8)	24 (61.5)	21 (53.8)
	Somewhat unlikely (%)	9 (23.1)	9 (23.1)	10 (25.6)	12 (30.8)	10 (25.6)	8 (20.5)	11 (28.2)	10 (25.6)
	Somewhat likely (%)	6 (15.4)	3 (5.1)	6 (15.4)	1 (2.6)	6 (15.4)	3 (7.7)	4 (10.3)	8 (20.5)
	Extremely likely (%)	0 (0.0)	0 (0.0)	3 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Sophomore (n=37)	Extremely unlikely (%)	20 (54.1)	28 (75.7)	19 (51.4)	25 (67.6)	23 (62.2)	25 (67.6)	23 (62.2)	20 (54.1)
	Somewhat unlikely (%)	7 (18.9)	8 (21.6)	8 (21.6)	8 (21.6)	9 (24.3)	8 (21.6)	10 (27.0)	5 (13.5)
	Somewhat likely (%)	9 (24.3)	1 (2.7)	10 (27.0)	4 (10.8)	4 (10.8)	4 (10.8)	4 (10.8)	9 (24.3)
	Extremely likely (%)	1 (2.7)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.7)	0 (0.0)	9 (24.3)	3 (8.1)
Junior (n=39)	Extremely unlikely (%)	14 (35.9)	20 (51.3)	13 (33.3)	24 (53.3)	17 (43.6)	21 (53.8)	15 (38.5)	15 (38.5)
	Somewhat unlikely (%)	10 (25.6)	13 (33.3)	10 (25.6)	18 (40.0)	11 (28.2)	11 (28.2)	15 (38.5)	6 (15.4)
	Somewhat likely (%)	11 (28.2)	6 (15.4)	14 (35.9)	3 (6.7)	10 (25.6)	7 (17.9)	7 (17.9)	13 (33.3)
	Extremely likely (%)	4 (10.3)	0 (0.0)	2 (5.1)	0 (0.0)	1 (2.6)	0 (0.0)	2 (5.1)	5 (12.8)
Senior (n=45)	Extremely unlikely (%)	17 (37.8)	25 (55.6)	12 (55.6)	24 (53.3)	18 (40.0)	23 (51.1)	23 (51.1)	17 (37.8)
	Somewhat unlikely (%)	11 (24.4)	16 (35.6)	23 (51.1)	18 (40.0)	21 (46.7)	19 (42.2)	14 (31.1)	11 (24.4)
	Somewhat likely (%)	16 (35.6)	4 (8.9)	10 (22.2)	3 (6.7)	6 (13.3)	3 (6.7)	8 (17.8)	15 (33.3)
	Extremely likely (%)	1 (2.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (4.4)
Super Senior (n=11)	Extremely unlikely (%)	4 (36.5)	6 (54.4)	4 (36.4)	5 (45.5)	5 (45.5)	3 (27.3)	4 (36.4)	4 (36.4)
	Somewhat unlikely (%)	5 (45.5)	5 (45.5)	3 (27.7)	5 (45.5)	4 (36.4)	8 (72.7)	4 (36.4)	4 (36.4)
	Somewhat likely (%)	2 (18.2)	0 (0.0)	4 (36.4)	1 (9.1)	2 (18.2)	0 (0.0)	3 (27.3)	3 (27.3)
	Extremely likely (%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table 20

Consumption Frequency and Acute Negative Expectations of Caffeine

	Less-than-daily consumers (n=84)				Daily consumers (n=87)			
	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Feel shaky or jittery	36 (42.9)	17 (20.2)	28 (33.3)	3 (3.6)	43 (49.4)	25 (28.7)	16 (18.4)	3 (3.4)
Feel tense	49 (58.3)	27 (32.1)	8 (9.5)	0 (0.0)	58 (66.7)	24 (27.6)	5 (5.7)	0 (0.0)
Heart race	32 (38.1)	25 (29.8)	26 (30.1)	1 (1.2)	36 (41.4)	29 (33.3)	18 (20.7)	4 (4.6)
Feel flushed	45 (53.6)	31 (36.9)	7 (8.3)	1 (1.2)	54 (62.1)	27 (31.0)	6 (6.9)	0 (0.0)
Feel anxious	43 (51.2)	25 (29.8)	14 (16.7)	2 (2.4)	43 (49.4)	30 (34.5)	14 (16.1)	0 (0.0)
Trouble concentrating	43 (51.2)	27 (32.1)	13 (15.5)	0 (0.0)	58 (66.7)	27 (31.0)	4 (4.6)	0 (0.0)
Thoughts race	43 (51.2)	26 (31.0)	13 (15.5)	2 (2.4)	46 (52.9)	28 (32.2)	13 (14.9)	0 (0.0)
Restlessness	35 (41.7)	15 (17.9)	25 (29.8)	9 (10.7)	42 (16.0)	21 (24.1)	23 (26.4)	1 (1.1)

Table 22

Gender and Withdrawal Expectations of Caffeine

	Females (n=140)				Males (n=31)			
	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Feel more content	13 (9.3)	36 (25.7)	66 (47.1)	25 (17.9)	2 (6.5)	5 (16.1)	18 (58.1)	6 (19.4)
The more I drink it, the more addicted I become	29 (20.7)	41 (29.3)	45 (32.1)	25 (17.9)	9 (29.0)	10 (32.3)	10 (32.3)	2 (6.5)
Nausea if not consumed regularly	101 (72.1)	27 (19.3)	8 (5.7)	4 (2.9)	17 (54.8)	11 (35.5)	2 (6.5)	1 (3.2)
Muscle pain or stiffness if not consumed regularly	107 (76.4)	20 (14.3)	11 (7.9)	2 (1.4)	20 (64.5)	7 (22.6)	3 (9.7)	1 (3.2)
Headaches if not consumed regularly	56 (40.0)	26 (18.6)	40 (28.6)	18 (12.9)	13 (41.9)	11 (35.5)	3 (9.7)	4 (12.9)
Drowsiness if not consumed regularly	51 (36.4)	37 (26.4)	37 (26.4)	15 (10.7)	11 (35.5)	13 (41.9)	6 (19.4)	1 (3.2)
Trouble focusing if not consumed regularly	69 (49.3)	40 (28.6)	24 (17.1)	7 (5.0)	11 (35.5)	14 (45.2)	4 (12.9)	2 (6.5)
Fatigue if not consumed regularly	64 (45.7)	32 (22.9)	28 (20.0)	16 (11.4)	12 (38.7)	13 (41.9)	6 (12.9)	0 (0.0)
Irritability if not consumed regularly	65 (46.4)	36 (25.7)	28 (20.0)	11 (7.9)	15 (48.4)	11 (35.5)	4 (12.9)	1 (3.2)
Less motivation if not consumed regularly	70 (50.0)	32 (22.9)	30 (21.4)	8 (5.7)	13 (41.9)	8 (25.8)	10 (32.3)	0 (0.0)
The longer I drink it, the harder it will be to quit	47 (33.6)	24 (17.1)	42 (30.0)	27 (19.3)	11 (35.5)	10 (32.3)	7 (22.6)	3 (9.7)

Table 23

Class and Withdrawal Expectations of Caffeine

		Feel more content (%)	More I drink it, the more addicted I become (%)	Nausea if not consume regularly (%)	Muscle pain, stiffness if not consume regularly (%)	Headache if not consume regularly (%)	Drowsy if not consume regularly (%)	Trouble focusing if not consume regularly (%)	Fatigue if not consume regularly (%)	Irritability if not consume regularly (%)	Less motivation if not consume regularly (%)	The longer I drink it, the harder it will be to quit (%)
Freshman (n=39)	Extremely unlikely (%)	6 (15.4)	15 (38.5)	30 (76.9)	30 (76.9)	15 (38.5)	14 (35.9)	19 (48.7)	23 (59.0)	21 (53.8)	18 (46.2)	21 (53.8)
	Somewhat unlikely (%)	8 (20.5)	11 (28.2)	5 (12.8)	4 (10.3)	9 (23.1)	11 (28.2)	9 (23.1)	6 (17.9)	9 (23.1)	11 (28.2)	5 (12.8)
	Somewhat likely (%)	14 (35.9)	10 (25.6)	2 (5.1)	3 (7.7)	9 (23.1)	11 (28.2)	9 (23.1)	7 (17.9)	5 (12.8)	6 (15.4)	8 (20.5)
	Extremely likely (%)	11 (28.2)	3 (7.7)	2 (5.1)	2 (5.1)	6 (15.4)	3 (7.7)	2 (5.1)	3 (7.7)	4 (10.3)	4 (10.3)	5 (12.8)
Sophomore (n=37)	Extremely unlikely (%)	1 (2.7)	5 (13.5)	28 (75.7)	29 (78.4)	18 (48.6)	15 (40.5)	19 (51.4)	17 (45.9)	17 (45.9)	20 (54.1)	9 (24.3)
	Somewhat unlikely (%)	10 (27.0)	12 (32.4)	8 (21.6)	4 (10.8)	8 (21.6)	10 (27.0)	11 (29.7)	8 (21.6)	11 (29.7)	7 (18.9)	11 (29.7)
	Somewhat likely (%)	21 (56.8)	15 (40.5)	0 (0.0)	3 (8.1)	7 (18.4)	8 (21.6)	4 (10.8)	8 (21.6)	6 (16.2)	8 (21.6)	11 (29.1)
	Extremely likely (%)	5 (13.5)	5 (13.5)	1 (2.7)	1 (2.7)	4 (10.8)	4 (10.8)	3 (8.1)	4 (10.8)	3 (8.1)	2 (5.4)	6 (16.2)
Junior (n=39)	Extremely unlikely (%)	2 (5.1)	6 (15.4)	25 (64.1)	28 (71.8)	17 (43.6)	13 (33.3)	17 (43.6)	13 (33.3)	16 (41.0)	16 (41.0)	8 (20.5)
	Somewhat unlikely (%)	10 (25.6)	12 (30.8)	10 (25.6)	8 (20.5)	7 (17.9)	15 (38.5)	12 (30.8)	13 (33.3)	12 (30.8)	10 (25.6)	10 (25.6)
	Somewhat likely (%)	20 (51.3)	10 (25.6)	3 (7.7)	3 (7.7)	9 (23.1)	5 (12.8)	6 (15.4)	10 (25.6)	9 (23.1)	11 (28.2)	10 (25.6)
	Extremely likely (%)	7 (17.9)	11 (28.2)	1 (2.6)	0 (0.0)	6 (15.4)	6 (15.4)	4 (10.3)	3 (7.7)	2 (5.1)	2 (5.1)	11 (28.2)
Senior (n=45)	Extremely unlikely (%)	4 (8.9)	9 (20.0)	25 (55.6)	28 (62.2)	17 (37.8)	13 (28.9)	17 (37.8)	13 (28.9)	16 (35.6)	16 (35.6)	8 (17.8)
	Somewhat unlikely (%)	12 (26.7)	12 (26.7)	10 (22.2)	8 (17.8)	7 (15.6)	15 (33.3)	12 (26.7)	13 (28.9)	12 (26.7)	10 (22.2)	10 (22.2)
	Somewhat likely (%)	22 (48.9)	17 (37.8)	3 (6.7)	3 (6.7)	9 (20.0)	5 (11.1)	6 (13.3)	10 (22.2)	9 (20.0)	11 (24.4)	10 (22.2)
	Extremely likely (%)	7 (15.6)	7 (15.6)	1 (2.2)	0 (0.0)	6 (13.3)	6 (13.3)	4 (8.9)	3 (6.7)	2 (4.4)	2 (4.4)	11 (24.4)
Super Senior (n=11)	Extremely unlikely (%)	2 (18.2)	3 (27.3)	7 (63.6)	7 (63.6)	4 (36.4)	4 (36.4)	6 (54.5)	5 (45.5)	5 (45.5)	6 (54.5)	5 (45.5)
	Somewhat unlikely (%)	1 (9.1)	4 (36.4)	3 (27.3)	3 (27.3)	1 (9.1)	3 (27.3)	4 (36.4)	3 (27.3)	3 (27.3)	3 (27.3)	3 (27.3)
	Somewhat likely (%)	7 (63.6)	3 (27.3)	0 (0.0)	1 (9.1)	5 (45.5)	4 (36.4)	1 (9.1)	3 (27.3)	3 (27.3)	2 (18.2)	3 (27.3)
	Extremely likely (%)	1 (09.1)	1 (09.1)	1 (09.1)	0 (0.0)	1 (09.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Table 24

Frequency of Consumption and Withdrawal Expectations of Caffeine

	Less-than-daily consumers (n=84)				Daily consumers (n=87)			
	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Feel more content	10 (11.9)	28 (33.3)	39 (46.4)	7 (8.3)	5 (5.7)	13 (14.9)	45 (51.7)	26 (29.8)
The more I drink it, the more addicted I become	27 (32.1)	21 (25.0)	24 (28.6)	12 (14.3)	11 (12.6)	30 (34.5)	31 (35.6)	15 (17.2)
Nausea if not consumed regularly	65 (77.4)	13 (15.5)	4 (4.8)	2 (2.4)	53 (60.9)	25 (28.7)	6 (6.9)	3 (3.4)
Muscle pain or stiffness if not consumed regularly	72 (85.7)	8 (9.5)	3 (3.6)	1 (1.2)	55 (63.2)	19 (21.8)	11 (12.6)	2 (2.3)
Headaches if not consumed regularly	49 (58.3)	24 (28.6)	8 (9.5)	3 (3.6)	20 (23.0)	13 (14.9)	35 (40.2)	19 (21.8)
Drowsiness if not consumed regularly	44 (52.4)	26 (31.0)	13 (15.5)	1 (1.2)	18 (20.7)	24 (27.6)	30 (34.5)	15 (17.2)
Trouble focusing if not consumed regularly	54 (63.5)	25 (29.8)	3 (3.6)	2 (2.4)	26 (29.9)	29 (33.3)	25 (28.7)	7 (8.0)
Fatigue if not consumed regularly	52 (61.9)	25 (29.8)	6 (7.1)	1 (1.2)	24 (27.6)	20 (23.0)	28 (32.2)	15 (17.2)
Irritability if not consumed regularly	54 (63.5)	22 (26.2)	6 (7.1)	2 (2.4)	26 (29.9)	25 (28.7)	26 (29.9)	10 (11.5)
Less motivation if not consumed regularly	57 (67.9)	14 (16.7)	13 (15.5)	0 (0.0)	26 (29.9)	26 (29.9)	28 (32.2)	8 (9.2)
The longer I drink it, the harder it will be to quit	40 (47.6)	15 (17.9)	13 (15.5)	16 (19.0)	18 (20.7)	19 (21.8)	36 (41.4)	14 (16.1)

Table 26

Gender and Mood Expectations of Caffeine

	Females (n=140)				Males (n=31)			
	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Help me relax	40 (28.6)	43 (30.7)	44 (31.4)	13 (9.3)	11 (35.5)	8 (25.8)	7 (22.6)	5 (16.1)
Feel carefree	55 (39.3)	46 (32.9)	32 (22.9)	7 (5.0)	8 (25.8)	9 (29.0)	10 (32.3)	4 (12.9)
Help me calm down	51 (36.4)	48 (34.3)	34 (24.3)	7 (5.0)	8 (25.8)	13 (41.9)	8 (25.8)	4 (12.9)
Center me	56 (40.0)	48 (34.3)	29 (20.7)	7 (5.0)	9 (29.0)	12 (38.8)	7 (22.6)	3 (9.7)
Improve my mood	28 (19.9)	23 (16.4)	64 (45.7)	25 (17.9)	6 (19.4)	7 (22.6)	15 (48.4)	3 (9.7)
Make me more outgoing	50 (35.7)	35 (25.0)	38 (27.1)	17 (12.1)	12 (38.7)	7 (22.6)	11 (35.5)	1 (3.2)
Help me deal with boredom	65 (46.4)	38 (27.1)	27 (19.3)	10 (7.1)	11 (35.5)	10 (32.3)	7 (22.6)	3 (9.7)

Table 27

Class and Mood Expectations of Caffeine

		Help me relax (%)	Feel carefree (%)	Help me calm down (%)	Center me (%)	Improve my mood (%)	Make me more outgoing (%)	Help me deal with boredom (%)
Freshman (n=39)	Extremely unlikely (%)	13 (33.3)	14 (35.9)	13 (33.3)	12 (30.8)	9 (23.1)	15 (38.5)	18 (46.2)
	Somewhat unlikely (%)	8 (20.5)	14 (35.9)	9 (23.1)	14 (35.9)	8 (20.5)	10 (25.6)	9 (23.1)
	Somewhat likely (%)	14 (35.9)	7 (17.9)	14 (35.9)	9 (23.1)	16 (41.0)	10 (25.6)	11 (28.2)
	Extremely likely (%)	4 (10.3)	4 (10.3)	3 (7.7)	4 (10.3)	6 (15.4)	4 (10.3)	1 (2.6)
Sophomore (n=37)	Extremely unlikely (%)	9 (24.3)	14 (37.8)	13 (35.1)	16 (43.2)	6 (16.2)	13 (35.1)	15 (43.2)
	Somewhat unlikely (%)	11 (29.7)	13 (35.1)	12 (32.4)	11 (29.7)	8 (21.6)	9 (24.3)	14 (37.8)
	Somewhat likely (%)	12 (32.4)	8 (21.6)	12 (32.4)	9 (24.3)	19 (51.4)	10 (27.0)	6 (16.2)
	Extremely likely (%)	5 (13.5)	2 (5.4)	0 (0.0)	1 (2.7)	4 (10.8)	5 (13.5)	1 (2.7)
Junior (n=39)	Extremely unlikely (%)	8 (20.5)	10 (25.6)	8 (20.5)	11 (28.2)	6 (15.4)	11 (28.2)	13 (33.3)
	Somewhat unlikely (%)	16 (41.0)	12 (39.8)	22 (56.4)	20 (51.3)	4 (10.3)	10 (25.6)	12 (30.8)
	Somewhat likely (%)	9 (23.1)	13 (33.3)	4 (10.3)	4 (10.3)	18 (46.2)	13 (33.3)	7 (17.9)
	Extremely likely (%)	6 (15.4)	4 (10.3)	5 (12.8)	4 (10.3)	11 (28.2)	5 (12.8)	7 (17.9)
Senior (n=45)	Extremely unlikely (%)	19 (42.2)	20 (44.4)	22 (48.9)	23 (51.1)	11 (24.4)	18 (40.0)	25 (55.6)
	Somewhat unlikely (%)	12 (26.7)	12 (26.7)	13 (28.9)	10 (22.2)	8 (17.8)	11 (24.4)	9 (20.0)
	Somewhat likely (%)	13 (28.9)	13 (28.9)	10 (22.2)	12 (26.7)	20 (44.4)	13 (28.9)	9 (20.0)
	Extremely likely (%)	1 (2.2)	0 (0.0)	0 (0.0)	0 (0.0)	6 (13.3)	3 (6.7)	2 (4.4)
Super Senior (n=11)	Extremely unlikely (%)	2 (18.2)	5 (45.5)	3 (27.3)	3 (27.3)	2 (18.2)	5 (45.5)	4 (36.4)
	Somewhat unlikely (%)	4 (36.4)	4 (36.4)	5 (45.5)	5 (45.5)	2 (18.2)	2 (18.2)	4 (36.4)
	Somewhat likely (%)	3 (27.3)	1 (9.1)	2 (18.2)	2 (18.2)	6 (54.5)	3 (27.3)	1 (9.1)
	Extremely likely (%)	2 (18.2)	1 (9.1)	1 (9.1)	1 (9.1)	1 (9.1)	1 (9.1)	2 (18.2)

Table 28

Frequency of Consumption and Mood Expectations of Caffeine

	Less-than-daily consumers (n=84)				Daily consumers (n=87)			
	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)	Extremely unlikely (%)	Somewhat unlikely (%)	Somewhat likely (%)	Extremely likely (%)
Help me relax	35 (41.7)	27 (32.1)	17 (20.2)	5 (6.0)	16 (18.4)	24 (27.6)	34 (39.1)	13 (14.9)
Feel carefree	40 (47.6)	25 (29.8)	15 (17.9)	4 (4.8)	23 (26.4)	30 (34.5)	27 (31.0)	7 (8.0)
Help me calm down	37 (44.4)	31 (36.9)	12 (14.3)	4 (4.8)	22 (25.3)	30 (34.5)	30 (34.5)	5 (5.7)
Center me	40 (47.6)	31 (36.9)	11 (13.1)	2 (2.4)	25 (28.7)	29 (33.3)	25 (28.7)	8 (0.2)
Improve my mood	23 (26.4)	11 (13.1)	39 (46.4)	9 (10.7)	11 (12.6)	17 (19.5)	40 (46.0)	19 (21.8)
Make me more outgoing	37 (44.0)	18 (21.4)	23 (26.4)	6 (7.1)	25 (28.7)	24 (27.6)	26 (29.9)	12 (13.8)
Help me deal with boredom	43 (49.4)	23 (26.4)	13 (15.5)	5 (6.0)	33 (37.9)	25 (28.7)	21 (24.1)	8 (9.2)

Table 30

Gender and Social Settings of Caffeine Consumption

	(%)	(%)	(%)	(%)	Always (%)	Males (n=31)				
						Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)
Not enough sleep	6 (4.3)	12 (8.6)	36 (25.7)	56 (40.0)	30 (21.4)	2 (6.5)	4 (12.9)	5 (16.1)	15 (48.4)	5 (16.1)
Studying for exams	9 (6.4)	11 (7.9)	54 (38.4)	44 (31.4)	22 (15.7)	3 (9.7)	5 (16.1)	11 (35.5)	8 (25.8)	4 (12.9)
Driving long distances	10 (7.1)	18 (12.9)	35 (25.0)	50 (35.7)	27 (19.3)	3 (9.7)	5 (16.1)	10 (32.3)	8 (25.8)	5 (16.4)
With alcohol while partying	113 (80.7)	9 (6.4)	12 (8.6)	5 (3.6)	1 (0.7)	25 (80.6)	2 (6.5)	1 (3.2)	1 (3.2)	2 (6.5)
When hungover	116 (82.9)	10 (7.1)	8 (5.7)	3 (2.1)	3 (2.1)	29 (93.5)	0 (0.0)	0 (0.0)	0 (0.0)	2 (6.5)
When I have a headache	42 (30.0)	23 (16.4)	29 (20.7)	33 (23.6)	13 (9.3)	13 (41.9)	7 (22.6)	6 (19.4)	3 (9.7)	2 (6.5)
At work	26 (18.6)	16 (11.4)	46 (32.9)	40 (28.6)	12 (8.6)	8 (25.8)	2 (6.5)	11 (35.5)	7 (22.6)	3 (9.7)
Exercising or playing sports	98 (70.0)	27 (19.3)	10 (7.1)	3 (2.1)	2 (1.4)	16 (51.6)	8 (25.8)	1 (3.2)	3 (9.7)	3 (9.7)
Doing homework	13 (9.3)	15 (10.7)	48 (34.3)	52 (37.1)	12 (8.6)	2 (6.5)	6 (19.4)	11 (35.5)	10 (32.3)	2 (6.5)
On a date	35 (25.0)	22 (15.7)	48 (34.3)	52 (37.1)	12 (8.6)	10 (32.3)	6 (19.4)	3 (9.7)	9 (29.0)	3 (9.7)
Shopping	24 (17.1)	30 (21.4)	47 (33.6)	35 (25.0)	4 (2.9)	10 (32.3)	6 (19.4)	11 (35.5)	2 (6.5)	2 (6.5)
Out with friends	6 (4.3)	13 (9.3)	45 (32.1)	65 (45.4)	11 (7.9)	4 (12.9)	6 (19.4)	10 (32.3)	8 (25.8)	3 (9.7)
At a restaurant	19 (13.6)	42 (30.0)	38 (27.1)	30 (21.4)	11 (7.9)	6 (19.4)	7 (22.6)	7 (22.6)	7 (22.6)	4 (12.9)
In class	26 (18.6)	27 (19.3)	42 (30.0)	38 (27.1)	7 (5.0)	5 (16.1)	6 (19.4)	11 (35.5)	7 (22.6)	2 (6.5)
As part of my morning routine	24 (17.1)	31 (22.1)	20 (14.3)	29 (20.7)	36 (25.7)	6 (19.4)	5 (16.1)	8 (25.8)	6 (19.4)	6 (19.4)

Table 31

Freshmen and Social Settings of Caffeine Consumption

	Freshmen (n=39)				
	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)
Not enough sleep	2 (5.1)	5 (12.8)	8 (20.5)	15 (38.5)	9 (23.1)
Studying for exams	2 (5.1)	6 (15.4)	12 (30.8)	13 (33.3)	6 (15.4)
Driving long distances	2 (5.1)	3 (7.7)	8 (20.5)	18 (46.2)	8 (20.5)
With alcohol while partying	35 (89.7)	3 (7.7)	0 (0.0)	0 (0.0)	1 (2.6)
When hungover	33 (84.6)	2 (5.1)	2 (5.1)	1 (2.6)	1 (2.6)
When I have a headache	10 (25.6)	7 (17.9)	11 (28.2)	6 (15.4)	5 (12.8)
At work	11 (28.2)	3 (7.7)	12 (30.8)	9 (23.1)	4 (10.3)
Exercising or playing sports	24 (61.5)	6 (15.4)	3 (7.7)	3 (7.7)	3 (7.7)
Doing homework	2 (5.1)	5 (12.8)	14 (35.9)	14 (35.9)	4 (10.3)
On a date	8 (20.5)	5 (12.8)	15 (38.5)	7 (17.9)	4 (10.3)
Shopping	5 (12.8)	11 (28.2)	11 (28.2)	10 (25.6)	2 (5.1)
Out with friends	2 (5.1)	4 (10.3)	10 (25.6)	19 (48.7)	4 (10.3)
At a restaurant	5 (12.8)	9 (23.1)	7 (17.9)	11 (28.2)	7 (17.9)
In class	7 (17.9)	9 (23.1)	10 (25.6)	10 (25.6)	3 (7.7)
As part of my morning routine	6 (15.4)	12 (30.8)	7 (17.9)	5 (12.8)	9 (23.1)

Table 32

Sophomores and Social Settings of Caffeine Consumption

	Sophomores (n=37)				
	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)
Not enough sleep	0 (0.0)	4 (10.8)	13 (35.1)	13 (35.1)	7 (18.9)
Studying for exams	1 (2.7)	4 (10.8)	(51.4)9	8 (21.6)	5 (13.5)
Driving long distances	2 (5.1)	3 (8.1)	8 (21.6)	18 (46.2)	8 (21.6)
With alcohol while partying	34 (91.9)	0 (0.0)	2 (5.1)	1 (2.7)	0 (0.0)
When hungover	34 (91.9)	1 (2.7)	1 (2.7)	1 (2.7)	0 (0.0)
When I have a headache	14 (37.8)	7 (18.9)	6 (16.2)	8 (21.6)	2 (5.1)
At work	7 (18.9)	6 (16.2)	9 (24.3)	12 (32.4)	3 (8.1)
Exercising or playing sports	24 (64.9)	8 (21.6)	4 (10.8)	1 (2.7)	0 (0.0)
Doing homework	3 (8.1)	3 (8.1)	20 (54.1)	8 (21.6)	3 (8.1)
On a date	10 (27.0)	8 (21.6)	12 (32.4)	7 (18.9)	0 (0.0)
Shopping	7 (18.9)	8 (21.6)	12 (32.4)	10 (27.0)	0 (0.0)
Out with friends	3 (8.1)	4 (10.8)	13 (35.1)	15 (40.5)	2 (5.1)
At a restaurant	7 (18.9)	8 (21.6)	11 (29.7)	11 (29.7)	0 (0.0)
In class	7 (18.9)	10 (27.0)	13 (35.1)	7 (18.9)	0 (0.0)
As part of my morning routine	8 (21.6)	7 (18.9)	5 (13.5)	6 (16.2)	11 (29.7)

Table 33

Juniors and Social Settings of Caffeine Consumption

	Juniors (n=39)				
	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)
Not enough sleep	3 (7.7)	4 (10.3)	6 (15.4)	19 (48.7)	7 (17.9)
Studying for exams	3 (7.7)	3 (7.7)	13 (33.3)	14 (35.9)	6 (15.4)
Driving long distances	4 (10.3)	6 (15.4)	11 (28.2)	8 (20.5)	10 (25.6)
With alcohol while partying	31 (79.5)	3 (7.7)	3 (7.7)	0 (0.0)	2 (5.1)
When hungover	34 (87.2)	0 (0.0)	3 (7.7)	1 (2.6)	1 (2.6)
When I have a headache	12 (30.8)	9 (23.1)	6 (15.4)	7 (17.9)	5 (12.8)
At work	7 (17.9)	5 (12.8)	15 (38.5)	8 (20.5)	4 (10.3)
Exercising or playing sports	27 (69.2)	7 (17.9)	2 (5.1)	1 (2.6)	2 (5.1)
Doing homework	4 (10.3)	4 (10.3)	11 (28.2)	16 (41.0)	5 (12.8)
On a date	7 (17.9)	7 (17.9)	13 (33.3)	9 (23.1)	3 (7.7)
Shopping	10 (25.6)	6 (15.4)	16 (41.0)	5 (12.8)	2 (5.1)
Out with friends	2 (5.1)	5 (12.8)	10 (25.6)	19 (48.7)	3 (7.7)
At a restaurant	3 (7.7)	11 (28.2)	12 (30.8)	8 (20.5)	5 (12.8)
In class	7 (17.9)	8 (20.5)	11 (28.2)	10 (25.6)	3 (7.7)
As part of my morning routine	8 (20.5)	8 (20.5)	9 (23.1)	7 (17.9)	7 (17.9)

Table 34

Seniors and Social Settings of Caffeine Consumption

	Seniors (n=45)				
	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)
Not enough sleep	3 (6.7)	2 (4.4)	11 (24.4)	18 (40.0)	11 (24.4)
Studying for exams	5 (11.1)	3 (6.7)	16 (35.6)	14 (31.1)	7 (15.6)
Driving long distances	5 (11.1)	4 (8.9)	11 (24.4)	18 (40.0)	7 (15.6)
With alcohol while partying	34 (75.6)	4 (8.9)	5 (11.1)	2 (4.4)	0 (0.0)
When hungover	40 (88.9)	3 (6.7)	1 (2.2)	0 (0.0)	1 (2.2)
When I have a headache	16 (35.6)	6 (13.3)	10 (22.2)	10 (22.2)	3 (6.7)
At work	7 (15.6)	4 (8.9)	16 (35.6)	15 (33.3)	3 (6.7)
Exercising or playing sports	33 (73.3)	10 (22.2)	2 (4.4)	0 (0.0)	0 (0.0)
Doing homework	5 (11.1)	8 (17.8)	10 (22.2)	20 (44.4)	2 (4.4)
On a date	17 (37.8)	8 (17.8)	11 (24.4)	7 (15.6)	2 (4.4)
Shopping	10 (22.2)	9 (20.0)	16 (35.6)	8 (17.8)	2 (4.4)
Out with friends	3 (6.7)	5 (11.1)	18 (40.0)	15 (33.3)	4 (8.9)
At a restaurant	7 (15.6)	17 (37.8)	14 (31.1)	5 (11.1)	2 (4.4)
In class	8 (17.8)	5 (11.1)	15 (33.3)	14 (31.1)	3 (6.7)
As part of my morning routine	3 (6.7)	8 (17.8)	6 (13.3)	12 (26.7)	14 (31.1)

Table 35

Super Seniors and Social Settings for Caffeine Consumption

	Super Seniors (n=11)				
	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)
Not enough sleep	0 (0.0)	1 (9.1)	3 (27.3)	6 (54.5)	1 (9.1)
Studying for exams	1 (9.1)	0 (0.0)	5 (45.5)	3 (27.3)	2 (18.2)
Driving long distances	0 (0.0)	3 (27.3)	4 (36.4)	2 (18.2)	2 (18.2)
With alcohol while partying	4 (36.4)	1 (9.1)	3 (27.3)	3 (27.3)	0 (0.0)
When hungover	4 (36.4)	4 (36.4)	1 (9.1)	0 (0.0)	2 (18.2)
When I have a headache	3 (27.3)	1 (9.1)	2 (18.2)	5 (45.5)	0 (0.0)
At work	2 (18.2)	0 (0.0)	5 (45.5)	3 (27.3)	1 (9.1)
Exercising or playing sports	6 (54.5)	4 (36.4)	0 (0.0)	1 (9.1)	0 (0.0)
Doing homework	1 (9.1)	2 (18.2)	4 (36.4)	4 (36.4)	0 (0.0)
On a date	1 (9.1)	2 (18.2)	4 (36.4)	4 (36.4)	0 (0.0)
Shopping	2 (18.2)	2 (18.2)	3 (27.3)	4 (36.4)	0 (0.0)
Out with friends	0 (0.0)	1 (9.1)	4 (36.4)	5 (45.5)	1 (9.1)
At a restaurant	3 (27.3)	4 (36.4)	1 (9.1)	2 (18.2)	1 (9.1)
In class	2 (18.2)	1 (9.1)	4 (36.4)	4 (36.4)	0 (0.0)
As part of my morning routine	3 (27.3)	1 (9.1)	1 (9.1)	5 (45.5)	1 (9.1)

Table 37

Gender and Social Influences on Caffeine Consumption

	Females (n=140)					Males (n=31)				
	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Generally consume caffeine only when with others.	26 (18.6)	50 (35.7)	28 (20.0)	26 (18.6)	10 (7.1)	12 (38.7)	7 (22.6)	9 (29.0)	3 (9.7)	0 (0.0)
Peers or friends influence you	45 (32.1)	40 (28.6)	25 (17.9)	25 (17.9)	5 (3.6)	13 (41.9)	10 (32.3)	5 (16.1)	3 (9.7)	0 (0.0)
Media and celebrity endorsers influence you	82 (58.6)	42 (30.0)	10 (7.1)	6 (4.3)	5 (3.6)	18 (58.1)	6 (19.4)	3 (9.7)	4 (12.9)	0 (0.0)
Tv ads influence you	70 (50.0)	35 (25.0)	12 (8.6)	22 (15.7)	1 (0.7)	16 (51.6)	4 (12.9)	4 (12.9)	6 (19.4)	1 (3.2)
Online ads influence you	76 (54.3)	41 (28.3)	11 (7.9)	12 (8.6)	0 (0.0)	18 (58.1)	10 (32.3)	2 (6.5)	1 (3.2)	0 (0.0)
Promotions and discounts influence you	33 (23.6)	15 (10.7)	26 (18.6)	46 (32.9)	20 (14.3)	9 (29.0)	1 (3.2)	8 (25.8)	12 (38.7)	1 (3.2)
Price is the most important factor.	26 (18.6)	33 (23.6)	41 (29.3)	30 (21.4)	10 (7.1)	12 (38.7)	4 (12.9)	6 (19.4)	5 (16.1)	4 (12.9)
If you need caffeine, you will buy at any price.	45 (32.1)	39 (27.9)	27 (19.3)	23 (16.4)	6 (4.3)	13 (41.9)	9 (29.0)	3 (9.7)	1 (3.2)	5 (16.1)
You buy products with caffeine strictly for the effects of caffeine.	40 (28.6)	55 (39.3)	28 (20.0)	13 (9.3)	4 (2.9)	12 (38.7)	6 (19.4)	6 (19.4)	4 (12.9)	3 (9.7)
You are brand loyal for caffeinated beverages.	34 (24.3)	36 (25.7)	31 (22.1)	29 (20.7)	10 (7.1)	10 (32.3)	7 (22.6)	6 (19.4)	7 (22.6)	1 (3.2)
You will go out of your way to purchase your favorite product.	37 (26.4)	37 (26.4)	25 (17.9)	31 (22.1)	10 (7.1)	12 (38.7)	6 (19.4)	11 (35.5)	2 (6.5)	0 (0.0)
You always go to the same store to get caffeinated products	47 (33.6)	40 (28.6)	26 (18.6)	23 (16.4)	4 (2.9)	12 (38.7)	5 (16.1)	9 (29.0)	4 (12.9)	1 (3.2)

Table 38

Freshmen and Social Influences on Caffeine Consumption

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
You generally consume caffeine only when you're with other people	9 (23.1)	6 (15.4)	15 (38.5)	6 (15.4)	3 (7.7)
Your peers or friends influence which type of caffeine you consume	14 (35.9)	8 (20.5)	12 (30.8)	4 (10.3)	1 (2.6)
The media and celebrity endorsers influence which type of caffeinated beverage you prefer.	20 (51.3)	12 (30.8)	5 (12.8)	2 (5.1)	0 (0.0)
TV advertisements have persuaded you to buy certain caffeinated products	18 (46.2)	10 (25.6)	4 (10.3)	5 (12.8)	2 (5.1)
Online advertisements have persuaded you to buy certain caffeinated products	19 (48.7)	13 (33.3)	4 (10.3)	3 (7.7)	0 (0.0)
Promotions and discounts are important to you when buying a caffeinated beverage	8 (20.5)	6 (15.4)	10 (25.6)	9 (23.1)	6 (15.4)
Price is the most important factor for you in making a caffeinated product choice	8 (20.5)	9 (23.1)	10 (25.6)	8 (20.5)	4 (10.3)
If you need caffeine, you will buy a caffeinated product at any price	8 (20.5)	10 (25.6)	11 (28.2)	4 (10.3)	6 (15.4)
You buy products with caffeine strictly for the effects of caffeine	15 (38.5)	9 (23.1)	8 (20.5)	5 (12.8)	2 (5.1)
You consider yourself brand loyal for specific caffeinated beverages	11 (28.2)	6 (15.4)	13 (33.3)	6 (15.4)	3 (7.7)
You will go out of your way to purchase your favorite brand of caffeinated product	8 (20.5)	10 (25.6)	11 (28.2)	7 (17.9)	3 (7.7)
You always go to the same store to get caffeinated products	11 (28.2)	10 (25.6)	10 (25.6)	5 (12.8)	3 (7.7)

Table 39

Sophomores and Social Influences on Caffeine Consumption

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
You generally consume caffeine only when you're with other people	8 (21.6)	12 (32.4)	10 (27.0)	6 (16.2)	1 (2.7)
Your peers or friends influence which type of caffeine you consume	11 (29.7)	12 (32.4)	6 (16.2)	7 (18.9)	1 (2.7)
The media and celebrity endorsers influence which type of caffeinated beverage you prefer.	26 (70.3)	8 (21.6)	1 (2.7)	2 (5.4)	1 (2.7)
TV advertisements have persuaded you to buy certain caffeinated products	21 (56.8)	9 (24.3)	2 (5.4)	5 (13.5)	0 (0.0)
Online advertisements have persuaded you to buy certain caffeinated products	21 (56.8)	10 (27.0)	3 (8.1)	3 (8.1)	0 (0.0)
Promotions and discounts are important to you when buying a caffeinated beverage	11 (29.7)	5 (13.5)	6 (16.2)	13 (35.1)	2 (5.4)
Price is the most important factor for you in making a caffeinated product choice	7 (18.9)	7 (18.9)	12 (32.4)	9 (24.3)	2 (5.4)
If you need caffeine, you will buy a caffeinated product at any price	13 (35.1)	13 (35.1)	5 (13.5)	3 (8.1)	3 (8.1)
You buy products with caffeine strictly for the effects of caffeine	12 (32.4)	12 (32.4)	5 (13.5)	5 (13.5)	3 (8.1)
You consider yourself brand loyal for specific caffeinated beverages	11 (29.7)	11 (29.7)	7 (18.9)	5 (13.5)	3 (8.1)
You will go out of your way to purchase your favorite brand of caffeinated product	15 (40.5)	8 (21.6)	8 (21.6)	4 (10.8)	2 (5.4)
You always go to the same store to get caffeinated products	15 (40.5)	7 (18.9)	5 (13.5)	9 (24.3)	1 (2.7)

Table 40

Juniors and Social Influences on Caffeine Consumption

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
You generally consume caffeine only when you're with other people	7 (17.9)	17 (43.6)	7 (17.9)	5 (12.8)	3 (7.7)
Your peers or friends influence which type of caffeine you consume	11 (28.2)	13 (33.3)	6 (15.4)	7 (17.9)	2 (5.1)
The media and celebrity endorsers influence which type of caffeinated beverage you prefer.	19 (48.7)	11 (28.2)	5 (12.8)	4 (10.3)	2 (5.1)
TV advertisements have persuaded you to buy certain caffeinated products	15 (38.5)	7 (17.9)	6 (15.4)	11 (28.2)	0 (0.0)
Online advertisements have persuaded you to buy certain caffeinated products	17 (43.6)	12 (30.8)	5 (12.8)	5 (12.8)	0 (0.0)
Promotions and discounts are important to you when buying a caffeinated beverage	8 (20.5)	2 (5.1)	5 (12.8)	17 (43.6)	7 (17.9)
Price is the most important factor for you in making a caffeinated product choice	7 (17.9)	7 (17.9)	9 (23.1)	10 (25.6)	6 (15.4)
If you need caffeine, you will buy a caffeinated product at any price	14 (35.9)	13 (33.3)	4 (10.3)	8 (20.5)	0 (0.0)
You buy products with caffeine strictly for the effects of caffeine	11 (28.2)	14 (35.9)	10 (25.6)	4 (10.3)	0 (0.0)
You consider yourself brand loyal for specific caffeinated beverages	5 (12.8)	13 (33.3)	8 (20.5)	11 (28.2)	2 (5.1)
You will go out of your way to purchase your favorite brand of caffeinated product	10 (25.6)	11 (28.2)	7 (17.9)	8 (20.5)	3 (7.7)
You always go to the same store to get caffeinated products	13 (33.3)	9 (23.1)	9 (23.1)	7 (17.9)	1 (2.6)

Table 41

Seniors and Social Influences on Caffeine Consumption

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
You generally consume caffeine only when you're with other people	11 (24.4)	17 (37.8)	5 (11.1)	10 (22.2)	2 (4.4)
Your peers or friends influence which type of caffeine you consume	15 (33.3)	15 (33.3)	5 (11.1)	9 (20.0)	1 (2.2)
The media and celebrity endorsers influence which type of caffeinated beverage you prefer.	29 (64.4)	13 (26.9)	2 (4.4)	1 (2.2)	0 (0.0)
TV advertisements have persuaded you to buy certain caffeinated products	25 (55.6)	12 (26.7)	3 (6.7)	5 (11.1)	0 (0.0)
Online advertisements have persuaded you to buy certain caffeinated products	28 (62.2)	15 (33.3)	1 (2.2)	1 (2.2)	0 (0.0)
Promotions and discounts are important to you when buying a caffeinated beverage	9 (20.0)	2 (4.4)	12 (26.7)	17 (37.8)	5 (11.1)
Price is the most important factor for you in making a caffeinated product choice	10 (22.2)	14 (31.1)	13 (28.9)	7 (15.6)	1 (2.2)
If you need caffeine, you will buy a caffeinated product at any price	20 (44.4)	9 (20.0)	8 (17.8)	8 (17.8)	0 (0.0)
You buy products with caffeine strictly for the effects of caffeine	11 (24.4)	21 (46.7)	9 (20.0)	3 (6.7)	1 (2.2)
You consider yourself brand loyal for specific caffeinated beverages	13 (28.9)	10 (22.2)	7 (15.6)	12 (26.7)	3 (6.7)
You will go out of your way to purchase your favorite brand of caffeinated product	12 (26.7)	11 (24.4)	7 (15.6)	13 (28.9)	2 (4.4)
You always go to the same store to get caffeinated products	15 (33.3)	15 (33.3)	9 (20.0)	6 (13.3)	0 (0.0)

Table 42

Super Seniors and Social Influences on Caffeine Consumption

	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
You generally consume caffeine only when you're with other people	3 (27.3)	5 (45.5)	0 (0.0)	2 (18.2)	1 (9.1)
Your peers or friends influence which type of caffeine you consume	7 (63.6)	2 (18.2)	1 (9.1)	1 (9.1)	0 (0.0)
The media and celebrity endorsers influence which type of caffeinated beverage you prefer.	6 (54.5)	4 (36.4)	0 (0.0)	1 (9.1)	0 (0.0)
TV advertisements have persuaded you to buy certain caffeinated products	7 (63.6)	1 (9.1)	1 (9.1)	2 (18.2)	0 (0.0)
Online advertisements have persuaded you to buy certain caffeinated products	9 (81.8)	1 (9.1)	0 (0.0)	1 (9.1)	0 (0.0)
Promotions and discounts are important to you when buying a caffeinated beverage	6 (54.5)	1 (9.1)	1 (9.1)	2 (18.2)	1 (9.1)
Price is the most important factor for you in making a caffeinated product choice	6 (54.5)	0 (0.0)	3 (27.3)	1 (9.1)	1 (9.1)
If you need caffeine, you will buy a caffeinated product at any price	3 (27.3)	3 (27.3)	2 (18.2)	1 (9.1)	2 (18.2)
You buy products with caffeine strictly for the effects of caffeine	3 (27.3)	5 (45.5)	2 (18.2)	0 (0.0)	1 (9.1)
You consider yourself brand loyal for specific caffeinated beverages	4 (36.4)	3 (27.3)	2 (18.2)	2 (18.2)	0 (0.0)
You will go out of your way to purchase your favorite brand of caffeinated product	4 (36.4)	3 (27.3)	3 (27.3)	1 (9.1)	0 (0.0)
You always go to the same store to get caffeinated products	5 (45.5)	4 (36.4)	2 (18.2)	0 (0.0)	0 (0.0)

Table 44

Caffeine Effect Awareness from Students in the School of Nursing and Health Sciences

	≤25%	25% to <50%	50% to <75%	≥75%
Correct	6 (9.2%)	19 (29.2%)	32 (49.2%)	8 (12.3%)
Incorrect	55 (84.6%)	10 (15.4%)	0 (0.0%)	0 (0.0%)
Didn't Know	20 (30.8%)	27 (41.5%)	12 (18.5%)	6 (9.2%)

Table 45

Caffeine Effect Awareness from Students Not in the School of Nursing and Health Sciences

	≤25%	25% to <50%	50% to <75%	≥75%
Correct	24 (18.5%)	48 (36.9%)	48 (36.9%)	10 (8.0%)
Incorrect	118 (90.8%)	11 (8.5%)	1 (0.8%)	0 (0.0%)
Didn't Know	24 (18.5%)	43 (33.1%)	35 (26.9%)	28 (21.5%)