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ABSTRACT OF DISSERTATION

Gary Eugene McIlvain

The Graduate School
University of Kentucky

2008

CAFFEINE CONSUMPTION PATTERNS AND BELIEFS OF COLLEGE
FRESHMEN

ABSTRACT OF DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Education in the
College of Education
at the University of Kentucky

By
Gary E. McIlvain

Ashland, Kentucky

Director: Dr. Melody Noland, Professor of Kinesiology and Health Promotion
Lexington, Kentucky
2008

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ABSTRACT OF DISSERTATION

CAFFEINE CONSUMPTION PATTERNS AND BELIEFS OF COLLEGE FRESHMEN

Recently, energy drinks that contain high caffeine content without any age restrictions for purchase, have been introduced into the U.S. market. Caffeine consumption in the U.S. has increased dramatically, resulting in an increase in emergency room visits and calls to poison control centers. This increase in energy drink consumption, along with the traditional coffees, teas, and soft drinks that people consume regularly, have pushed caffeine consumption to new highs in a multi-billion dollar market.

The purpose of this study was to determine (1) the amount of caffeine consumed by a sample of freshmen students at Marshall University, (2) their beliefs regarding caffeine consumption, (3) reported perceived benefits and adverse effects of caffeine consumption, (4) reasons for consuming or refraining from consuming caffeine, and (5) predictors of high and low caffeine consumption

Eighty three percent reported having at least one sign/symptom of caffeine intoxication in the past while 51% reported having at least one sign/symptom of caffeine withdrawal. More than 78% consumed above the recommended 200mg of caffeine per day. The mean milligram of caffeine consumed per day in the present study was 849.86, which computes to 12.08 mg/kg/day. This was three to five times the recommended amount. Father's social index, participation in organized activity in college, and three items for concentration, keep awake, and wake up (items of alertness) were statistically significant predictors of caffeine consumption. Respondents that participated in organized activity while in college consumed on average 60.7% more caffeine than those who indicated they did not participate in organized activity while in college. Every time the three items for concentration, keep awake, and wake up increased one point, caffeine consumption increased on average 41.1%. Females were more likely to believe that caffeine is addictive than their male counterparts. Beliefs of negative consequences of caffeine consumption did not deter caffeine consumption. Slightly more than 60% reported using caffeine to wake up in the morning and more than 76% reported using it to stay awake. This was consistent with reported beliefs of the effects of caffeine consumption. Implications for education were discussed.

KEYWORDS: Caffeine, Caffeine Consumption, Guarana, Caffeineism, Caffeine Intoxication

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CAFFEINE CONSUMPTION PATTERNS AND BELIEFS OF COLLEGE
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DISSERTATION

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Gary Eugene McIlvain, MS, ATC

Lexington, Kentucky

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This dissertation is dedicated to my loving wife Lisa and my parents, Charlie and Cindy
McIlvain.

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Chapter 1

Introduction

“Caffeine is the most commonly used mood-altering drug in the world” (Juliano, & Griffiths, 2005, p403). Even though caffeine is widely accepted it has been scrutinized for centuries in the United States due to unhealthy effects to the human body. With the recent explosion in the energy drink market (Tibbles, 2006), increased soft drink consumption among youth (CSPI, 1998), and as Kaczmariski reported, the media targeting youth in advertising (Tibbles, 2006; Molnar, 1999) there is a growing concern about youth consuming large amounts of caffeine.

Research has shown that adolescents typically engage in many unhealthy behaviors such as substance abuse and risky sexual behavior. Adolescents also have many unhealthy nutritional behaviors which are fueled by increasing options given to American youth. Many schools have vending machines and/or school stores (French, Story, Fulkerson, & Gerlach, 2003; Shannon, Story, Fulkerson, & French, 2002). This usually offers the high school student a wide array of unhealthy choices, including snacks and soft drinks. The consumption of soft drinks (with many soft drinks having caffeine) is of growing concern due to the lack of nutritional sustenance (Fried & Nestle, 2002). Adolescence is one of the most dynamic times of a person’s life (Story, Neumark-Sztainer, & French, 2002) in physical development and acquiring lifetime habits, and one of the most opportune times to adopt a healthy behavior. All the while, soft drink companies target schools and younger children to create loyalty to their particular brand by offering schools cash payments for advertising rights, and by offering free scoreboards for athletic events, profits from sales, and other types of payments (Fried & Nestle, 2002).

Drinks high in caffeine often use marketing schemes that target sensation seekers. This is evident when watching the X-games, which are games that offer extreme competitions such as motorcycle vaulting (similar to pole vaulting in track and field, but done on a motorcycle), motorcycle stunting, bicycle stunting, and skateboarding. The X-games are often sponsored by Red Bull energy drink or other high caffeine drinks. It is

also evident by watching commercials or being on web sites such as Red Bull, Mountain Dew, or Monster energy drink to see sales ads such as “Red Bull, it gives you wings,” or “Do the Dew,” and “Let your inner man out” respectively. Sensation seekers often get bored easily, prefer change, are risk takers, and enjoy intense sensations and experiences for the sake of the experience (Zuckerman, 1972). This population will generally try a product if it promises a new and exciting experience.

Justification for Studying Caffeine Consumption

There are a number of reasons why caffeine consumption needs more study: First, there are a lack of data regarding college freshmen and caffeine consumption. Second, there is increased evidence of adverse physical and behavioral effects related to caffeine such as sleep deprivation, increased heart rate, increased blood pressure, central nervous system disorders, vasodilation, trembling, seizures, urticaria (severe allergic reaction), headaches, increased body temperature, inverse relationship to grades, disruption of coordination of complex tasks, sleep apnea, nervousness, hyperactivity, agitation, anxiety, attention disorders, and disruptive behaviors (Bardwell et al , 2000; Catlin & Hatton, 1991; Dews, 1984; Fernandez-Nieto & Quirce, 2002; Hering-hanit & Gadoth, 2003; Katholi, et al, 2003; Pollak & Bright, 2003; Stebbins, Daniels, & Lewis, 2001; Zagnoni & Albano, 2002). Third, there is a call from the American Academy of Pediatrics (2005) for programs to reduce usage of sport enhancing aids that claim to “give an edge” (p.1103), “increase strength, power, speed or endurance” (p.1104), or those aids used for weight control. One of these ergogenic aids is caffeine. Fourth, the Canadian Centre for Drug-Free Sport (1993), Llorens (1998), and Tymowski and Somerville (2002) reported the use of caffeine to enhance athletic performance among Canadian youth. Fifth, there has been a sharp increase in soft drink consumption among U.S. youth and many of these soft drinks contain caffeine (Cavadini, Siega-Riz, & Pipkin, 2000; Jacobson, 1998; Kassem, Lee, Modeste, & Johnston, 2003). Sixth, Simmons, reported that 31% of U.S. teens are drinking energy drinks, most of which have caffeine as a main ingredient (Tibbles, 2006). This is an increase of 3 million teens in the past three years, resulting in an 80% increase in the energy drink market (Tibbles, 2006). Finally, the FDA has issued a call that there is a lack of data regarding the

possible physical consequences of caffeinated beverages and a clearer understanding is needed about the reasons why young people use energy drinks and the contexts in which they are used (Amelia, 2006). In addition to the energy drink market explosion, it has been reported that the number of calls to Poison Control Centers due to caffeine overdose has increased (Crouch, B., Caravati, E., & Booth, J. (2004); Tibbles, 2006). Crouch, et al (2004) reported that more than 23% of all substances reported by Poison Control Centers for ages 6-19 was caffeine.

For all of these reasons, there is a need for data on American youth's caffeine consumption. By gaining insight into caffeine consumption among incoming college freshmen, researchers and health promoters can gain a description of caffeine consumption rates and beliefs of the effects of caffeine among students who recently graduated from high school.

Purpose of the Study

The purpose of this study was to determine (1) the amount of caffeine consumed by a sample of freshmen students at Marshall University, (2) their beliefs regarding caffeine consumption, (3) reported perceived benefits and adverse effects of caffeine consumption, (4) reasons for consuming or refraining from consuming caffeine, and (5) predictors of high and low caffeine consumption. These data will give health promotion professionals information which will be useful in planning interventions.

Research Questions

The following research questions were raised for this study.

1. What is the average amount of caffeine consumed daily among a group of college students?
2. What beliefs do these college students have regarding caffeine (e.g. effects on health, performance enhancement, weight loss aid, and aid in staying awake or alert)?
3. What are the perceived health benefits and adverse health effects of caffeine consumption?
4. What reasons do students give for either consuming or not consuming caffeine?

5. Are there predictors of high and low caffeine consumption (e.g. SES, sex, sensation seeking, and participation in sport, band, academic or other extracurricular activities)?

Hypotheses

1. More than 50% of students will report having experienced at least one adverse health effects due to caffeine consumption.
2. Sensation seeking will be a predictor of caffeine consumption.
3. A linear composite of the following will predict caffeine consumption: Sex, SES, beliefs, and sensation seeking.

Definition of Terms

For the purposes of this study, the following terms were identified and defined:

Caffeine Consumption – ingesting caffeine by means of liquid or pill ingestion.

Freshmen – students enrolled as a first semester freshmen at Marshall University between the age of 18 and 20.

High Caffeine Consumption – > 2.5 mg of caffeine per kg of body weight per Day (Health Canada 2005).

Chapter 2

Review of the Literature

The purpose of this review is to discuss adolescent nutritional knowledge and behavior, the history of caffeine and its effect on human physiology and behavior, sensation seeking, caffeine as an ergogenic aid, caffeine intoxication, caffeinism, current adolescent caffeine use, and the DSM-IV Classifications with regard to caffeine intoxication, caffeinism, and other caffeine related disorders.

Adolescents: Nutrition Knowledge and Behavior

Substance abuse and proper nutrition continue to be of concern among adolescents. Unhealthy behaviors such as substance abuse, smoking, and risky sexual behavior are only a few of areas in which adolescents are exercising poor judgment, another is nutrition. Many schools have vending machines and/or school stores (French, Story, Fulkerson, & Gerlach, 2003; Shannon, Story, Fulkerson, & French, 2002). By this configuration the schools are offering students choices, but are often choices that are unhealthy. With an increase in overweight and obese adolescents, professionals are concerned with the increase of soft drink consumption. Especially since most soft drinks do not offer nutrition needed by growing adolescents and are high in calories (Fried & Nestle, 2002). Adolescence is an opportune time to teach and engrain health behaviors. It is the time of ones life when physical and mental changes are rapid and lifetime behaviors are developed (Story, Neumark-Sztainer, & French, 2002).

When addressing adolescents, and their nutritional knowledge and behavior, one must approach them with a different mindset than when dealing with adults. Most adolescents are still concrete thinkers and have yet to become abstract thinkers. They see the here and now, and often are oblivious to the future. Adolescents are more concerned with what is going on in the present time and often put more thought to appearance and perception than to their future. To reach adolescents one must not only show how something will benefit them, but also be able to demonstrate short-term benefits (Croll, Neumark-Sztainer, & Story, 2001). Adolescence is viewed as a dynamic and complex transitional time in life. During this time every aspect of the adolescent's development and social growth is going through a transformation. Even with the importance put on

nutrition, adolescents have poor nutritional habits (Story, Neumark-Sztainer, & French, 2002).

Croll, Neumark-Sztainer, & Story (2001) reported that when asked, adolescents relate nutrition to good foods/beverages and bad foods/beverages. They often relate eating out to bad nutrition and eating home cooked food (including fruits and vegetables) as good nutrition. Often the bad foods were listed as chips, candy, fast foods, pizza, soft drinks, sugary foods, and junk food. It was also reported that whether food is bad or not was often associated with whether or not the food comes in a wrapper. It was even viewed that high calorie foods, high cholesterol foods, steak, beef, ribs, and chicken with skin were unhealthy (Croll, Neumark-Sztainer, & Story, 2001). Shannon, Story, Fulkerson, & French (2002) report that 42% of students had trouble identifying which foods were low-fat and that 48% of students would prefer that foods contain labels stating they are low-fat.

When describing what is healthy, adolescents often describe things that are cooked, eating at home with family members, and eating at a relative's house. Healthy eating is associated with eating vegetables without butter, watching fat intake, calorie intake, limiting caffeine, and not eating what is often referred to as a "bunch of junk" (Croll, Neumark-Sztainer, & Story, 2001).

Dwyer, Evans, Stone, Feldman, & et al (2001) report that 69% of students eat three meals a day while noting that the most often skipped meal was breakfast. Many who ate fewer meals per day tended to snack more often through out the day. The snacks included many with sweeteners which included soft drinks or sweets. With 79% of students eating lunch at school it is important to be aware of what school lunches and vending machines offer. Many schools offer a la carte programs and vending machines. Currently there are no federal nutritional guidelines for these programs as there are for school cafeterias (French, Story, Fulkerson, Gerlach, 2003).

Fried and Nestle (2002) reported that most adolescents have received information about healthy eating, the Food Guide Pyramid, and what is considered unhealthy. They have shown a general concept of what is healthy and unhealthy by relating foods and drinks to categorical bunching (e.g. food purchased out of vending machines or from fast

food restaurants is unhealthy and home cooked food is healthy). Yet they still have unhealthy nutritional habits, with one fourth of students drink 26 ounces of soft drinks per day. And when in environments (schools) that provide vending/a la carte programs they are less likely to drink beverages such as juices, milk, or water (Fried & Nestle, 2002). Ninety-three percent of students report that they choose what tastes best when choosing what to eat (Shannon, Story, Fulkerson, & French , 2002).

Soft drinks offer a wide array of less-than-desirable ingredients. One of the ingredients scrutinized over the last several decades is caffeine. Katholi, Stormer, Stericker, Rankin, Katholi, & Katholi (2003) brought caffeine to the forefront linking it to decreased performance in the classroom, sleep deprivation, and viewing the addictive properties and acceptance of caffeine as a gateway drug.

Americans, on average, consume 1.6 12 ounce cans of soft drinks per day for every man, woman, and child, doubling in consumption since 1974 (Jacobson, 1998). It has been reported by Kassem, Lee, Modeste, and Johnston (2003) that slightly more than 82% of adolescents are soft drink consumers and that children and adolescents consume 50% more soft drinks than milk (Cavadini, Siega-Riz, & Pipkin, 2000; Cullen, Ash, Warneke, & Moor, 2002; French, Lin, & Guthrie, 2003; Harnack, Stang, & Story, 1999; Jacobson, 1998; Rampersaud, Bailey, & Kauwell, 2003). Males tend to drink more soft drinks than do their female counterpart (Cavadini, Siega-Riz, & Pipkin, 2000; French, Lin, & Guthrie, 2003; Harnack, Stang, & Story, 1999; Jacobson, 1998). Harnack, Stang, & Story (1999) reported that race, sex, and urbanization were all significant when predicting soft drink consumption while Kassem, Lee, Modeste, & Johnston (2003) reported that females chose soft drinks as the beverage of choice due to availability, taste, and that soft drinks will quench thirst.

With the increased consumption of soft drinks and decreased consumption of milk, a higher caloric intake is seen which has been associated with many health related issues. Decreased consumption of milk has been associated with the onset of osteoporosis (Cavadini, Siega-Riz, & Pipkin, 2000; Jacobson, 1998). The increased amount of calories consumed in soda, due to the high levels of sugar, has been linked to

Type-II diabetes (Shultze, Manson, Ludwig, et. al. 2004), obesity, and dental carries (Jacobson, 1998; Shultze, Manson, Ludwig, et. al. 2004).

Caffeine and College Students

College students ingest excessive and often times dangerous levels of caffeine (Johnson-Green, Douglass, et al, (1988). They reported that adverse biological and psychological side effects, such as muscle tremors, insomnia, stomach disorders, and fatigue, were being experience by high caffeine users. These users, specifically females, were knowledgeable of caffeine content which may indicate that females sought out drinks high in caffeine. Research completed by Pela (1989) found that the most commonly used drug among college students in Benin City, Nigeria was caffeine where 95 percent of student reported using caffeine in social settings. This research was supported by Egdochuku and Akerele (2007). They reported that Nigerian undergraduates most frequently abused caffeine among stimulants questioned. (This stimulant, caffeine, among others are associated with traits such as greed, fraud, examination malpractices, cultism, and character failure. Traits such as these are associated with violent demonstrations (Egdochuku & Akerele, 2007).) Kristiansen, Levy-Milne, Barr, and Flint (2005) reported that Canadian University varsity athletes reported that the most common reasons given for caffeine use among males was to counteract tiredness, liking the taste, providing more energy, and to enhance performance. Females reported using caffeine for the taste, to counteract tiredness, to provide more energy, and to enhance performance (p. 203). Among the supplements, caffeine was “by far the most reported product causing side effects” (p 205). Celebrating achievement and facing a task requiring creativity were primary reasons for consuming caffeine in research completed by Venti and Chambliss (2000) comparing American and Australian student use of psychoactive substances.

Caffeine was reported to be statistically significant for females, but not men, in predicting a BMI (body mass index) gain when following students for one year (Adams & Rini, 2007). However, Adams and Rini stated that it was unclear if it was caffeine or the calories associated with drinks with caffeine in them that led to the BMI gain. In a summary memorandum by Howes (2006) it is reported that one in 5 college students

have used energy drinks in the previous year and these drinks are associated with higher levels of alcohol consumption, use of illicit drugs, and non-medical use of prescription drugs. Bradley and Petree (1990) reported that nearly 19 percent of college students had experienced five or more DSM-III caffeinism signs. A positive association between caffeinism symptoms and caffeine consumption was reported among those with expectations of caffeine-enhanced performance.

Sensation Seeking

Sensation seeking can be defined as “a trait defined by the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such an experience” (Zuckerman, 1994 p. 27). Reinforcement for the sensation seeker tends to be the sensory effects of external stimulation (Zuckerman, 1979). “The high-sensation seeker is sensitive to his or her internal sensations and chooses external stimuli that maximize them. Unusual sensations may be produced by emotions, drugs, and physical activities such as free-fall skydiving, scuba diving, or other activities involving speed and movement beyond the ordinary range (Zuckerman, 1979 p. 10). Parents are often frightened by children who are sensation seekers. Their children often alter and change games so they become dangerous, satisfying their sensation seeking while worrying parents (Zuckerman, 1979). The sensation seeker will become bored when stimuli and experiences become repetitive (Zuckerman, 1971; Zuckerman & Bone, 1972). The following is Zuckerman’s Sensation Seeking Scale – Form V (SSS–V) and scoring table as reported by Zuckerman (1979 p. 397-401). The SSS-V has four subscales with 10 sets of questions in each subscale. The subscales are Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (Dis), and Boredom Susceptibility (BS) (Zuckerman, 1979 p. 102-103). Zuckerman & Bone (1972 p. 309) report that the TAS items “express a desire to engage in outdoor sports or other activities involving elements of speed or danger,” while the ES items “indicate a need for a broad variety of inner experience achieved through travel, drugs, music, art, and an unconventional style of life with an element of resistance to irrational authority and conformity,” and the Dis is a “swinger factor, including items expressing a hedonistic, extraverted philosophy of

“wild” parties, social drinking, variety in sexual life, and gambling,” and the last subcategory of BS items indicate “a dislike of repetition, the routine and predictable, dull or boring people, and a restless reaction to monotony.”

Zuckerman’s (1979 p. 268-296) sensation seeking scale (see appendix A) has been positively correlated with varied sexual activities, drug and alcohol use, smoking and food preferences such as spicy, sour, and crunchy foods. With the length of Zuckerman’s SSS-V questionnaire being difficult to administer with other questionnaires due to its length Hoyle, Stephenson, Palmgreen, Lorch, and Donohew (2002) and Stephenson, Hoyle, Palmgreen, & Slater (2003) developed shorter scales to measure sensation seeking. These scales, called the Brief Sensation Seeking Scale (BSSS) and the Brief Sensation Seeking Scale-4 (BSSS-4) revealed statistically significant effects of both grade and Sex on all four measures of sensation seeking (TAS, ES, Dis, and BS) and appears to “adequately capture the tendencies of impulsive sensation seekers while also exhibiting a strong conceptual link to the original four-dimensional conceptualization of sensation seeking.” (Hoyle, Palmgreen, & Slater, 2003 p. 284). The BSSS contains eight questions while the BSSS-4 contains only four questions and is ideal for use in large scale surveys. See Appendix B for the eight and four questions scales. Sensation seekers include those who like novel experiences, Gupegui, et al (2007) reported that novelty seeking was associated with heavy caffeine consumption (> 200mg/day) among adults. Miller (2008) reported that jock identity (which included significant risk taking tendencies, especially in males, which is also associated with sensation seeking) was associated with energy drink consumption (most of which contain high levels of caffeine).

Caffeine

The history of caffeine dates back to about 4700 B.C. when tea was popular in China (Lecos, 1984). Caffeine was first isolated in Germany in 1820 by Runge. It was also reported to be isolated by Robiquete in 1823 and Pelletier in 1826 (Dews, 1984). Many other terms for caffeine were used until 1840 when “caffeine” became the predominant term. Earlier terms for caffeine included “cofeina” in 1823, “guaranin”, “coffein” in 1826, and in 1827 the term “thein” was used by Oudry. In 1838 and finally

in 1840 it was noted that all the substances thought to be different were actually the same as what we now know as caffeine (Dews, 1984). Caffeine, specifically caffeine metabolism, was being studied as early as 1850. From that point on, caffeine has been scrutinized and studied by many different researchers with many different outcomes (Dews, 1984; Lecos, 1984). Historically caffeine was associated exclusively with coffee. In 1962 approximately 75% of all people (ages ranging from 10 to those older than 60) were coffee drinkers. In 1987 this fell to 52%, a decline of almost 25%. At the same time the percentage of soft drink consumers was on the increase (Cavadini, Siega-Riz, & Pipkin, 2000; Jacobson, 1998; Lecos, 1988).

See Appendix C for charts depicting the amount of caffeine in different beverages, foods, and drugs as reported by Erowid (2007) and by *The Center For Science In The Public Interest* (2007).

Caffeine has been at the center of controversy for decades. In the early 1980's the FDA issued warnings stating caffeine had been linked to birth defects, cancer, cardiovascular disease, behavioral problems, central nervous system disorders, reproductive problems, and nonmalignant breast lumps (Lecos, 1988).

Physiologically, caffeine has been shown to affect the cardiovascular system by raising blood pressure, raising pulse when in high volume, lowering pulse when in low volume, dilating vessels, increasing norepinephrine, epinephrine, & rennin activity, causing trembling and seizures (Catlin & Hatton, 1991; Zagnoni & Albano, 2002), and urticaria (Fernandez-Nieto & Quirce, 2002). Other effects of caffeine include indirect coronary artery dilation, headaches (Hering-Hanit & Gadoth, 2003), sleep deprivation (Pollak & Bright, 2003), and increases in body temperature (Stebbins, Daniels, & Lewis, 2001). Heart rate often decreases during the first hour and then increased above baseline after the second hour after ingestion. Habitual users differ from non-habitual users due to tolerance. This was shown by blood pressure and heart rate returning to normal values with prolong use of caffeine (Dews, 1984; Garattini, 1993).

Caffeine has been shown to have effects on behavior as well. It has been shown to be inversely related to grades and decrease performance in the classroom (Katholi, Stormer, Stericker, Rankin, Katholi, & Katholi, 2003), may disrupt coordination in

complex tasks (Catlin & Hatton, 1991), cause sleep disorders such as sleep apnea (Bardwell, Ziegler, Ancoli-Israel, Berry, Nelesen, Druning, & Dimsdale, 2000), nervousness (Zagnoni & Albano, 2002), hyperactivity, agitation, anxiety, withdrawal from play and interaction, attention disorders, and disruptive behaviors (Dews, 1984; Garattini, 1993).

The following are recommendations from Health Canada (2005) for maximum caffeine intake based on behavioral effects.

* Children	4-6 years of age	45mg/day
	7-9 years of age	62.5 mg/day
	10-12 years of age	85 mg/day
Women of child bearing age and/or pregnant		300mg/day
* Based on 2.5 mg/kg of body weight per day and avg. body weight		

Kuchment (2007) reported that Roland Griffiths, neuroscientist at John's Hopkins University School of Medicine, reported that moderate doses (200-300mg/day) of caffeine for adults are not harmful but doses more than 500 - 600mg/day can cause side effects. These dosages are also supported by The Mayo Clinic (2007).

Caffeine ingested in lower doses has been shown to have positive effects. Brice and Smith (2002) found that doses of caffeine (either 65mg taken 4 times over a five hour period or a larger dose of 200mg taken at once) taken over time or all at once had a positive effect on alertness, improved performance on simple and choice reactive tasks, improved performance on a cognitive vigilance task and a task requiring sustained response and dual tracking/target detection. They also found that both doses increased anxiety. Biggs, Smith, Dorrian, Reid, Dawson, et al (2007) reported that small doses of caffeine (100 mg) increased driving performance, decreased driver perception of sleepiness and increased driver perception of driving performance. Koppelstaetter, Poeppel, Siedentopf, Ischebeck, Verius, Haala, et al (2007) reported that doses as little as 100mg of caffeine has a positive effect on frontopolar cortex of the brain. This part of the brain has been associated with attentional and executive functions such as cognitive conflict tasks, error detection/monitoring, working memory, planning, monitoring, and

problem solving. It was reported that there was increased activity in the frontopolar cortex and postulated that this could benefit the tasks associated with that cortex. Barry, Johnstone, Clarke, Rushby, Brown, and Mckenzie reported that a single dose of 250mg of caffeine decreased simple auditory go/nogo tasks, but had no effect of omission or commission of errors thus it improved the processing related to response production and task performance. Maia & Medonca (2002) suggest that those that consumed between 175-200mg of caffeine daily over time had a significantly reduced chance of developing Alzheimer's disease as those that consumed less than 100mg of caffeine per day. Another benefit of caffeine is using caffeine in a topical lotion. It has been found to increase skin barrier function (Brandner, Behne, Huesing, & Moll, 2006).

Caffeine as an Ergogenic Aid

Even with the documented negative effects of caffeine (Bardwell, Ziegler, Ancoli-Israel, Berry, Nelesen, Druning, & Dimsdale, 2000; Dews, 1984; Fernandez-Nieto & Quirce, 2002; Garattini, 1993; Lecos, 1988; Katholi et al, 2003), it is often sought out by athletes as an ergogenic aid to enhance performance. Caffeine acts as a stimulant by releasing catecholamines such as epinephrine. Quantities, such as 3-5 mg/kg, appear to enhance performance (Mangus, B. & Trowbridge, C., 2005). Caffeine has also been shown to delay fatigue, heighten the feeling of alertness, decrease reaction time, and increase vigilance (Catlin & Hatton, 1991; Mangus & Trowbridge, 2005). Spriet, Maclean, Dyck, Hultman, Cederblad, and Graham (1992) reported that a high caffeine dose one hour prior to exercise prolongs exercise due to delaying exhaustion. However, it was reported that caffeine appears to only enhance activities that are endurance activities and not very short-duration, high-intensity exercise bouts (Graham & Spriet, 1991; Greer, McLean, & Graham 1998; Spriet, 1995). High levels of caffeine can disqualify an athlete from competition. The NCAA disqualifies athletes who test more than 15µg/ml. Even with this deterrent, caffeine is still used as an ergogenic aid (Mangus & Trowbridge, 2005). Caffeine levels below the 15µg/ml will still enhance exercise; therefore it is recommended by Spriet (1995) that caffeine ingestion 48-72 hours prior to exercise be banned.

Performance-enhancing substances have become of great concern to pediatricians (The American Academy of Pediatrics, 2005). “Efforts to minimize use of performance-enhancing substances require the pediatrician to have an understanding of the incentives for use, a comprehensive definition of performance-enhancing substances, and familiarity with strategies for prevention” (p 1103). The American Academy of Pediatrics released a list of recommendations with regard to the use of performance enhancing substances as part of a policy statement (2005). See Appendix D for the list of recommendations.

Tymowski & Somerville (2002) report that more than 29% of New Brunswick, Canada youth females and 30% of males reported using caffeine to improve sport performance in the 12 months previous to the research. Slightly less than 88% of the students stated that they had heard of athletes using drugs or doping methods to help them perform better in sport. Youth and adolescents reported they found information about substances used in sport on the tv/radio, in magazines, on the internet, and from coaches, parents, friends and team mates (Tymowski & Somerville, 2002; Llorens, 1998). One third of students surveyed reported using caffeine to improve sport, slightly over 41% of males and slightly less than 39% of females believe that caffeine could harm their health, or hurt them (Tymowski & Somerville, 2002) while Llorens (1998) reported that two in five (40.2%) Quebec youth had taken caffeine in order to improve their athletic performance, but when asked youth and adolescents reported that they did not know if caffeine would harm their health. In a study by Llorens (1998) through the *Drug Awareness Program Royal Canadian Mounted Police*, it was reported by *The Canadian Centre for Drug Free Sport* (1993) in the *National School Survey On Drug and Sport* that about 30% of students believed that caffeine would help an athlete perform better. Students reported that they believed that caffeine would improve their athletic performance and admitted to using caffeine to enhance athletic performance in the last 12 months. (Canadian Centre for Drug-Free Sport, 1993).

Caffeine Intoxication, Caffeinism, and DSM IV-TR Classifications

“Caffeine is the most commonly used mood-altering drug in the world” (Juliano, & Griffiths, 2005, p403). Many support the DSM IV-TR classification of dependency for caffeine (Gilliland & Bullock, 1984; Hughes, Oliveto, Liguori, Carpenter, & Howard,

1998), even though the DSM IV-TR only recognizes caffeine intoxication, caffeine induced anxiety disorder, caffeine induced sleep disorder, and caffeine-related disorder (American Psychiatric Association, 2000).

Caffeine intoxication, previously called Caffeinism (Griffiths, Juliano, & Chausmer, 2003) can be evident when as little as 100mg of caffeine is consumed per day by those who are unaccustomed to caffeine. To meet the criteria of caffeine intoxication five or more symptoms must develop shortly after consuming caffeine (American Psychiatric Association, 2000). Caffeine intoxication was identified as early as 1914 and was considered to be a state of poisoning not often encountered, but by 1925 multiple cases were reported (McManamy & Schube, 1936). Caffeinism is defined by Josephson & Stine (1976) as “a syndrome resulting from the excessive ingestion of caffeine and characterized primarily by cardiovascular and central nervous system manifestations” (pg 776). In a recent study Hughes, Oliveto, Liguori, Carpenter, & Howard (1998) reported that “a substantial number of current coffee, tea, and soda drinkers endorse criteria for dependence, withdrawal, or intoxication as applied to their caffeine use” (p 105).

The following are current diagnostic criteria for caffeine intoxication as described by the American Psychiatric Association (2000):

Diagnostic criteria for 305.90 Caffeine Intoxication

- A. Recent consumption of caffeine, usually in excess of 250 mg (e.g. more than 2-3 cups of brewed coffee).
- B. Five (or more) of the following signs, developing during, or shortly after, caffeine use:
 - 1. restlessness
 - 2. nervousness
 - 3. excitement
 - 4. insomnia
 - 5. flushed face
 - 6. diuresis
 - 7. gastrointestinal disturbance
 - 8. muscle twitching
 - 9. rambling flow of thought and speech
 - 10. tachycardia or cardiac arrhythmia
 - 11. periods of inexhaustibility
 - 12. psychomotor agitation

13. Diagnostic criteria for 305.90 Caffeine Intoxication continued

- C. The symptoms in Criterion B cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- D. The symptoms are not due to a general medical condition and are not better accounted for by another mental disorder (e.g. an Anxiety Disorder).

When symptoms are in excess of those usually associated with caffeine intoxication and when symptoms are sufficiently severe to warrant independent clinical attention the DSM IV-TR recognizes them as Other Caffeine-Induced Disorders (APA, 1994. p. 213). These disorders are categorized as caffeine-induced anxiety and caffeine-induced sleep disorder. The following criteria are diagnostic criteria the DSM IV-TR uses to diagnose each disorder.

Diagnostic criteria for Substance-Induced Anxiety Disorder

- A. Prominent anxiety, Panic Attacks, or obsessions or compulsions predominate in the clinical picture.
- B. There is evidence from the history, physical examination, or laboratory findings of either (1) or (2):
 - 1. the symptoms in criterion A developed during, or within 1 month of, substance intoxication or withdrawal.
 - 2. medication use is etiologically related to the disturbance
- C. The disturbance is not better accounted for by an anxiety disorder that is not substance induced. Evidence that the symptoms are better accounted for by an anxiety disorder that is not substance induced might include the following: the symptoms precede the onset of the substance use (or medication use); the symptoms persist for a substantial period of time (e.g. about a month) after the cessation of acute withdrawal or severe intoxication or are substantially in excess of what would be expected given the type or amount of the substance used or the duration of the use; or there is other evidence suggesting the existence of an independent non-substance-induced anxiety disorder (e.g. a history of recurrent non-substance-induced-related episodes).
- D. The disturbance does not occur exclusively during the course of a delirium.

Diagnostic criteria for Substance-Induced Anxiety Disorder continued

- E. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Note: This diagnosis should be made instead of a diagnosis of substance intoxication or substance withdrawal only when the anxiety symptoms are in excess of those usually associated with the intoxication or withdrawal syndrome and when the anxiety symptoms are sufficiently severe to warrant independent clinical attention.

Code [Specific Substance] – Induced Anxiety Disorder

(291.8 Alcohol; 292.89 amphetamine (or Amphetamine-Like Substance); 292.89 Caffeine; 292.89 Cannabis; 292.89 Cocaine; 292.89 Hallucinogen; 292.89 Inhalant; 292.89 Phencyclidine (or Phencyclidine-Like Substance); 292.89 Sedative, Hypnotic, or Anxiolytic; 292.89 Other [or unknown] Substance)

Specify if:

With Generalized Anxiety: if excessive anxiety or worry about a number of events or activities predominates in the clinical presentation.

With Panic Attacks: if Panic Attacks (see p. 395) predominate in the clinical presentation.

With Obsessive-Compulsive Symptoms: if obsessions or compulsions predominate in the clinical presentation.

With Phobic Symptoms: if phobic symptoms predominate in the clinical presentation.

Specify if (see table on p. 177 for applicability by substance):

With Onset During Intoxication: if the criteria are met for intoxication with the substance and the symptoms develop during the intoxication syndrome

With Onset During Withdrawal: if criteria are met for Withdrawal from the substance and the symptoms develop during, or shortly after, a withdrawal syndrome.

Diagnostic criteria for Substance-Induced Sleep Disorder

- A. A prominent disturbance in sleep that is sufficiently severe to warrant independent clinical attention.

- B. There is evidence from the history, physical examination, or laboratory findings of either (1) or (2).

1. the symptoms in Criterion A developed during, or within a month of, Substance Intoxication or Withdrawal.

2. medication use is etiologically related to the sleep disturbance

Diagnostic criteria for Substance-Induced Sleep Disorder continued

C. the disturbance is not better accounted for by a Sleep Disorder that is not substance induced. Evidence that the symptoms are better accounted for by a Sleep Disorder that is not substance induced might include the following: the symptoms precede the onset of the substance use (or medication use); the symptoms persist for a substantial period of time (e.g. about a month) after the cessation of acute withdrawal or severe intoxication, or are substantially in excess of what would be expected given the type or amount of the substance used or the duration of the use; or there is other evidence that suggests the existence of an independent non-substance-induced Sleep Disorder (e.g. a history of recurrent non-substance-related episodes).

D. The disturbance does not occur exclusively during the course of a delirium.

F. the sleep disturbance caused clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Note: this diagnosis should be made instead of a diagnosis of Substance Intoxication or Substance Withdrawal only when the sleep symptoms are in excess of those usually associated with the intoxication or withdrawal syndrome and when the symptoms are sufficiently severe to warrant independent clinical attention.

Code [Specific Substance] – Induced Sleep Disorder

(291.8 Alcohol; 292.89 Amphetamine; 292.89 Caffeine; 292.89 Cannabis; 292.89 Cocaine; 292.89 Opioid; 292.89 Sedative, Hypnotic, or Anxiolytic; 292.89 Other [or unknown] Substance)

Specify if:

Insomnia Type: if the predominant sleep disturbance is insomnia

Hypersomnia Type: if the predominant sleep disturbance is hypersomnia

Parasomnia Type: if the predominant sleep disturbance is parasomnia

Mixed Type: if more than one sleep disturbance is present and non predominates

Specify if:

With Onset During Intoxication: if the criteria are met for intoxication with the substance and the symptoms develop during the intoxication syndrome.

With Onset During Withdrawal: if criteria are met for Withdrawal from the substance and the symptoms develop during, or shortly after, a withdrawal syndrome.

Caffeine withdrawal syndrome must be due to the abrupt cessation of, or reduction in, the use of caffeine-containing products (APA, 1994. p 708) Caffeine Withdrawal has been included in the ICD-10 by the World Health Organization (p. 833)

while the American Psychiatric Association (1994, p. 709) only offers proposed criteria.. The following criteria are criteria given in the DSM-IV for research criteria for caffeine withdrawal.

Research Criteria for caffeine withdrawal

A. Prolonged daily use of caffeine

Abrupt cessation of caffeine use, or reduction in the amount of caffeine used, closely followed by headache and one (or more) of the following symptoms:

1. Marked fatigue or drowsiness
2. marked anxiety or depression
3. nausea or vomiting

C. The symptoms in Criterion B cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

D. The symptoms are not due to the direct physiological effects of a general medical condition (e.g. migraine, viral illness) and are not better accounted for by another mental disorder.

Although the DSM-IV stops short of offering diagnostic criteria for caffeine dependence, it has been widely supported in the literature (Bernstein, Carrrol, Thuras, et al, 2002; Griffiths, Juliano, & Chausmer, 2003; Hering-Hanit & Gadoth, 2003; Hughes, Oliveto, Liguori, Carpenter, & Howard, 1998; Juliano & Griffiths, 2005; Oberstar, Berstein, & Thuras, 2002; Strain, Mumford, 1994). The American Psychiatric Association (1994) lists the following criteria when diagnosing Substance Dependence (pg. 181) and Substance Abuse (pp. 182-183).

Criteria for Substance Dependence

A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:

1. tolerance, as defined by either of the following:
 - a. a need for markedly increased amounts of the substance to achieve intoxication or desired level.
 - b. markedly diminished effect with continued use of the same amount of the substrand.

Criteria for Substance Dependence continued

2. withdrawal, as manifested by either of the following:
 - a. the characteristic withdrawal syndrome for the substance (refer to Criteria A and B of the criteria sets for Withdrawal from the specific substances)
 - b. the same (or closely related) substance is taken to relieve or avoid withdrawal symptoms.
3. the substance is often taken in larger amounts or over a longer period than was intended
4. There is a persistent desire or unsuccessful efforts to cut down or control substance use
5. A great deal of time is spent in activities necessary to obtain the substance (e.g. visiting multiple doctors or driving long distances), use the substance (e.g. chain smoking), or recover from its effects.
6. Important social, occupational, or recreational activities are given up or reduced because of substance abuse
7. the substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g. current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite that an ulcer was made worse by alcohol consumption)

Specify if:

With Physiological Dependence: evidence of tolerance or withdrawal (i.e. either Item 1 or 2 is present)

Without Physiological Dependence: no evidence of tolerance or withdrawal (i.e., neither item 1 or 2 is present)

Course Specifiers (see text for definitions):

Early Full Remission

Early Partial Remission

Sustained Full Remission

Sustained Partial Remission

On Agonist Therapy

In a Controlled Environment

Criteria for Substance Abuse

- A. A maladaptive pattern of use of substance use leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring within a 12-month period.
1. Recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home (e.g. repeated absences or poor work performance related to substance

Criteria for Substance Abuse continued

- use; substance-related absences, suspensions, or expulsions from school; neglect of children or household)
2. Recurrent substance use in situations in which it is physically hazardous (e.g. driving an automobile or operating a machine when impaired by substance use).
 3. Recurrent substance-related legal problems (e.g. arrests for substance-related disorderly conduct).
 4. Continued substance use despite having persistent or recurrent effects of the substance (e.g. arguments with spouse about consequences of intoxication, physical fights).
- B. the symptoms have never met the criteria for Substance Dependence for this class of substance.

The DSM-IV does not include diagnostic criteria for caffeine dependence due to insufficient information pertaining to other features of dependence (e.g. inability to stop use and use despite harm) which are generally present with other diagnoses of dependence (Griffiths, Juliano, & Chausmer, 2003).

Summary

Caffeine is a widely accepted drug in American culture with many adverse affects have been reported in the literature. Among the adverse affects related to caffeine consumption are poor grades and decreased classroom performance (Katholi, Stormer, Stericker, Rankin, Katholi, & Katholi, 2003), disruption of coordination in complex tasks (Catlin, & hatton, 1991), agitation, hyperactivity, anxiety, withdrawal from play and interaction, attention disorders, and disruptive behaviors (Dews, 1984; Garattini, 1993), sleep disorders (Bardwell, Ziegler, Ancoli-Israel, Berry, Nelesen, Druning, & Dimsdale, 2000; Pollak & Bright, 2003), increased blood pressure, abnormal pulse, trembling, seizures (Catlin & Hatton, 1991; Zagnoni & Albano, 2002) allergic reactions (Fernandez-Nieto & Quirce, 2002), headaches (Hering-Hanit & Gadoth, 2003), excitement, and nervousness (Zagnoni & Albano, 2002).

Positive effects of caffeine consumption has shown some benefits. In doses 100mg and less it has been shown to protect from Alzheimer's disease (Maia & Mendonca, 2002), improve skin barrier function (Brandner, et al, 2006), decrease auditory reaction time (Barry, et al, 2007), increase frontopolar cortex function

(Koppelstaetter, et al, 2007), increase driving performance and decrease perception of sleepiness (Biggs, et al, 2007), and increase alertness, improved performance on simple and choice reactive tasks, and increase other cognitive tasks (Brice & Smith, 2002).

However, with the explosion of the energy drink market, and most of these drinks being high in caffeine content, it is important to understand what people believe about caffeine, how much they are consuming, and what can predict caffeine consumption to avert the negative effects of caffeine.

Chapter 3

Methodology

This chapter includes the methodology by which this study was conducted. It will include discussion of the participants, the pilot study conducted, sample selection, procedures, and data analysis.

Participants

The participants for this study were 300 (approximately 20 subjects per predictor) freshmen at Marshall University in Huntington, WV. All subjects were freshmen, had graduated from high school in the past year, and were 18-20 years of age. Of the 300 participants, 39.3% were males, 66.7% were females, and 90% were Caucasian. More information on the participants is contained in chapter 4.

Instrument

An anonymous survey was used to determine (1) the amount of caffeine consumed by a sample of freshmen students at Marshall University, (2) their beliefs regarding caffeine consumption, (3) reported perceived benefits and adverse effects of caffeine consumption, (4) reasons for consuming or refraining from consuming caffeine, and (5) predictors of high and low caffeine consumption. Health professionals reviewed the instrument for face validity. Questions 1- 3 were general demographic questions, questions 4-5 were adopted from Hollingshead's Two Factor Index of Social Position in Miller and Salkind (1991 p. 462-469) and found reliable and valid (Ellis, Lane, & Olesen, 1963; Slomczynski, Miller, & Kohn, 1981). Questions 6-7 were general demographic and background questions. Question 8 was adopted by permission (via email correspondence with Dr. Palmgreen at the University of Kentucky) from Hoyle, Stephenson, Palmgreen, Lorch, and Donohew (2002 p. 405) and shown to be valid and reliable (Hoyle, et. al, 2002). Questions 9-23 were adapted/adopted with permission (via email correspondence with the Canadian Centre for Drug Free Sport) from *Attitudes and behaviors of New Brunswick students towards the use of performance-enhancing*

substances in sport: Final report, 2002, National Survey on Drugs and Sport: Final report by Canadian Centre for Drug-Free Sport, 1993, and Young peoples attitudes towards doping in sport: Final report by the Royal Canadian Mounted Police, 1998.

These questions were used to report beliefs and trends. Questions 24-25 were adapted/adopted from the DSM-IV criteria for caffeine induced sleep disorder, intoxication, anxiety disorder, and caffeine related disorder (1994). Questions 26-29 were developed by the investigator to determine the amount of caffeine consumed. See appendix E for a copy of this questionnaire.

Pilot Study

This questionnaire was utilized in a pilot study by a convenience sample of 30 Marshall University students in the division of Exercise Science, Sport, and Recreation to determine if the questionnaire was understood by university students and to time how long it took for completion of the questionnaire. These participants were not included as subjects in the actual study. Once the participants completed the survey they were asked (1) if they had any questions regarding the survey, (2) if they understood if the question asking the number of drinks of colas they consumed each day over the past week, (3) was anything confusing, and (4) did anything need to be added to the survey. It took participants an average of 15 minutes to take the survey. Changes made to the survey included (1) adding a question on caffeine tablets, gum, and mints due to comments that students use caffeine pills, gum, and/or mints to stay awake when partying on weekends, (2) changing the wording on level of education to include Hollingshead's descriptions of each level of education and putting the choices in order to expedite data entry, (3) and adding the words "soft drinks" after "other" to the beverage consumption chart and the same for energy drinks, and coffee and teas. Socioeconomic status, total caffeine consumption, and milligrams of caffeine per kilogram of body weight per day were calculated to insure a range of scores. After all changes were made, the survey was finalized and the actual version used is contained in Appendix E.

Sample Selection

Marshall University UNI 101 (a required university orientation class for all 2000⁺ incoming freshmen at Marshall University) and other predominately freshman classes served as the convenience sample. The principal investigator (Gary McIlvain) selected enough class sections to obtain 300 surveys and then contacted course instructors (by looking up course instructors utilizing the course schedule book and online information available to the investigator) and obtained permission to administer surveys in his/her class section(s). Classes used to collect data in were UNI 101 (a freshman orientation class), ENG 101, ENG 102, ESS 118 (Development of Sport and Physical Education in the US), and HS 222 (First Aid). All were classes that generally had high enrollment of freshmen.

Procedures

Research approval was obtained by a faculty dissertation committee at the University of Kentucky. Next, IRB approval was obtained from the University of Kentucky and then by Marshall University. The dean of each college was contacted to obtain permission to contact individual faculty. Individual class faculty were contacted via email in which the principal investigator (PI) introduced himself and explained the purpose of the study, that it was anonymous, it had IRB approval, and that it should only take 15 minutes to complete. Once permission was granted by the individual class faculty, the PI scheduled a day and time to collect data in each class section. Data were collected in February and took about 2-3 weeks to collect. After introducing himself to the class, the PI emphasized that participation was voluntary and anonymous and would in no way affect the student's grades or credit in the course. Surveys and cover letters (see Appendix E and F) were distributed to each student in the room. All surveys were collected by the PI upon completion. The PI gave all students a survey. If a student did not want to participate (approximately 8-10 in number) or did not meet the inclusion criteria (approximately 50 in number) he/she was instructed to read through the survey if he/she wished and then to return a blank survey when the PI collected all surveys.

Data Analysis

Data were coded by hand by the investigator and entered in the computer. SPSS (version 15) was used for all analyses. Socioeconomic status for the participant’s father/male guardian and for his/her mother/female guardian was calculated by using Hollingshead’s Index of Social Position (Miller & Salkind, 1991 p. 462). Father’s social index was calculated by finding the father’s occupation in Hollingshead’s categories (categorized by income potential and ranked 1-7, with 1 being the higher score) and then multiplied by a factor weight of 7 to give a partial, or occupation score. Then father’s education was ranked 1-7, again with 1 being the highest score one can obtain (meaning a higher SES, the lower the score on Hollingshead’s social index, the higher the SES), and multiplied by a factor weight of 4 to obtain a partial, or education score. The scores for occupation and education were added to obtain a social index (the lower the social index total score, the higher the SES). The following shows the comparison of social index to SEs. Mother’s SES was tabulated in the same manner. The following is the example given in Miller and Salkind (1991, p 462):

“If one were to compute a score for the manager of a Kroger grocery store who had completed high school and one year of business college, the procedure would be as follows:

Factor	Scale Score	+	Factor Weight	=	Partial Score
Occupation	3		7		21
Education	3		4		12
			Index of Social Position Score		33”

The following shows ranges of Hollingshead’s 2 Factor of Social Index:

Item	Range
Occupation	7-49
Education	4-28
Social Index	11-77

The eight items on the Sensation Seeking Scale were scored on a five-point Likert Scale and then summed, resulting in a new variable (called Risky) and that variable had a range of 8-40. Race categories were collapsed and coded as Caucasian or other. Total

milligrams of caffeine per day were tabulated. Frequencies and percentages were calculated for descriptive analysis. Means and standard deviations were calculated where appropriate. A multiple regression was performed to determine if there were significant predictors of high caffeine consumption. The dependent variable was total caffeine consumption and the predictor variables were sex, sensation seeking, father’s social index, mother’s social index, ethnicity, participation in organized activities while in high school, participation in organized activities while in college, and a scale consisting of three caffeine beliefs (items of alertness). Correlation analysis was used to determine if there was a relationship between caffeine consumption and sensation seeking. T-tests were used to test hypotheses concerning differences in beliefs and consumption by Sex. Cronbach’s alpha and Principal Component Analysis were used to determine intercorrelations between constructs. The Brief Sensation Seeking Scale items, ranges, and calculations were as follows:

Item	Question	Range
1	I would like to explore strange places	1-5
2	I get restless when spending too much time at home	1-5
3	I like to do frightening things	1-5
4	I like wild parties	1-5
5	I would like to take off on a trip with no pre-planned routes or timetables	1-5
6	I prefer friends who are excitingly unpredictable	1-5
7	I would like to try bungee jumping	1-5
8	I would love to have new and exciting experiences, even if they are illegal	1-5
	New variable “Risky” was formed by summing the scores of each individual item.	8-40

Chapter 4
Results and Discussion

Results

Three hundred and three participants were involved in this study. Three surveys were excluded due to excessive missing data or subjects electing not to finish the survey, leaving 300 usable surveys. Of this 300, there were 118 males (39.3%) and 182 females (60.7%). Ethnic origin was predominantly Caucasian with 270 (90%) of participants being Caucasian, 12 (4%) were African American, five (1.7%) Hispanic, three (1.0%) were Asian, and 10 (3.3%) reported other (see Table 1).

Table 1

Ethnicity of Participants (N=300)

Ethnicity	n=300
Male	118 (39.3%)
Female	182 (60.7%)
Caucasian	270 (90.0%)
African American	5 (1.7%)
Hispanic	3 (1.0%)
Asian	10 (3.3%)
Other	10 (3.35)

Participants' socioeconomic status was classified using Hollingshead's Two Factor Index of Social Position (Hollingshead, 1957). Father and mother's occupation and highest level of education were asked. Occupation and level of education were given a numeric value listed in Hollingshead's occupation and education scale. Father's and mothers social index was weighted and tabulated. The lower the social index computation, the higher the socioeconomic status. Means and standard deviations were computed (see Table 2). Reliability was calculated in two ways, first using Cronbach's Alpha of .603, which is acceptable and second by very heavy Principal Component Analysis. All Principal component Analyses were well above .3 suggesting the items

were closely intercorrelated, indicating that they represented one construct/concept, (see Table 3). Hollingshead's Two Factor Index of Social Position has been found valid and reliable in previous research as well (Ellis, Lane, & Olesen, 1963; Slomczynski, Miller, & Kohn, 1981).

Table 2

Social Index

	Mean	Standard Deviation
Father's Social Index. dadSI	40.83	17.97
Mother's Social Index. momSI	39.24	16.71

Table 3

Principal Component Analysis for Father's and Mother's Social Index

Social Index	Principal Component Loading
Item 1. educationmom	0.73
Item 2. occupationmom	0.62
Item 3. occupationdad	0.76
Item 4. educationdad	0.83

Among the 300 participants, 255 (85%) reported participating in organized high school activities (this included activities organized by the high school such as competitive sports, academic competitions, etc., and those activities organized in the community such as boxing, gymnastics, etc.) while 45 (15%) reported not participating in any organized activity. Eighty-five (28.3%) of the participants reported participating in organized activities during their freshmen year in college and 215 (71.7%) reported that they did not participate in any organized activity while in college.

An eight item scale was used to assess sensation seeking. The respondents could choose from 1 -5 on a Likert scale (see Table 4). Means and standard deviations were computed for each of the eight items. The Likert scale scores were totaled (strongly agree = 1, agree = 2, neither agree nor disagree = 3, disagree = 4, and strongly disagree = 5) to give a numeric value. The range of scores was 8 (lowest possible score) to 40 (highest possible score). The lower the total score, the stronger sensation seeking the respondent was determined to be. Means and standard deviations were computed for each of the eight items of the sensation seeking scale (see Table 5). A variable called

“Risky” was tabulated by adding together the scores of each of the individual items of the eight item sensation seeking scale. This variable was found reliable in two ways. Cronbach’s Alpha was .741 and there was a heavy Principal Component Analysis. All but one of the eight items of the eight item sensation seeking scale were well above .3, suggesting that the items were closely intercorrelated, and indicating that they represented one construct/concept. When the item that was below .3 was removed from the scale, it increased Cronbach’s Alpha slightly, but since the eight item sensation scale has been found valid and reliable in previously published research, all eight items of the scale were included in constructing the variable Risky by summing the responses (see Table 6).

Table 4

Brief Sensation Seeking Scale

Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
1	2	3	4	5
Item 1 I would like to explore strange places.				
Item 2 I get restless when spending too much time at home.				
Item 3 I like to do frightening things.				
Item 4 I like wild parties.				
Item 5 I would like to take off on a trip with no pre-planned routes or timetables.				
Item 6 I prefer friends who are excitingly unpredictable.				
Item 7 I would like to try bungee jumping.				
Item 8 I would love to have new and exciting experiences, even if they are illegal.				

Table 5

Sensation Seeking Individual Item Descriptives

	Mean	Standard Deviation
Item 1	2.07	0.92
Item 2	1.87	0.87
Item 3	2.89	1.08
Item 4	3.06	1.26
Item 5	2.38	1.27
Item 6	2.50	0.93
Item 7	2.55	1.39
Item 8	3.13	1.19
Total of Items 1-8. Risky	20.47	5.40

Table 6

Principal Component Analysis for “Risky”

	Principal Component Analysis
Item 1	0.57
Item 2	0.18
Item 3	0.74
Item 4	0.58
Item 5	0.69
Item 6	0.65
Item 7	0.58
Item 8	0.66

Fifteen questions were asked in the survey instrument about beliefs and/or reasons to consume or not consume caffeine. Respondents could answer yes or no to these questions. Eight of these questions inquired about beliefs of how caffeine would effect respondents if consumed, one question asked if the respondents had a religious objection to caffeine consumption, and six questions asked how respondents had used caffeine in the past, their daily caffeine consumption, and the number of years the respondents had been consuming caffeine. Frequencies, means, and standard deviations for these questions were computed (see Table 7).

Table 7

Caffeine Beliefs and Use Frequencies

	Yes	No
Q1. I believe caffeine will help me concentrate when studying	83 (27.7%)	217 (72.3%)
Q2. I believe that caffeine will help keep me awake	229 (76.0%)	71 (23.7%)
Q3. I believe that caffeine will wake me up in the morning	178 (59.3%)	122 (40.7%)
Q4. I believe that caffeine will help me lose weight	15 (5.0%)	285 (95.0%)
Q5. I believe caffeine enhances performance (athletic, academic, artistic, etc)	57 (19.0%)	243 (81.0%)
Q6. I believe that caffeine can be harmful to my health and can hurt me	239 (79.7%)	61 (20.3%)

Q7. I believe that caffeine is addictive	247 (82.3%)	53 (17.7%)
<i>Table 7 Continued</i>		
Q8. I believe that caffeine can disrupt coordination	129 (43.0%)	171 (57.0%)
Q9. I have religious objections to caffeine consumption	4 (1.3%)	296 (98.7%)
Q10. Have you ever used caffeine to wake up in the morning	182 (60.7%)	118 (39.3%)
Q11. Have you ever used caffeine to stay awake	229 (76.3%)	71 (23.7%)
Q12. Have you ever used caffeine to enhance physical performance	41 (13.7%)	259 (86.3%)
Q13. Have you ever used caffeine to enhance mental performance	80 (26.7%)	220 (73.3%)
Q14. Have you ever used drinks/pills with caffeine to lose weight	26 (8.7%)	274 (91.3%)
Q15. Do you drink beverages with caffeine in them on a daily basis?	195 (65.0%)	105 (35.0%)
	Mean	Standard Deviation
How many years have you been drinking beverages with caffeine. 0 1 2 3 4 5 6 7 8 9 10+	9.11	2.09

Participants were asked if they had signs and/or symptoms of caffeine intoxication or if they had signs and/or symptoms of caffeine withdrawal. Respondents checked all signs/symptoms of caffeine intoxication and/or withdrawal they had experienced. Responses were tabulated as yes or no answers (if subjects checked a sign/symptom then it was recorded as yes and if left unchecked then it was recorded as no). The total number of signs/symptoms for each respondent was computed by adding the totaling the number of yes responses for intoxication and withdrawal. Eighty three percent reported having at least one sign/symptom of caffeine intoxication in the past while 51% reported having at least one sign/symptom of caffeine withdrawal. Of the 22 signs/symptoms of caffeine intoxication, the maximum number any one person reported was 14. Of nine signs/symptoms of caffeine withdrawal, the maximum number any one

person reported was eight. Frequencies, means, and standard deviations caffeine intoxication and withdrawal were computed (see Table 8).

Table 8

Caffeine Intoxication and Withdrawal Frequencies, Percentages, and Means

Caffeine Intoxication	Yes	No
Item 1 restlessness	120 (40.0%)	180 (60.0%)
Item 2 excitement	115 (38.3%)	185 (61.7%)
Item 3 hot flashes	13 (4.3%)	287 (95.7%)
Item 4 nervousness	35 (11.7%)	265 (88.3%)
Item 5 can't sleep	147 (49.0%)	153 (51.0%)
Item 6 red faced	7 (2.3%)	293 (97.7%)
Item 7 frequent urination	96 (32.0%)	204 (68.0%)
Item 8 stomach pain	49 (16.3%)	251 (83.7%)
Item 9 muscle twitching	39 (13.0%)	261 (87.0%)
Item 10 rambling speech	24 (8.0%)	276 (92.0%)
Item 11 can't concentrate	43 (14.3)	257 (85.7%)
Item 12 fast heart beat	52 (17.3%)	248 (82.7%)
Item 13 hives	0 (0.0%)	300 (100.0%)
Item 14 irritated	23 (7.7%)	277 (92.3%)
Item 15 rash	0 (0.0%)	300 (100.0%)
Item 16 panic attack	11 (3.7%)	289 (96.3%)
Item 17 anxiety	37 (12.3%)	263 (87.7%)
Item 18 obsessive	8 (2.7%)	292 (97.3%)
Item 19 compulsive	12 (4.0%)	288 (96.0%)
Item 20 headache	94 (31.3%)	206 (68.7%)
Item 21 irregular heart beat	27 (9.0%)	273 (91.0%)
Item 22 hyperactivity	69 (23.0%)	231 (77.0%)
Caffeine Withdrawal	Yes	No
Item 1 fatigue	61 (20.3%)	239 (79.7%)
Item 2 drowsiness	45 (15.0%)	255 (85.0%)
Item 3 anxiety	7 (2.3%)	293 (97.7%)
Item 4 depressed	13 (4.3%)	287 (95.7%)
Item 5 sick at stomach	11 (3.7%)	289 (96.3%)
Item 6 vomiting	2 (0.7%)	298 (99.3%)
Item 7 headache	108 (36.0%)	192 (64.0%)
Item 8 cravings	74 (24.7%)	226 (75.3%)
Item 9 irritability	41 (13.7%)	259 (86.3%)
	Mean	Standard Deviation

Total Intoxication Signs/Symptoms	3.40	2.99
Total Withdrawal Signs/Symptoms	1.20	1.59

Finally, the total amount of caffeine consumed/ingested was computed by asking participants to complete charts indicating how much caffeine each respondent consumed in soft drinks, energy drinks, coffee and tea, and caffeine pills, gum, and/or mints. Drinks were asked by size of drink and number of drinks consumed. Caffeine pills, gum, and/or mints were asked by number of days consumed and number of pills, gum, and/or mints consumed each day. Having few respondents indicating they consumed caffeine pills, gum, and/or mints, this category was only used for tabulating total milligrams of caffeine used. Total caffeine was tabulated and means and standard deviations were computed (See Table 9).

Table 9

Total Caffeine Means and Standard Deviations

	Mean	Std Deviation
Item 1 Milligrams of Caffeine/Day. *totalcaffein	849.86	1265.62
Natural log of totalcaffein. *lncaff	9.44	5.88
Item 2 Milligrams of Caffeine/Kilogram of Body Weight/Day. *mgkgday	12.08	18.43
Number that reported they did not consume caffeine in the reporting time frame of the previous two weeks	16 (5.33%)	

* coding used in SPSS spreadsheet

To look for predictors of high and low caffeine consumption, a regression analysis was performed. Since the dependant variable (total caffeine) was sharply skewed to the right, its variability was tightly constrained. To remedy this, all the values of the dependent variable were expressed in natural logarithms as recommended by a statistics expert. (That process approximately normalized the distribution making it more informative.) (See Table 9). Questions 1-3 of caffeine beliefs construct a scale of beliefs of caffeine effect that we called three items for concentration, keep awake, and wake. This scale was found reliable in two ways. First the loadings of Principal Component Analysis were all large and well above .3 suggesting the items were closely intercorrelated, indicating that they represent one construct/concept and second by a

Cronbach's Alpha of .601 (a .601 Cronbach's Alpha is an artifact of the small number of items that make up the scale). This collection of items was a powerful predictor of caffeine consumption (see Table 10).

Table 10

Three items for concentration, keep awake, and wake up

	Principal Component Loading
Item 1 Belief Question 1	.61
Item 2 Belief Question 2	.79
Item 3 Belief Question 3	.81

When the regression analysis was computed, father's social index, participation in organized activity in college, and three items for concentration, keep awake, and wake up (items of alertness) were statistically significant. On average, every time the respondent's father's social index increased by one point, caffeine consumption increased on average by eight percent. Respondents that indicated they participated in organized activity while in college consumed on average 60.7% more caffeine than those who indicated they did not participate in organized activity while in college. It was also found that every time the three items for concentration, keep awake, and wake up increased one point, caffeine consumption increased on average 41.1%. Sex, sensation seeking, mother's social index, ethnicity, and participation in an organized activity in high school were not statistically significant. A total of the 8 items of the sensation seeking scale was used (Risky) and since the ethnic background was Caucasian, ethnicity was tabulated as a new variable race (which computed race to either Caucasian or Other, with Other being a summation of African American, Asian, Hispanic, and Other) (see Table 11). The regression analysis had a Cronbach's Alpha of .741

Table 11

Regression Analysis to Predict Caffeine Consumption

	Sig
Item 1 Sex	0.19
Item 2 Sensation Seeking	0.16
Item 3 Father's Social Index.	0.02*
Item 4 Mother's Social Index	0.66
Item 5 Ethnicity	0.31

Item 6 Participation in Organized High School Activity	0.74
Item 7 Participation in Organized College Activity	0.01*
Item 8 Questions 1-3 of Caffeine Beliefs. Three items for concentration, keep awake, wake up	0.00***

* $p < .05$ ** $p < .01$ *** $p < .001$

When analyzing belief questions one through eight for Sex differences, only one question was found significant, which was belief question 7 (I believe caffeine is addictive). Females were more likely to believe that caffeine is addictive than their male counterparts. Independent t-tests were computed and significance levels reported (see Table 12). A correlation analysis showed no statistical relationship between the BSSS variable Risky and total caffeine consumption or between the Brief Sensation Seeking Scale variable Risky and the natural logarithm of total caffeine consumption (see Table 13).

Table 12

T-tests for Sex Differences on Caffeine Beliefs

Caffeine Belief Question	t	Significance
1. concentrate	1.11	0.26
2. keepawake	0.84	0.40
3. wakeup	1.67	0.09
4. losewght	-0.57	0.56
5. performc	-0.13	0.18
6. harmful	1.43	0.15
7. addictive	2.13	0.03*
8. coordinate	1.13	0.25

* $p < .05$

** $p < .01$

*** $p < .001$

Table 13

BSSS and Total Caffeine/Natural Log of Total Caffeine Correlation

	totalcaffeine	lncaff
Risky	0.24	0.20

Discussion

Research Questions were (1) what is the average amount of caffeine consumed daily, (2) what beliefs do these college students have regarding caffeine (e.g. effects on health, performance enhancement, weight loss aid, and aid in staying awake or alert), (3) what are the perceived health benefits and adverse health effects of caffeine consumption, (4) what reasons do students give for either consuming or not consuming caffeine, and (5) are there predictors of high and low caffeine consumption (e.g. SES, sex, sensation seeking, and participation in sport, band, academic or other extracurricular activities)?

Hypotheses for this research were (1) more than 50% of students will report having experienced at least one adverse health effects (intoxication or withdrawal signs/symptoms) due to caffeine consumption, (2) sensation seeking will be a predictor of caffeine consumption, and (3) a linear composite of the following will predict caffeine consumption: Sex, SES, beliefs, and sensation seeking.

The first research question was, “What is the amount of caffeine consumed daily?” The recommended maximum amount of caffeine consumption per kilogram per day was exceeded. *Health Canada* reported that excess of 2.5 mg/kg/day can cause adverse health effects. Kuchment (2007) reported that Roland Griffiths stated that moderate doses of 200-300mg/day of caffeine were not harmful. Griffith’s doses are supported by *The Mayo Clinic* (2007). Respondents to the present survey may not be aware of the total amount of caffeine they are consuming because they do not pay close enough attention to product labels and may not know other names caffeine can be listed under on the product labeling. Statements from participants after they finished the survey such as “I didn’t realize a lot of the stuff I was drinking had caffeine in it” and “I was drinking that because caffeine was not listed on the label,” lead the researcher to believe that labeling on drinks are inconsistent and misleading to consumers. The mean milligram of caffeine consumed per day in the present study was 849.86, which computes

to 12.08 mg/kg/day. This is nearly five times the recommended amount of *Health Canada* and approximately three times the recommended amount by Griffiths and *The Mayo Clinic*. This level of caffeine consumption is generally associated with signs and symptoms of caffeine intoxication and withdrawal if one quits consuming caffeine. Signs and symptoms of intoxication (caffeine poisoning) can include restlessness, excitement, hot flashes, nervousness, sleeplessness, flushed face, frequent urination, stomach pain, muscle twitching, rambling speech, lack of concentration, fast heart rate, hives, feeling irritated, rash, panic attack, anxiety, feeling obsessive or compulsive, headache, irregular heart beat, hyperactive. Signs and symptoms of caffeine withdrawal can include fatigue, drowsiness, anxiety, depression, feeling sick at stomach, vomiting, headache, cravings for caffeine, and irritability.

The second research question related to beliefs of college students regarding caffeine. These beliefs concerning whether caffeine has positive and/or negative health effects were somewhat inconsistent. Just more than 72% of respondents did not believe that caffeine would help them concentrate while 76% and slightly more than 59% believed that caffeine will keep them awake or wake them up in the morning respectively. When these three beliefs were summed and used as a scale it was found to be a very strong predictor of high caffeine consumption. This supports Pela (1989), in that the drinks are sought out due to their caffeine content and supports Kristiansen, Levy-Milne, Barr, and Flint (2005) findings that caffeine was sought after to counteract tiredness. More than 81% of the respondents did not believe that caffeine would enhance athletic, academic, artistic, or other performances. This finding would suggest that respondents would not seek drinks with caffeine in them due to not believing these drinks do not enhance performance. This is a different finding than that of Kristiansen, et al (2005) who reported that caffeine was sought by those wanting to enhance performance and have more energy. Belief questions that caffeine can harm one's health, it is addictive, and it can disrupt coordination were also somewhat inconsistent. Nearly 80% of respondents reported that they believe caffeine can be harmful and hurt them while and a very similar percentage (82%) said it is addictive. Fifty-seven percent of respondents reported that they believe that caffeine can disrupt coordination. Even with such a large

number of respondents reporting that they believe caffeine has negative health effects and is addictive it was found that they still exceeded about 4-6 times the recommended maximum amount of caffeine. This suggests that even though respondents felt that caffeine has negative health effects, the desire to use caffeine to stay awake or to wake up in the morning takes precedence in their decision making process of whether or not to use caffeine. Sex was only significant in the belief that females were more likely than males to believe caffeine was addictive.

The third research question was concerned with the perceived health benefits and adverse health effects of caffeine consumption. It was found that 83% of the respondents reported having at least one sign/symptom of caffeine intoxication and respondents had a mean of 3.4 signs/symptoms. This is slightly lower than the *DSM IV-TR* diagnostic criteria of 5 or more signs/symptoms to diagnose someone with caffeine intoxication. Even though the *DSM IV-TR* stops short of offering diagnostic criteria for caffeine withdrawal, the notion of withdrawal is supported by many authors (Bernstein, Carroll, Thuras, et al, 2002; Griffiths, Juliano, & Chausmer, 2003; Hering-Hanit & Gadoth, 2003; Hughes, Oliveto, Liguori, Carpenter, & Howard, 1998; Juliano & Griffiths, 2005; Oberstar, Berstein, & Thuras, 2002; Strain, Mumford, Silverman, et al, 1994). The present study found that 51% of respondents reported having at least one sign/symptom of caffeine withdrawal. This percentage could be due to the fact that 65% of respondents reported drinking caffeine on a daily basis for a mean of more than 9 years, thus reinforcing caffeine dependence and averting withdrawal. Signs and symptoms of withdrawal would not occur if caffeine were constantly consumed, thus giving a very high percentage reporting that they have had signs/symptoms of caffeine intoxication (83%), while only 51% reported withdrawal signs/symptoms.

Research question number four related to reasons participants gave for consuming or not consuming caffeine. Sixty-five percent of respondents reported consuming caffeine on a daily basis for a mean of nine years. Almost 61% had used caffeine to wake up in the morning while 76.3% had used caffeine to stay awake. Only 13.7% of subjects reported using caffeine to enhance physical performance and 26.7% reported using caffeine to enhance mental performance. A mere 8.7% of respondents reported

using caffeine to lose weight. This suggests that participants in this study consumed caffeine for specific reasons, which were to help them wake up and to help them stay awake. By in large, caffeine was not consumed by participants of this study to enhance physical or mental performance or to lose weight.

Predictors of caffeine consumption were addressed in the fifth research question. Even though there were no predictors of low caffeine consumption, high caffeine consumption predictors were found. Father's social index, participation in organized activities (athletics, intramurals, and other organized activities on and/or off campus) while in college, and a scale called three items for concentration, keep awake, and wake up were statistically significant in predicting caffeine consumption. As the father's social index increased (thus SES decreasing) it was found that caffeine consumption increased. Drinks that were consumed in the largest quantities were soft drinks, tea, and brewed coffee (other than Starbucks coffee). This may be a fact that these drinks are less expensive thus being more available to families of lower SES. Participation in organized college activity was found to be a significant predictor of caffeine consumption. This supported Miller's (2008) findings that energy drinks (caffeinated drinks) were associated with those that had a self reported jock identity. Where in the present study, it was found that more common drinks containing caffeine were consumed more than energy drinks, but were consumed significantly higher by those that associated themselves with activity, such as those Miller reported with jock identity.

The researcher did not expect father's social index to impact caffeine consumption and mother's social index would not (see Table 13). With social index using occupation and highest education achieved, mothers/female guardians had a slightly higher social index than did the fathers/male guardians. Father's/male guardian's social index was found to be a significant predictor of caffeine consumption. As father's/male guardian's social index increased (SES decreasing with increasing social index) caffeine consumption increased. This could be in part due to the cheaper costs of drinks with caffeine in them (e.g. soft drinks, tea, coffee) making them more affordable to those with less disposable income.

Table 13

Hollingshead's Index of Social Position Classification Descriptions

Hollingshead's Index of Social Position	
Description	Range of Scores
Upper	11-17
Upper-Middle	18-31
Middle	32-47
Lower-Middle	48-63
Lower	64-77

Sensation seeking was not found to be statistically significant in predicting caffeine consumption. This differs from what Miller (2008) and Gurpegui, et al (2007) reported. This may be due to the population of the study. Marshall University freshmen were probably not motivated by sensation seeking ads and may have been deterred by the cost of the energy drinks. They also seemed to be using caffeine in order to stay awake and to wake up in the mornings rather than to seek a new experience. Even though participation in organized activity while in college was found a significant predictor of increased caffeine consumption, the participants were not found to be sensation seekers. If athletes alone were participants on a broader scale, sensation may have been found a significant predictor of caffeine consumption.

Even though 85% of respondents reported participating in organized activities while in high school and only slightly more than 28% reported participating in organized activity while in college, participation in organized activity while in college were not significantly related to caffeine consumption. Participation in organized activities while in high school was not significant on caffeine consumption. This could be due to the respondents being busier in college than they were while in high school and using coffee or caffeine drinks to wake up or give them energy for the activities, or this result could be due to the fact that they were making buying decisions now that they were in college instead of a parent/guardian buying beverages for them.

Beliefs about alertness were found to be a strong predictor of high caffeine consumption. This was expected by the researcher and supports findings by Kristiansen, et al (2005) that college athletes consume caffeine to counteract tiredness. With 76% of

respondents believing that caffeine would help keep them awake and slightly more than 59% of respondents believing that caffeine would wake them up in the morning, this again suggests that college freshmen sought out drinks with caffeine in them to either keep them up or to wake them up.

The hypothesis that more than 50% of respondents will report having experienced at least one adverse health effect due to caffeine was accepted while the hypothesis that sensation seeking would be a predictor of caffeine consumption was rejected. The hypothesis that a linear composite of Sex, SES, beliefs, and sensation seeking would predict caffeine consumption was partially accepted since father's SES, beliefs about alertness, and participation in organized activity while in college were significant predictors, although sensation seeking was not.

Limitations

Limitations existed within this study. When determining SES, only fathers/male guardian and mother/female guardian's social index was calculated. Students were not asked their individual occupation and/or educational level. This was due to students being traditional college freshmen, or college freshmen that have graduated from high school within the past year when data collected. It was believed that the primary SES would come from the parents social index, thus the participants social index was not calculated.

Another limitation relates to the location where the study was conducted. Only students at Marshall University were used as participants thus limiting generalization. Marshall University is a mid-sized college that is predominately Caucasian and located in Appalachia. Being in Appalachia in West Virginia made Marshall University unique in that it had a very large number of first time college students, meaning that a large number of participants were likely to be the first in their family to attend college.

Other limitations were that the data were self reported, thus it may not be as accurate if participants were asked to track caffeine consumption over a period of two weeks. When asked how much of certain beverages, pills, gum, etc that contains caffeine, participants had to rely on memory, thus it could have affected actual results. In addition a question was never asked if someone had never consumed any caffeine, which

could have affected mean caffeine consumption. It was asked “what is the average number of each drink you have consumed each day over the past two weeks.” If a person marked zero, it did not mean that they had never consumed caffeine, just not over the past two weeks.

Chapter 5

Summary, Conclusions, and Implications

Summary

The purpose of this study was to determine (1) the amount of caffeine consumed by a sample of freshmen students at Marshall University, (2) their beliefs regarding caffeine consumption, (3) reported perceived benefits and adverse effects of caffeine consumption, (4) reasons for consuming or refraining from consuming caffeine, and (5) predictors of high and low caffeine consumption. These data will give health promotion professionals information which will be useful in planning interventions.

A pilot study was conducted to refine the instrument. The survey was then administered to 300 freshmen students at Marshall University who were enrolled in undergraduate classes and who had graduated from high school in the past year. Descriptive statistics were computed. Correlations, t-tests and a multiple regression were used to test the hypotheses. Eighty-three percent of subjects reported having at least one sign/symptom of caffeine intoxication in the past while 51% reported having at least one sign/symptom of caffeine withdrawal. The mean milligram of caffeine consumed per day in the present study was 849.86, which computes to 12.08 mg/kg/day. This was 3 to 5 times the recommended amount. A multiple regression was computed to determine predictors of caffeine consumption. Father's social index, participation in organized activity in college, and three items for concentration, keep awake, and wake up (items of alertness) were statistically significant. On average, every time the respondent's father's social index increased by one point, caffeine consumption increased on average by eight percent. Respondents who participated in organized activity while in college consumed on average 60.7% more caffeine than those who indicated they did not participate in organized activity while in college. Every time the three items for concentration, keep awake, and wake up increased one point, caffeine consumption increased on average 41.1%. Females were more likely to believe that caffeine is addictive than their male counterparts. A correlation analysis showed no statistical relationship between the brief sensation-seeking scale (BSSS) variable Risky and total caffeine consumption or between the BSSS variable Risky and the natural logarithm of total caffeine consumption.

Caffeine users represented all social and demographic characteristics that were included in the data collection. High caffeine users, greater than 200mg/day, are typical of the population studied.

Conclusions

1. The average amount of caffeine consumed by participants in this study was 12.08mg/kg/day which was 3 to 5 times the recommended amount. College freshmen are drinking caffeine at levels that would trigger withdrawal if they ever stopped using it (which they have not done). They may not be aware of the total amount they are consuming due to not paying attention to labeling, not calculating it, not caring, or possibly by not knowing how much caffeine is too much. While some caffeine may be permissible, caffeine in large quantities may have health consequences.

2. When asked, 76% of students believed that caffeine would help keep them awake and 59.3% believed it would wake them up in the morning. Slightly more than 79% of students believed that caffeine can be harmful to their health and 82.3% believed that caffeine is addictive. Students seemed to seek out caffeine for specific purposes even though they believed it could be harmful to their health and was addictive. Only 19% of students believed that caffeine can help performance (athletic, academic, artistic, etc).

3. There were no perceived health benefits to consuming caffeine. Only 27.7% of students believed that caffeine would help them concentrate when studying and only five percent believed that caffeine would help them lose weight. Forty-three percent of students believed that caffeine would disrupt coordination. As discussed in #2, most students believed that caffeine was addictive and could harm them, but when asked, they did not believe it helped with weight loss, concentration, or that caffeine could disrupt coordination.

4. The two main reasons students gave for consuming caffeine was to wake up in the morning and to stay awake. Slightly more than 60% of students reported using caffeine to wake up in the morning while more than 76% of students reported using caffeine to stay awake. This is consistent with the belief that caffeine would wake them up and keep them awake. Only 13.7% of the students reported using caffeine to enhance physical performance while 26.7% reported using caffeine to enhance mental performance. This is consistent with the reported beliefs of caffeine helping with concentration and performance (with 19% of students believing that caffeine would help

with performance and 27.7% believing that caffeine would help them concentrate). Students stated that they were drinking caffeine for the purpose of waking up or staying awake, but the level of consumption was much higher than necessary to achieve that purpose.

5. There were three significant predictors of high caffeine consumption and no predictors of low caffeine consumption. Predictors of high caffeine consumption were father's social index, participation in organized activity in college, and three items for concentration, keep awake, and wake up (items of alertness).

Implications

Future research concerning caffeine beliefs and consumption patterns should be expanded to include middle school, high school, trade schools, junior colleges, community colleges, military, traditional college/universities (including freshmen through graduate students), college/university faculty and military officers. This would give a broader view of beliefs and consumption patterns to help the health professional determine when these beliefs and consumption patterns are developed and how they change over time. Investigating caffeine consumption among trade schools, junior colleges, community colleges and the military, researchers would allow researchers to include a larger concentration of low SES participants in their population. Another area of research would be to expand the questions regarding beliefs about caffeine. This could include more belief questions of harmful and beneficial health effects due to caffeine consumption. Investigating student athletes in college, high school, and middle school settings might allow for a better assessment of sensation seeking and caffeine consumption. Another area of research with regard to caffeine consumption is the current trend of mixing caffeine with alcohol. This seems to be a growing in popularity among college students and was not specifically addressed in this study.

While knowledge might not be sufficient for changing behavior, some knowledge is needed and these students appeared to be lacking some important information about caffeine. When teaching health classes in high school or college, teachers and college health professionals should include teaching health effects of caffeine as they do fat intake and alcohol consumption. Some of the topics that should be included are: how to read labels and calculate daily caffeine consumption, what other foods or substances contain caffeine (e.g. guarana), health effects of caffeine (both positive and negative), how much caffeine is too much, and the amount of caffeine necessary to wake up and to keep one awake. This information would enable students to make better decisions on how much caffeine (if any) to consume.

Another implication of this study is to encourage the CDC to include questions regarding caffeine consumption on the *Youth Risk Behavior Surveillance Survey*. It was reported that the freshmen respondents, ranging from age 18-20, have consumed caffeine

for a mean of 9.11 years. This shows that they were consuming caffeine by the age of 9-11 years of age and possibly before. *Attitudes and behaviors of New Brunswick students towards the use of performance-enhancing substances in sport: Final report, 2002*, *National Survey on Drugs and Sport: Final report by Canadian Centre for Drug-Free Sport, 1993*, and *Young peoples attitudes towards doping in sport: Final report by the Royal Canadian Mounted Police, 1998* both asked questions regarding caffeine consumption along with asking use of tobacco, alcohol, marijuana, steroids, and other drugs. This could lead to longitudinal data of caffeine consumption patterns, reasons caffeine is consumed; how that changes as one gets older; and the number of signs/symptoms of caffeine intoxication and withdrawal reported at different ages.

With more than 78% of the respondents consuming more than the recommended amount (200/mg of caffeine per day), experts may not appreciate the heavy use of caffeine among the population at large. What quantifies high caffeine consumption should re-evaluated by health professionals to better determine categories of consumption.

Appendix A

Zuckerman's Sensation Seeking Scale (1979 p. 268-296)

1. A. I like "wild uninhibited parties."
B. I prefer quiet parties with good conversations.
2. A. There are some movies I enjoy seeing a second or even a third time.
B. I can't stand watching a movie that I've seen before.
3. A. I often wish I could be a mountain climber.
B. I can't understand people who risk their necks climbing mountains.
4. A. I dislike all body odors.
B. I like some of the earthy body smells.
5. A. I get bored seeing the same old faces.
B. I like the comfortable familiarity of everyday friends.
6. A. I like to explore a strange city or section of a town by myself, even if it means getting lost.
B. I prefer a guide when I am in a place I don't know well.
7. A. I dislike people who do or say things just to shock or upset others.
B. When you can predict almost everything a person will do and say he or she must be a bore.
8. A. I usually don't enjoy a movie or play where I can predict what will happen in advance.
B. I don't mind watching a movie or play where I can predict what will happen in advance.
9. A. I have tried marijuana or would like to.
B. I would never smoke marijuana.
10. A. I would not like to try any drug which might produce strange and dangerous effects on me.
B. I would like to try some of the new drugs that produce hallucinations.
11. A. A sensible person avoids activities that are dangerous.
B. I sometimes like to do things that are a little frightening.
12. A. I dislike "swingers."
B. I enjoy the company of real "swingers."
13. A. I find that stimulants make me uncomfortable.
B. I often like to get high (drinking liquor or smoking marijuana).
14. A. I like to try new foods that I have never tasted before.
B. I order the dishes with which I am familiar, so as to avoid disappointment and unpleasantness.
15. A. I enjoy looking at home movies or travel slides.
B. Looking at someone's home movies or travel slides bores me tremendously.
16. A. I would like to take up the sport of water-skiing.
B. I would not like to take up water-skiing.
17. A. I would like to try surf-board riding.
B. I would not like to try surf-board riding.

Appendix A Continued

18. A. I would like to take off on a trip with no pre-planned or definite routes, or timetable.
B. When I go on a trip I like to plan my route and timetable fairly carefully.
19. A. I prefer the “down-to-earth” kinds of people as friends.
B. I would like to make friends in some of the “far-out” groups like artists or “hippies.”
20. A. I would not like to learn to fly an airplane.
B. I would like to learn to fly an airplane.
21. A. I prefer the surface of the water to the depths.
B. I would like to go scuba diving.
22. A. I would like to meet some persons who are homosexual (men or women).
B. I stay away from anyone I suspect of being “queer.”
23. A. I would like to try parachute jumping.
B. I would never want to try jumping out a plane with or without a parachute.
24. A. I prefer friends who are excitingly unpredictable.
B. I prefer friends who are reliable and predictable.
25. A. I am not interested in experience for its own sake.
B. I like to have new and exciting experiences and sensations even if they are a little frightening, unconventional or illegal.
26. A. the essence of good art is in its clarity, symmetry of form and harmony of colors.
B. I often find beauty in the “clashing” colors and irregular forms of modern painting.
27. A. I enjoy spending time in the familiar surroundings of home.
B. I get very restless if I have to stay around home for any length of time.
28. A. I like to dive off the high board.
B. I don’t like the feeling I get standing on the high board (or I don’t go near it at all).
29. A. I like to date members of the opposite sex who are physically exciting.
B. I like to date members of the opposite sex who share my values.
30. A. Heavy drinking usually ruins a party because some people get loud and boisterous.
B. Keeping the drinks full is the key to a good party.
31. A. The worst social sin is to be rude.
B. The worst social sin is to be a bore.
32. A. A person should have considerable sexual experience before mge.
B. It’s better if two married persons begin their sexual experience with each other.
33. A. Even if I had the money I would not care to associate with flight persons like those in the “jet set.”
B. I could conceive of myself seeking pleasure around the world with the “jet set.”
34. A. I like people who are sharp and witty even if they do sometimes insult others.
B. I dislike people who have their fun at the expense of hurting the feelings of others.
35. A. There is all together too much portrayal of sex in movies.
B. I enjoy watching many of the “sexy’ scenes in movies.

Appendix A Continued

36. A. I feel best after taking a couple of drinks.
 B. Something is wrong with people who need liquor to feel good.
37. A. People should dress according to some standards of taste, neatness, and style.
 B. People should dress in individual ways even if the effects are sometime strange.
38. A. Sailing long distances in small sailing crafts is foolhardy.
 B. I would like to sail a long distance in a small but seaworthy sailing craft.
39. A. I have no patience with dull or boring persons.
 B. I find something interesting in almost every person I talk to.
40. A. Skiing fast down a high mountain slope is a good way to end up on crutches.
 B. I think I would enjoy the sensations of skiing very fast down a high mountain slope.

Scoring Key for SSS – Form V

	No.	Keyed Items									
	Items										
TAS	10	3A	11B	16A	17A	20B	21B	23A	28A	38B	40B
ES	10	4B	6A	9A	10B	14A	18A	19B	22A	26B	37B
Dis	10	1A	12B	13B	25B	29A	30B	32A	33B	35B	36A
BS	10	2B	5A	7B	8A	15B	24A	27B	31B	34A	39A
Total*	40	1A	2B	3A	4B	5A	6A	7B	8A	9A	10B
		11B	12B	13B	14A	15B	16A	17A	18A	19B	20B
		21B	22A	23A	24A	25B	26B	27B	28A	29A	30B
		31B	32A	33B	34A	35B	36A	37B	38B	39A	40B

* The Total score may also be obtained by summing the four subscale scores, but it may be desirable to also score the 40 items and check with the sum of the subscales.

Appendix B

Brief Sensations Seeking Scale

1. I would like to explore strange places.
2. I get restless when spending too much time at home.
3. I like to do frightening things.
4. I like wild parties.
5. I would like to take off on a trip with no pre-planned routes or timetables.
6. I prefer friends who are excitingly unpredictable.
7. I would like to try bungee jumping.
8. I would love to have new and exciting experiences, even if they are illegal.

* BSSS from Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002 p. 405

Brief Sensation Seeking Scale-4

1. I would like to explore strange places.
2. I like to do frightening things.
3. I like new and exciting experiences, even if I have to break the rules.
4. I prefer friends who are exciting and unpredictable.

* BSSS-4 from Stephenson, Hoyle, Palmgreen, & Slater, 2003 p. 282

Appendix C

Caffeine content reported by Erowid (2007) and The Center For Science In The Public

Interest (2007)

Caffeine Content of Bottled Beverages (mg / 12 oz)

ENERGY DRINKS & SYRUPS

		Red Flash	CC	40.5
		Aqua Java (50-60 mg per 16.9 oz)	CSPI	~39.1
Powershot (100 mg per 1 oz)	1200	Ruby Red	NSDA	39
Sky Rocket Syrup (100 mg per 1 oz)	1200	Squirt	NSDA	39
		Ruby Red	NSDA	39
Upshot (200 mg per 2.5 oz)	960	Squirt, Diet	NSDA	39
Kore Energy Shot (100 mg per 1.8 oz)	666.7	Pepsi	NSDA	38.4
Spike Shooter (300 mg per 8 oz)	428.6	Pepsi, Wild Cherry	NSDA	38
Cocaine Energy Drink (280 mg per 8.4 oz) (now called Censured Energy Drink)	400	Ale-8-One	ABA	37
Redline RTD (250 mg per 8 oz)	375	Inka Kola	ABA	37
Wired X294 (294 mg per 16 oz)	220.6	Inka Kola, Diet	ABA	37
Celsius (200 mg per 12 oz)	200	Pepsi, Diet	NSDA	36
		Pepsi, Wild	NSDA	36
NOS (250 mg per 16 oz)	187.6	Cherry Diet	NSDA	36
Boo-Koo Energy (360 mg per 24 oz)	180	Aspen	NSDA	36
Rockstar Zero Carb (360 mg per 24 oz)	180	Nestea Honey	ABA	39
		Lemon Green	ABA	39
Spark (120 mg per 8 oz)	180	RC Cola, Diet	NSDA	36
Vamp (240 mg per 16 oz)	180	Diet Rite	NSDA	36
Rip It Energy Fuel (100 mg per 8 oz)	150	Coca-Cola, Classic *	CC	34
Crunk (100 mg per 8.3 oz)	144.6	Coca-Cola, C2	ABA	34
Red Bull (80 mg per 8.3 oz)			CC	34

Appendix C continued

115.5

Coca-Cola, Cherry *					
Sobe Adrenaline Rush (79 mg / 8.3 oz)		114.2	Coca-Cola, Diet Cherry	ABA	34
AMP Energy Drink	ABA	112.5	Coca-Cola, Diet w/ Splenda	ABA	34
KMX, Orange (75 mg / 8.4 oz)	ABA	107.1	Coca-Cola, Vanilla	ABA	34
Full Throttle (72 mg / 8 oz)	ABA	100	Coca-Cola, Zero	ABA	34
Full Throttle, Sugar Free (72 mg / 8 oz)	ABA	100	Snapple Peach	NSDA	31.5
Bawls Guarana (67 mg per 10 oz)	BAW	80	Nestea Sweet Iced Tea	NSDA	26.5
Jolt	JC	72	Nestea Unsweetened Iced Tea	ABA	26
Krank 20 (100 mg per 16.9 oz)	CSPI	71	Snapple Green Tea w/Lemon	NSDA	24
RC Edge	NSDA	70.2	IBC Cherry Cola	NSDA	23
Vault	ABA	70	Barq's A & W Diet	CC	22.5
XTC Power Drink	DP	70	Creme Soda	NSDA	22
Sun Drop, Diet	NSDA	69	Mistic Lemon Tea	NSDA	18
Aqua Blast (90 mg per 16.9 oz)	CSPI	63.9	Mistic Peach Tea	NSDA	18
Sun Drop, Cherry	NSDA	64	Cool (Nestea)	NSDA	16.5
Sun Drop	ABA	63	Nestea Lemon, Sweet	ABA	16
Sugar-Free Mr. Pibb	NSDA	58.8	Nestea Lemon, Diet	ABA	16
Josta	CB	58	Nestea Raspberry	ABA	16
Kick	NSDA	57.6	Snapple Sweet Tea	NSDA	12
Pepsi One	NSDA	55	Diet Cool (Nestea)	NSDA	10.5

Appendix C continued

Mountain Dew (0 in Canada)	NSDA	55	Snapple Sun Tea	NSDA	7.5
Mountain Dew, Diet	NSDA	55	Snapple Sun Tea, Diet	NSDA	7.5
Mountain Dew, Code Red	NSDA	55	Canada Dry Diet Cola	NSDA	1.2
Mello Yellow	NSDA	51	Fresca		0
Surge	CC	52.5			
Nehi Wild Red	NSDA	50.1			
Nestea Earl Grey	ABA	50			
Tab	NSDA	46.8			
Battery Energy Drink	NSDA	46.7			
Water Joe (60-70 mg per 16.9 oz)	CSPI	~46.2			
Coca-Cola, Diet	CC	45			
Coca-Cola, Diet Vanilla	ABA	45			
Coca-Cola, Diet w/ lemon	CC	45			
Coca-Cola, Diet w/ lime	CC	45			
RC Cola	NSDA	43.2			
RC Cola, Cherry	NSDA	43.2			
Dr Nehi	NSDA	42			
Sunkist, Diet	NSDA	42			
Dr. Pepper	NSDA	41			
Dr. Pepper, Diet	ABA	41			
Sunkist	NSDA	41			
Sunkist, Diet	ABA	41			
Mr. Pibb	NSDA	40.8			
Mr. Pibb, Diet	ABA	40			
Pibb Xtra	ABA	40			

Appendix C continued

Pibb Zero	ABA	40
Mr. Pibb, Diet	CC	40.5

Caffeine Content of Coffee & Teas

Percolated (7 oz)	CB	140	tea, iced (12 ozs.)	B&M	70
Drip (7 oz)	B&M	115-175	tea, black (6 oz)	CB	70
Espresso (1.5-2 oz)	B&M	100	tea, green (6 oz)	CB	35
Brewed (7 oz)	B&M	80-135	tea, instant (7 oz)	B&M	30
Instant (7 oz)	B&M	65-100	yerba maté, (3 g teabag)	ERO	24-Oct

Caffeine Content of Caffeine Pills (mg per tablet)

Vivarin	TCP	200	Vroom Foods Foosh Mints	SPFL	102
No-Doz, Maximum Strength	CSPI	200	Vroom Foods Buzz Bite Chews	SPFL	102
Dexatrim	TCP	200	No-Doz	TCP	100
Caffedrine Awake, Maximum Strength	CMF	200	Awake	CMF	100
Stay Awake	CMF	200	Aqua-Ban	CMF	100
Ultra Pep-Back	CMF	200	Wake-Ups	TCP	100
Quick Pep	CMF	150	Aqua-Ban	CMF	~65-175
			Fat Burner	CMF	~55

Sources

ABA	American Beverage Association
B&M	Bunker and McWilliams in <i>J Am Diet</i> 74:28-32, 1979
BAW	Bawls.com FAQ
CB	Caffeine Blues, by Stephen Cherniske, M.S.

Appendix C continued

CC	Coca Cola
CMF	The Caffeine & Migraine FAQ
CSPI	Center for Science and the Public Interest
DP	Desk Potato Caffeine Guide
ERO	Erowid Yerba Maté Dosages
IFIC	International Food Information Council
JC	Jolt Cola
NSDA	National Soft Drink Association
SOBE	Sobe
SPFL	Sani-Pure Food Labs
TCP	The Caffeine Page

Spike Shooter Energy Drink	300 mg caffeine	per 8.4 fl oz
www.spikeshooter.com	retrieved 10-19-2007	
Jolt	220 mg caffeine	per 23.5 oz
From product nutritional label		

Appendix D

American Academy of Pediatrics Policy Statement Recommendations

1. Use of performance-enhancing substances for athletic or other purposes should be strongly discouraged.
2. Parents should take a strong stand against the use of performance-enhancing substances and, whenever possible, demand that coaches be educated about the adverse health effects of performance-enhancing substances.
3. Schools and other sports organizations should be proactive in discouraging the use of performance-enhancing substances, incorporating this message into policy and educational materials for coaches, parents, and athletes.
4. Interventions for encouraging substance-free competition should be developed that are more positive than punitive, such as programs that teach sound nutrition and training practices along with skills to resist the social pressures to use performance-enhancing substances.
5. Colleges, schools, and sports clubs should make use of educational interventions that encourage open and frank discussion of issues related to the use of performance-enhancing substances, with the aim of promoting decisions about personal drug use based on principles of fair competition and character rather than on the fear of getting caught.
6. Coaches at all levels, including youth sports, should encourage wholesome and fair competition by emphasizing healthy nutrition and training practices, taking a strong stand against cheating, and avoiding the “win at all costs” philosophy.
7. Inquiries about the use of performance-enhancing substances should be made in a manner similar to inquiries about the use of tobacco, alcohol, or other substances of abuse. Guidelines for patient confidentiality should be followed and explained to the patient.
8. Athletes who admit using performance-enhancing substances should be provided unbiased medical information about benefits, known adverse effects, and other risks. When appropriate, additional testing may be necessary to investigate or rule out adverse medical effects.
9. The pediatric health care professional providing care for an athlete who admits to using a performance-enhancing substance should explore the athlete’s motivations for using these substances, evaluate other associated high-risk behaviors, and provide counseling on safer, more appropriate alternatives for meeting fitness or sports-performance goals.
10. Nonusers of performance-enhancing substances should have their decisions reinforced while establishing an open channel of communication if questions about performance-enhancing substances arise in the future.
11. Pediatric health care professionals should promote safe physical activity and sports participation by providing or making available sound medical information on exercise physiology, conditioning, nutrition, weight management, and injury prevention and by helping to care for sports-related medical conditions and injuries.

* The American Academy of Pediatrics, 2005 p. 1105-1106

Appendix E

Survey Questionnaire

Caffeine Survey

1. Sex: (*check one*) I am a: Male Female

2. I weigh _____ pounds.

3. Ethnic Origin: (*check one*)
African American Asian Caucasian Hispanic other

4. What is the occupation of your father (male guardian) _____
What is the occupation of your mother (female guardian) _____

If you answered retired, deceased, or disabled to any of #4 then what was his/her
occupation prior to that? Father (male guardian) _____
Mother (female guardian) _____

5. What is the highest level of education of your father (male guardian) *check one*
Graduate professional training (e.g. masters, doctorate, MD, chiropractor)
Standard college/university graduation (4 year college degree)
Partial college training (completed at least 1 year of college)
High school graduation (completed high school or trade school)
Partial high school (completed 10th or 11th grades)
Junior high school (completed 7th through 9th grades)
Less than 7 years of school (had not completed 7th grade)

What is the highest level of education for your mother (female guardian) *check one*
Graduate professional training (e.g. masters, doctorate, MD, chiropractor)
Standard college/university graduation (4 year college degree)
Partial college training (completed at least 1 year of college)
High school graduation (completed high school or trade school)
Partial high school (completed 10th or 11th grades)
Junior high school (completed 7th through 9th grades)
Less than 7 years of school (had not completed 7th grade)

Appendix E continued

6. Did you participate in high school sponsored activities or other organized activities while in high school? **Yes** **No**

If so, which? [*Check all that apply.*]

basketball	football	volleyball	tennis
wrestling	softball	baseball	soccer
cross country	track and field	swimming	band
rugby	academic team competition		choir
journalism	cheerleading	gymnastics	dance
intramural sports	other _____		

7. Do you participate in college sponsored activities or other organized activities while in college? **Yes** **No**

If so, which? [*Check all that apply.*]

basketball	football	volleyball	tennis
wrestling	softball	baseball	soccer
cross country	track and field	swimming	band
rugby	academic team competition		choir
journalism	cheerleading	gymnastics	dance
intramural sports	other _____		

Appendix E continued

8. Answer the following questions that best describes you. 1 = strongly agree, 2 = agree, 3 = neither agree or disagree, 4 = disagree, and 5 = strongly disagree. (circle your response)

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
I would like to explore strange places	1	2	3	4	5
I get restless when spending too much time at home	1	2	3	4	5
I like to do frightening things	1	2	3	4	5
I like wild parties	1	2	3	4	5
I would like to take off on a trip with no pre-planned routes or timetables	1	2	3	4	5
I prefer friends who are excitingly unpredictable	1	2	3	4	5
I would like to try bungee jumping	1	2	3	4	5
I would love to have new and exciting experiences, even if they are illegal	1	2	3	4	5

9. I believe that caffeine will help me concentrate when studying. **Yes** **No**

10. I believe that caffeine will help keep me awake. **Yes** **No**

11. I believe that caffeine will wake me up in the morning. **Yes** **No**

12. I believe that caffeine will help me lose weight. **Yes** **No**

Appendix E continued

13. I believe caffeine enhances performance (athletic, academic, artistic, etc). **Yes No**

14. I believe that caffeine can be harmful to my health and can hurt me. **Yes No**

15. I believe caffeine is addictive. **Yes No**

16. I believe that caffeine can disrupt coordination. **Yes No**

17. I have religious objections to caffeine consumption. **Yes No**

Have you consumed caffeine in the past year? *If no, skip to question 30*
If yes, continue with # 18 below.

18. Have you ever used caffeine to wake up in the morning? **Yes No**

19. Have you ever used caffeine to stay awake? **Yes No**

20. Have you ever used caffeine to enhance physical performance? **Yes No**

21. Have you ever used caffeine to enhance mental performance? **Yes No**

22. Have you ever used drinks/pills with caffeine to lose weight? **Yes No**

23. Do you drink beverages with caffeine in them on a daily basis (e.g. coffee, tea, soft drinks, etc)?

Yes No

How many years have you been drinking beverages with caffeine?

Circle one answer:

0 1 2 3 4 5 6 7 8 9 10+

24. Have you ever felt/had any of the following reactions after drinking/taking caffeine?

(Check all that apply)

restlessness	excitement	hot flashes	nervousness
can't sleep	red faced	frequent urination	stomach pain
muscle twitching	rambling speech	can't concentrate	fast heart beat
hives	irritated	rash	panic attack
anxiety	obsessive	compulsive	headache
irregular heart beat	hyperactivity		

25. Have you felt/had any of the following reactions if you don't get your caffeine?

(Check all that apply)

fatigue (always tired)	drowsiness	anxiety	depressed
sick at stomach	vomiting	headache	cravings for caffeine
irritability			

Appendix E continued

26. If you drink soft drinks containing caffeine, please answer the questions in the following chart. If you do not, then skip to # 27.

What is the average number of each drink you have consumed each day over the past week? For example: if you drink any Cola's (such as Coke, Pepsi, RC, Dr. Pepper, or Mr. Pibb) how many 8oz drinks, 12 oz drinks, 20 oz drinks, 1 liter bottles, and 2 liter bottles do you consume on average each day?		
Beverage Type	Size	Number of Drinks
Colas (such as Coca-Cola, Pepsi, RC, Dr. Pepper, or Mr. Pibb)	8oz mini drink	0 1 2 3 4 5 6 7 8 9 10 +
	12oz drink	0 1 2 3 4 5 6 7 8 9 10 +
	20oz drink	0 1 2 3 4 5 6 7 8 9 10 +
	1 liter bottle	0 1 2 3 4 5 6 7 8 9 10 +
	2 liter bottle	0 1 2 3 4 5 6 7 8 9 10 +
Sunkist Orange or Diet Sunkist Orange	8oz mini drink	0 1 2 3 4 5 6 7 8 9 10 +
	12oz drink	0 1 2 3 4 5 6 7 8 9 10 +
	20oz drink	0 1 2 3 4 5 6 7 8 9 10 +
	1 liter bottle	0 1 2 3 4 5 6 7 8 9 10 +
	2 liter bottle	0 1 2 3 4 5 6 7 8 9 10 +
Mountain Dew (any flavor) or Diet Mountain Dew	8oz mini drink	0 1 2 3 4 5 6 7 8 9 10 +
	12oz drink	0 1 2 3 4 5 6 7 8 9 10 +
	20oz drink	0 1 2 3 4 5 6 7 8 9 10 +
	1 liter bottle	0 1 2 3 4 5 6 7 8 9 10 +
	2 liter bottle	0 1 2 3 4 5 6 7 8 9 10 +
Mountain Dew MDX	20 oz drink	0 1 2 3 4 5 6 7 8 9 10 +
Jolt	23.5 oz can	0 1 2 3 4 5 6 7 8 9 10 +
Vault	20 oz bottle	0 1 2 3 4 5 6 7 8 9 10 +
Diet Coke (silver can) or Diet Pepsi (blue can)	8oz mini drink	0 1 2 3 4 5 6 7 8 9 10 +
	12oz drink	0 1 2 3 4 5 6 7 8 9 10 +
	20oz drink	0 1 2 3 4 5 6 7 8 9 10 +
	1 liter bottle	0 1 2 3 4 5 6 7 8 9 10 +
	2 liter bottle	0 1 2 3 4 5 6 7 8 9 10 +
Other Soft Drinks List _____	List Size _____	0 1 2 3 4 5 6 7 8 9 10+

Appendix E continued

27. If you drink energy drinks, please answer the questions in the following chart. If you do not, then skip to # 28.

What is the average number of each drink you have consumed each day over the past week?		
Energy Drink Type	Size	Number of Drinks
Red Bull	8.3 oz can	0 1 2 3 4 5 6 7 8 9 10 +
Monster (any flavor)	16 oz can	0 1 2 3 4 5 6 7 8 9 10 +
Rock Star (any flavor)	16 oz can	0 1 2 3 4 5 6 7 8 9 10 +
SOBE (any flavor)	16 oz can	0 1 2 3 4 5 6 7 8 9 10 +
AMP (any flavor)	16 oz can	0 1 2 3 4 5 6 7 8 9 10 +
Full Throttle (any flavor)	16 oz can	0 1 2 3 4 5 6 7 8 9 10 +
Shock Wave (any flavor)	16 oz can	0 1 2 3 4 5 6 7 8 9 10 +
XYIENCE	16 oz can	0 1 2 3 4 5 6 7 8 9 10 +
Green Tea Energy Drink	16 oz can	0 1 2 3 4 5 6 7 8 9 10 +
NOS	16 oz can	0 1 2 3 4 5 6 7 8 9 10 +
	11 oz bottle	0 1 2 3 4 5 6 7 8 9 10 +
Bawls Guarana	16 oz can	0 1 2 3 4 5 6 7 8 9 10 +
	10 oz can	0 1 2 3 4 5 6 7 8 9 10 +
5-hour Energy	2 oz bottle	0 1 2 3 4 5 6 7 8 9 10 +
Other Energy Drinks List _____	List Size _____	0 1 2 3 4 5 6 7 8 9 10 +

Appendix E continued

28. If you drink coffee or tea, please answer the questions in the following chart. If you do not, then skip to # 29.

What is the average number of each drink you have consumed each day over the past week?		
Type	Size	Number of Drinks
Brewed Coffee	Coffee Cup	0 1 2 3 4 5 6 7 8 9 10 +
	16 oz cup	0 1 2 3 4 5 6 7 8 9 10 +
	20 oz cup	0 1 2 3 4 5 6 7 8 9 10 +
Instant Coffee	Coffee Cup	0 1 2 3 4 5 6 7 8 9 10 +
Starbucks Double Shot	6.5 oz Can	0 1 2 3 4 5 6 7 8 9 10 +
Starbucks Brewed Coffee	Short	0 1 2 3 4 5 6 7 8 9 10 +
	Tall	0 1 2 3 4 5 6 7 8 9 10 +
	Grande	0 1 2 3 4 5 6 7 8 9 10 +
	Venti	0 1 2 3 4 5 6 7 8 9 10 +
Starbucks Espresso-Hot	Short	0 1 2 3 4 5 6 7 8 9 10 +
	Tall	0 1 2 3 4 5 6 7 8 9 10 +
	Grande	0 1 2 3 4 5 6 7 8 9 10 +
	Venti	0 1 2 3 4 5 6 7 8 9 10 +
Starbucks Tazo Tea	Short	0 1 2 3 4 5 6 7 8 9 10 +
	Tall	0 1 2 3 4 5 6 7 8 9 10 +
	Grande	0 1 2 3 4 5 6 7 8 9 10 +
	Venti	0 1 2 3 4 5 6 7 8 9 10 +
Hot Tea	Coffee Cup	0 1 2 3 4 5 6 7 8 9 10 +
Ice Tea	16 oz bottle	0 1 2 3 4 5 6 7 8 9 10 +
Arizona Ice or Green Tea (any flavor)	34 oz bottle	0 1 2 3 4 5 6 7 8 9 10 +
	23.5 oz can	0 1 2 3 4 5 6 7 8 9 10 +
	16 oz bottle	0 1 2 3 4 5 6 7 8 9 10 +
Diet Lipton Green Tea	20 oz bottle	0 1 2 3 4 5 6 7 8 9 10 +
Gold Peak Ice Tea	16.9 oz bottle	0 1 2 3 4 5 6 7 8 9 10 +
Other Coffee/Tea List _____	List Size_____	0 1 2 3 4 5 6 7 8 9 10+

Appendix E continued

29. Over the past week, have you consumed caffeine gum, caffeine pills, or caffeine mints? If yes, how many days per week did take them? When you did take them, how many did you take or chew each day?

If you did not use caffeine gum, pills or mints, then skip to #30.

Type	How many days per week? (list below)	Number per day
No Doz		0 1 2 3 4 5 6 7 8 9 10+
Ultra Awake		0 1 2 3 4 5 6 7 8 9 10+
Hydroxycut		0 1 2 3 4 5 6 7 8 9 10+
Caffeine		0 1 2 3 4 5 6 7 8 9 10+
Caffeine Alert		0 1 2 3 4 5 6 7 8 9 10+
Yellow Jacket or other Caffeine Mints		0 1 2 3 4 5 6 7 8 9 10+
Vivarin		0 1 2 3 4 5 6 7 8 9 10+
Warp 9		0 1 2 3 4 5 6 7 8 9 10+
Jolt Caffeine Gum		0 1 2 3 4 5 6 7 8 9 10+
Mini Thin Extreme Energizer		0 1 2 3 4 5 6 7 8 9 10+
Pro Plus		0 1 2 3 4 5 6 7 8 9 10+
Other List _____		0 1 2 3 4 5 6 7 8 9 10+

30. Your participation is greatly appreciated. **Thank you.**

Appendix F

COVER LETTER

CAFFEINE CONSUMPTION PATTERNS AND BELIEFS OF INCOMING COLLEGE FRESHMEN

You are being invited to take part in a research study about caffeine consumption patterns and beliefs. You are being invited to take part in this research study because you are a first time college freshmen and have graduated from high school within the past year. If you volunteer to take part in this study, you will be one of about 300 people to do so at the Marshall University. The person in charge of this study is Gary E. McIlvain (PI) of the University of Kentucky. Gary is being guided by Dr. Melody Noland (advisor).

The purpose of this study is to investigate caffeine consumption patterns and beliefs among incoming freshmen. By doing this study, we hope to learn how much caffeine is being consumed, for what purposes, and if there are predictors of caffeine consumption. The research procedures will be conducted at Marshall University in Huntington, WV in UNI 101 (classes for incoming freshmen), and in English 101/102 classes. The total amount of time you will be asked to volunteer for this study is 15 minutes. You, as freshmen at Marshall University, are being asked to complete an anonymous survey that includes questions about caffeine consumption, beliefs toward caffeine, and to complete non-identifying demographic data.

You should NOT participate in this study if you have attended college full time for more than two semesters or have been out of high school for more than one year. You can NOT participate in the study if you are less than 18 years of age.

We cannot and do not guarantee that you will receive any personal benefits from taking part in this study. Your willingness to take part, however, may, in the future, help society as a whole better understand this research topic. If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering. Participation or nonparticipation will not affect your grade in this class in any way.

Your information will be combined with information from other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered. You will not be identified in these written materials. We may publish the results of this study; however, since this is an anonymous survey, your name can not be associated with any data.

This study is anonymous. That means that no one, not even members of the research team, will know that the information you give came from you. If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. You will not be treated differently if you decide to stop taking part in the study. Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions, suggestions, concerns, or complaints about the study, you can contact the investigator, Gary E. McIlvain at 304-696-2930 or 606-928-2756 or his advisor, Dr.

Appendix F continued

Melody Noland at (859) 257-5827. If you have any questions about your rights as a volunteer in this research, contact the staff in the Office of Research Integrity at the University of Kentucky at 859-257-9428 or toll free at 1-866-400-9428.

Appendix G

Survey Instruction Script

You are being asked to participate in research that will help to determine (1) beliefs about caffeine, (2) caffeine consumption patterns, and (3) predictors of caffeine consumption. The research is a self report survey that will take about 10-15 minutes to complete. To participate in this research you must be at least 18 years of age, a freshman at Marshall, and have graduated from high school in the last year. It is very important for you to understand that if you are less than 18 years of age, not a freshman, or did not graduate in the past year, you are not permitted to participate in this research and should not complete the survey. The survey includes questions about demographics, beliefs, and caffeine consumption. If you feel that these types of questions will cause you discomfort you should not participate in the survey. Your participation is completely voluntary and anonymous. Participation will not affect your grade or credit in this course. By completing and returning the survey implies your consent to participate. I will now answer any questions you may have.”

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Curriculum Vita

Gary E. McIlvain, MS, ATC

Birthplace & DOB

Glendale, WV November 17, 1970

Education

MS Health - Middle Tennessee State University, Murfreesboro, TN, August 1999.

BS Exercise Science/Athletic Training - Lipscomb University, Nashville, TN, December 1993.

Diploma Magnolia High School, New Martinsville, WV, June, 1989.

Professional Experience

Aug. 1999 – Present Assistant Professor; Clinical Coordinator, Athletic Training Curriculum, Marshall University, Huntington, WV

Aug. 1998 – Aug. 1999 Graduate Assistant Athletic Trainer, Middle Tennessee State University, Murfreesboro, TN

Aug. 1996 – May 1998 Head Athletic Trainer, Lipscomb University, Nashville, TN

Aug. 1994 – May 1996 Assistant Athletic Trainer, Lipscomb University, Nashville, TN

Related Work Experience

Feb. 2006 – Current Medical Director (August 2007-Current) & Head athletic trainer (February 2006-current)

July 31-Current Athletic Training Consultant to Kentucky Christian University.

July 31-August 3, 2006 Head Athletic Trainer for High School Football Camp at Kentucky University, Grayson, KY.

June 1997 – July 1997 Vanderbilt University Athletics, Basketball camp head athletic trainer.

Oct. 1996 – May 1997 Contract Athletic Trainer, Baptist Sports Medicine Center, Nashville, TN

May 1996 – July 1996 YMCA Wellness Trainer, Murfreesboro, TN.

Awards

2007-2008 Cambridge Who's Who Among Executives and Professionals in Athletic Training
2006-2007 Marshall University College of Education and Human Services Faculty Award for Excellence in Scholarship
2006-2007 Cambridge Who's Who Among Executives and Professionals
2005-2006 The Chancellor's List
2005-2006 Manchester Who's Who Among Executives and Professionals
2004-2005 The Chancellor's List
2004-2005 Who's Who Among America's Teachers
2003-2004 Who's Who Among America's Teachers

Patents Held

U.S. Patent # 5,749, 668 Strengthening Device for Lower Leg/Ankle
Currently in final development/marketing.

Patent Pending – for remote controlled oxygen tubing collection device

Publications, Presentations, Inservices, Reviewer, Editing

1. Jones, M., McIlvain, G., Schaeffer, M., Hoxie, S., & Giangarra, C. (2008) Pancreatic transection – An unusual youth soccer injury. *Athletic Therapy Today* 13(5), 17-19.
2. McIlvain, G. & Giangarra, C. (2008). Median nerve entrapment: Looking beyond carpal tunnel. *Athletic Therapy Today* 13(3), 3-6.
3. Martin, D. & McIlvain, G. March 2, 2008. Invited speakers at Southeast Athletic Trainers' Association annual district meeting. Topic: Neurologic Assessment for Athletic Trainers.
4. January 20-21 (2007) Martin, D., McIlvain, G., and Sturgill, R. Functional Lung and Heart Evaluation. Tennessee Athletic Trainers' Society Annual meeting. Invited speakers.
5. March 25 (2006) McIlvain, G. & Martin, D. Concussions: What are we saying? What are we doing? Invited poster presentation.
6. Reviewer for The Strength and Conditioning Journal 2001-Present
7. McIlvain, G. May 27, 2007. Inservice at Elite Rehab and Fitness. Inservice title: *The Female Knee & Reducing the risk of ACL injury.*”
8. McIlvain, G. & Giangarra, C. MD March 10, 2007. Presentation/Inservice at Boyd County High School titled *The female athlete: Her knee and reducing the risk of injury.*

9. McIlvain, G. & Martin, D. February 23, 2007. West Virginia Athletic Trainers' Association Annual Meeting. Poster presentation titled "Concussions: What are we saying... What are we doing?"
10. Martin, D., McIlvain, G., Sturgill, R. January 20, 2007. Tennessee Athletic Trainer's Society Annual Meeting and Clinical Symposium. Invited Speaker for Preconference workshop titled *Functional Lung and Heart Evaluation*.
11. McIlvain, G., Sturgill, R., & Martin, D. (2006) *Being Prepared for a Medical Emergency*. Journal of Physical Education and Recreation (Hong Kong) 12(1). 68-62.
12. McIlvain, G., Proposed Text Reviewer (selected chapters) F. A. Davis & Company. *Emergency Care of Sports Injuries*. April, 2006.
13. McIlvain, G., Sturgill, R., & Martin, D. *Program Assessment: A Technological Design & Approach*. Marshall University Assessment Day Poster Presentation. April 5, 2006.
14. McIlvain, G., Martin, D., & Sturgill, R. *Use of Otoscope and Ophthalmoscope For the Athletic Trainer*. Workshop/Presentation at the South East Athletic Trainers Association Symposium & Members Meeting. March 30-April 2, 2006 . Atlanta, Ga.
15. Sturgill, R., Martin, D., McIlvain, G. *Heart Assessment for the Athletic Trainer Workshop*. South East Athletic Trainers Association Symposium & Members Meeting. March 30-April 2, 2006. Atlanta, Ga.
16. Martin, D., McIlvain G., Sturgill, R. *Pulmonary Assessment For The Athletic Trainer*. (Presentation). South East Athletic Trainers Association Symposium & Members Meeting. March 30-April 2, 2006. Atlanta, Ga.
17. Martin., D., Sturgill, R., McIlvain, G. *Cardiac Assessment for the Athletic Trainer*. (Presentation). South East Athletic Trainers Association Symposium & Members Meeting. March 30-April 2, 2006. Atlanta, Ga.
18. Martin, D., McIlvain, G., Sturgill, R., *Thoracic Evaluation for the Athletic Trainer*. (Presentation) West Virginia Athletic Trainer's Association Annual Meeting & Symposium. March 25, 2006.
19. Martin, D., McIlvain, G., Sturgill, R. *Thoracic Evaluation for the Athletic Trainer*. (Workshop) West Virginia Athletic Trainer's Association Annual Meeting & Symposium. March 25, 2006.
20. McIlvain, G., Martin, D., Sturgill, R. *Prevention Programs For the Female Knee: An Evidence Based Approach For the Practitioner*. West Virginia Athletic Trainer's Association Annual Meeting & Symposium. March 25, 2006.
21. Sturgill, R., McIlvain, G., Martin, D. *Radiology For The Athletic Trainer*. West Virginia Athletic Trainer's Association Annual Meeting & Symposium. March 25, 2006.
22. Martin, D., McIlvain, G., & Sturgill, R. *Cooperative Electronic Advising, Student Portfolios, & Program Assessment: A Technological Approach*. West Virginia Association of Colleges for Teacher Education Conference. February 23-24, 2006.

23. Martin, D. & McIlvain, G. *Neurologic Evaluation Skills: A Return to Basics* Kentucky Athletic Trainer's Annual Symposium, January 21, 2006.
24. McIlvain, G., Sturgill, R., & Martin, D. *Medical Emergency: What's Your Plan.* 4th Hawaii International Conference on Educaiton, January 5, 2006.
25. Sturgill, R., McIlvain, G., & Martin, D. *Cooperative Electronic Advising and Electronic Portfolios.* 4th Hawaii International Conference on Educaiton, January 5, 2006.
26. McIlvain, G. November 4, 2005. Invited speaker at the University of Charleston. Topic: *ACL Prevention Programs: An Evidence Based Approach.*"
27. Martin, D., McIlvain, G., & Sturgill, R., *Adolescent Ankle Injuries; When to Refer,* WVAHPERD October, 22, 2005
28. McIlvain, G. & Sturgill, R. *Health Care Provider CPR/FBOA Workshop,* WVAHPERD October 22, 2005.
29. Sturgill, R., & McIlvain, G. *Review and update on CPR and FBOA; Health Care Provider.* WVAHPERD October 21, 2005.
30. Reviewer for Strength and Conditioning Journal 2003-present
31. McIlvain, G. *The Female Knee, Her ACL, & Evidence Based Programs Shown to Reduce the Risk.* Belfonte Hospital, Ashland, KY. August 4, 2005.
32. McIlvain, G. & Erwin, M. *The Female Knee and the ACL Dilemma.* Magnolia High School, New Martinsville, WV. July 9, 2005
33. Martin, D., McIlvain, G., & Sturgill, R. *Heart and Lung Assessment for the Athletic Trainer.* Kentucky Athletic Trainer's Annual Symposium, Feb. 19, 2005.
34. McIlvain, G & Martin, D. July 2004. *Ouch, That hurts! Common Injuries in adolescents.* WVAPHERD Meeting
35. McIlvain, G & Martin, D. July 2004. *He is Paralyzed! What do I do.* Backboarding workshop. WVAPHERD Meeting
36. Martin, D., & McIlvain, G. February 2004. *Use of Otoscope & Ophthalmoscope for athletic trainers.* Presentation at Kentucky Athletic Trainers Association Annual Meeting and Symposium.
37. McIlvain, G. October 2003. *Their heart stopped, what do I do?* Health Care Provider CPR and Airway Obstruction Updates. WVAPHERD Meeting
38. McIlvain, G., Martin, D., July 2002 Workshop in *CPR and Airway Obstruction.* WVAPHERD Meeting
39. Martin, D & McIlvain, G. October 2003, *Cooperative Electronic Advising.* WVAPHERD Higher Education Seminar.
40. McIlvain, G. October 2002, Review for McGraw Hill. Reviewed text titled *Essentials of Athletic Training, 5th ed.*
41. McIlvain, G., Martin, D., Toney, M. July 2002 *CPR and Choking Certification* WVAPHERD Meeting
42. McIlvain, G. July 2002. *Their not breathing, what do I do?* Health Care Provider CPR and Airway Obstruction Updates. WVAPHERD Meeting
43. McIlvain, G. July 2002 *Using Technology in HPER and Sciences Classes* WVAPHERD Higher Education Seminar

44. Martin, D., & McIlvain, G. May 2002. *Otoscope/Ophthalmoscope* Presentation at Mid-Atlantic Athletic Trainers Association Annual Meeting and Symposium.
45. McIlvain, G. 2002. *Technology Workshop; Using Spring Visor (Palm Pilot) for Power Point Presentations*, Marshall University
46. McIlvain, G., Martin, R. D., Toney, M. 2000. Health Care Provider CPR instruction for Cable Midland High School Students, Huntington, WV
47. McIlvain, G., Martin, R. D., Toney, M. 2000. Health Care Provider CPR instruction for Recreation Sport Graduate Students, Marshall University
48. McIlvain, G. 2000. Technology Workshop; *Using Miniature Laptop and External CD Writers*, Marshall University
49. McIlvain, G. 2000. Technology Workshop; *Using Digital Cameras for Digital Movies/Pictures and Power Point*, Marshall University
50. Elrod, B., MD, Stowers, MD, Snoddy, C, MS, ATC, McIlvain, G, ATC; 1997, *Educational Series on ACL injuries in female athletes*; Nashville Channel 4 News Cast. *Mechanism, Causes, Mental Reactions, Surgery, & Recovery*.
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