

KNOWLEDGE DEFICITS OF CAFFEINE AMONGST ADOLESCENTS  
IN METROPOLITAN PHOENIX

by

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As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Amy Michelle Mandile, titled Knowledge Deficits of Caffeine Amongst Adolescents in Metropolitan Phoenix and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

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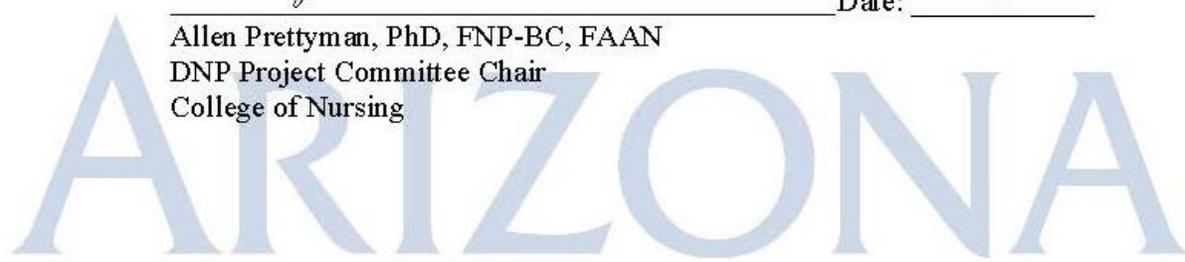
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Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

I hereby certify that I have read this DNP project prepared under my direction and recommend that it be accepted as fulfilling the DNP project requirement.

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## DEDICATION

This DNP Project, my FNP degree, and my life's work as a nurse are dedicated to my late mother, Suzanne Belle Mandile, BSN-RN, AGNP-BC. Thank you for the endless years of sacrifice, encouragement, mama bear-ness, and friendship. You are my example of fearless pioneering. I am so proud of you. I miss you and love you with all my heart.

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## ABSTRACT

Caffeine is a central nervous system stimulant found in natural and artificial products such as cocoa, tea, coffee, as well as energy drinks, energy shots, and additives with variable concentration levels consumed by roughly 73% of adolescents in the United States. Caffeine has several documented side effects such as increased alertness, improved focus, decreased fatigue, improved physical performance, insomnia, headache, anxiety, dehydration, abnormal heart rhythm, restlessness, physiological dependence, and death. Not much is known on what local Arizona adolescents comprehend on caffeine, its anticipated side effects, and caffeine-containing product identification. This DNP project's primary purpose was to evaluate knowledge adolescents; aged 13-18 years have concerning common caffeine-containing beverage products. A pre-questionnaire (Appendix F), followed by an education session (Appendix G), and post-questionnaire (Appendix H) at a local Phoenix, Arizona healthcare clinic were utilized and evaluated. Results yielded a high percentage of adolescent awareness to purposeful caffeine consumption for the result of heightened alertness. Adolescents also displayed knowledge of common products such as coffee, energy drinks, and soda products to contain caffeine. There was a knowledge gap related to hydration products containing caffeine and misidentification on chocolate-flavored drinks to be without caffeine; however, this percentage decreased post-education information session, displaying that education on products is beneficial to heighten adolescent consumer awareness.

## **INTRODUCTION**

Caffeine is a central nervous system stimulant consumed by approximately 87% of the general United States (U.S.) population (Kole & Barnhill, 2013) and roughly 73% of adolescents (Branum et al., 2014). This chemical occurs naturally in many products such as cocoa, tea, and coffee with variable concentration levels (Viana et al., 2018). In addition, synthetically manufactured caffeine is a common additive in soda, alcohol, energy drinks, energy shots, and over-the-counter dietary supplements (Viana et al., 2018), all of which are readily available to the public. With the addition of caffeinated branded energy drinks to the market scene, caffeine consumption among adolescents is on the rise (Branum et al., 2014). Teenager's rationale for the consumption of caffeine is related to the feelings of increased concentration and being alert, however, the average adolescent has been found to have difficulty in accurately identifying caffeine-containing products (Thakre et al., 2015). In a study conducted on seventh and eighth-grade students, adolescent participants were not able to consistently identify caffeine-containing beverages (Thakre et al., 2015). This knowledge deficit among adolescents 13-18 years of age puts youth at risk to experience the negative side effects of caffeine (Ahluwalia et al., 2016).

### **Background Knowledge**

Caffeine is generally associated with the positive effects of increased alertness, improved focus, decreased fatigue, and improved physical performance (Mitchell et al., 2013). However, caffeine has several negative side effects such as insomnia, headaches, anxiety, dehydration, abnormal heart rhythm, restlessness, physiological dependence, and in rare cases, death (Ahluwalia et al., 2016). With such adverse side effects, it is important to understand the trend of caffeine consumption among adolescents.

Traditionally, adolescents have ingested soda and tea as their main supplier of caffeine, however, there has been a trend in the past decade to coffee and energy drinks due to increased marketing, product availability, and social shift encouraging adolescents to these products (Branum et al., 2014). An example of this is coffee, wherein the year 1999-2000, only 10% of adolescents consuming caffeine obtained it from coffee; however, this percentage increased to 24% in the year 2009-2010. Regarding energy drinks, in the year 1999-2000, no data exists, but in 10 short years after their debut to the market, energy drinks accounted for 6% of caffeine intake in 2009-2010 (Branum et al., 2014). Soda has seen a decline from 62% in 1999-2000 to 38% in 2009-2010 with sugary coffee drinks predominantly replacing this high fructose corn syrup drink (Branum et al., 2014). Recognizing the significance in source trends is important due to caffeine milligrams contained in each drink. Soda is limited by the Federal Drug Administration's (FDA) guidelines to no more than 71 milligrams in 12-ounces with average soft drinks containing between 30-55 milligrams (Kristjansson et al., 2013); however, there is no restriction to caffeine contained in coffee or energy drinks (Kole & Barnhill, 2013). The impact of this can be seen in caffeine overdoses that totaled approximately 5,448 cases in 2007 with 46% of these cases reported to be younger than 19 years of age according to Poison Control Centers (Seifert et al., 2011). This bears significant relevance as the FDA released recommendations of consuming  $\leq 400$ mg/day of caffeine for adults (Thakre et al., 2015); however, currently there are no FDA recommendations for age groups of  $\leq 17$  years for caffeine ingestion (Thakre et al., 2015). To prevent such adverse events, the Canadian Government, the only governmental body within Northern America, released recommendations for adolescent caffeine ingestion to no more than 2.5mg/kg of body weight (Government of Canada, 2013).

Adolescents are still in their physical and cognitive developmental stages, emphasizing potential adverse effects of heavy caffeine consumption in development and behavioral patterns (Richards & Smith, 2015). In the study by Kristjansson et al. (2013), positive correlations were found between caffeine consumption and aggressive behavior patterns in both male and female adolescents. Unlike adults, few studies have been conducted on safe thresholds for caffeine ingestion in adolescents, making it hard to distinguish appropriate recommended levels (Richards & Smith, 2015).

Regulation and labeling of caffeinated products are variable or nonexistent (Kole & Barnhill, 2013). The FDA, under the 1994 Dietary Supplement Health and Education Act, instituted *dietary supplements* as its own category to be regulated differently from *conventional food* products monitored by the FDA (Kole & Barnhill, 2013). This fact matters as *dietary supplements* do not currently have caffeine limits on manufacturers adding large concentrations (Kole & Barnhill, 2013). This omission leads to consumer knowledge deficits of caffeine-containing substances and caffeine dose per product (Kole & Barnhill, 2013). Considering that approximately 73% of adolescents ingest caffeinated products, mixed with the consistent ambiguity of caffeine labeling and concentration, there is a need to assess for caffeine knowledge and consumption among adolescents.

Caffeine consumption among teenagers is common (Branum et al., 2014). The more healthcare providers are aware of caffeine habits, the more they can anticipate education opportunities for the teenage patient population at a centrally located Happy Kids Pediatric clinic in Phoenix, Arizona.

### **Local Problem**

The state of Arizona, like other portions of the United States, faces unique problems of adolescents and caffeine intake. In Drescher et al. (2011), a study focusing on Tucson youth sleep apnea, demonstrated that increased caffeine correlated with a decrease in total sleep time each night. This is significant as the typical adolescent needs approximately 8.5 to 9.25 hours each night for optimal functioning (National Sleep Foundation, 2000). However, approximately 30% of adolescents aged 6-17 years of age in Arizona are not getting the recommended amount of sleep time (U.S. Department of Health and Human Services [HRSA], 2011), placing Arizona adolescents at increased risk of ingesting stimulants such as caffeine. Excess calorie ingestion for adolescents frequently accompanies caffeinated beverages, introducing an increased risk for obesity (Malik et al., 2006). Of adolescents in the 9th to 12th grades in Arizona, 12.3% are classified as obese with 15.9% classified as overweight (Centers for Disease Control and Prevention [CDC], 2019), placing the adolescent at an increased risk for type 2 diabetes, adulthood obesity, and heart disease (Robert Wood Johnson Foundation, 2018). Currently, little data is available on Maricopa County concerning adolescent caffeinated beverage consumption. However, what is known is that caffeinated beverage consumption amongst Arizona adolescents is actively decreasing total sleep time (HRSA, 2011) and increasing the opportunity for overweight or obese teenagers through unnecessary calorie intake (Malik et al., 2006).

### **Purpose**

The purpose of this DNP project was to evaluate knowledge adolescents; aged 13-18 years have concerning common caffeine-containing beverage products that they consume regularly.

## **Stakeholders**

Stakeholders are individuals who are invested in the success of an idea, business, or project (American Society for Quality, 2019). Stakeholders identified for the DNP project were the Happy Kids Pediatric Clinic, its staff including nurse practitioners (NP), physician assistants (PA), medical doctors (MD), medical assistants (MA), parents, and the adolescent population. Happy Kids Pediatrics is an Arizona family-run company founded in 1999, with the mission of serving the local Metropolitan Phoenix pediatric community and their parents by providing child wellness, prevention, and education in the community (Happy Kids Pediatrics 2019). Happy Kids Pediatrics provides care from the newborn to the geriatric patient, performs in-office procedures, and education on pediatric health, development, and nutrition (Happy Kids Pediatrics, 2019). Stakeholders guide the nutritional intake of adolescents and play a pivotal role in adolescent development.

## **Project Question**

For adolescents, aged 13-18 years, in a Happy Kids Pediatric office, is there a knowledge gap in correctly identifying caffeinated products?

## **Theoretical Framework**

### **Introduction of the Social Cognitive Theory**

The Social Cognitive Theory (SCT) guided this DNP project. The SCT was developed by Albert Bandura, a Canadian-American psychologist, to explain the nature of behavioral and intellectual learning as socially dynamic with interrelated dependency between the person, the environment, and an individual's behavior (Boston University School of Public Health, 2018). The SCT is based on the specific constructs of reciprocal determinism, observational learning,

reinforcement, and expectations (Glanz, 2016). The SCT considers the concept of acquiring and maintaining behavior as socially influenced with reciprocity between the individual and the environment to learn new behavioral patterns and discard old behavioral patterns (Boston University School of Public Health, 2018). The SCT provided this DNP project the opportunity of evaluating the social-behavioral factors that influence the adolescent's knowledge, perception, and interaction with caffeinated products with the intention of creating educational support to instill knowledge and skills in identifying caffeinated products.

SCT reflects the adolescent development stage from dependency to independence as highlighted by their right to choose beverages of choice that reflect their blossoming personal identity.

### **Reciprocal Determinism**

Reciprocal determinism is a core concept of SCT where the individual serves a dual dynamic as an agent of change and as a receiver of change (Glanz, 2016). This concept involves the give-and-take interactions of the person, the environment, and behaviors that not only influence the learning and action of self-behavior but other individuals within the social environment (Glan, 2016). External influences such as peers, parents, and social media play key roles in social reciprocal interactions with the individual that help to mold the learning process of behavior obtainment or discontinuation (Meisel et al., 2018). An example of this is seen in a study of adolescents and alcohol by Meisel et al. (2018). Meisel and colleagues (2018) found that teenage alcohol behavior was learned from a dynamic meshwork between the adolescent's current and prior experiences with alcohol; observational learning from peers, social media, and adults; reinforcement from peers and personal experience; and expectations from peers, parents,

and self. As with Meisel et al. (2018), the SCT's reciprocal determinism highlighted adolescent caffeine utilization as a dynamic interaction between the individual, the social and physical environments, and behavior.

### **Observational Learning**

Observational learning is the process of seeing then doing. In SCT, observational learning allows the adolescent to watch others, observe outcomes of behavior and model their own behavior if the observed example appears desirable to do so (Boston University School of Public Health, 2018). Observational learning allows the individual to acquire familial norms, social norms, cultural norms, and, in the case of caffeine consumption, dietary norms from their immediate and/or external environment (Wham et al., 2017). In a study by Zarychta et al. (2015), adolescent observation of parental behavior of dietary caffeine intake was one of the largest indicators for current and future caffeine consumption.

**Reinforcement.** The concept of reinforcement evaluates the adolescent's self-reflection of performing behaviors as well as the external responses from social influences and environment that may alter the likelihood of continuing a specific behavior (Boston University School of Public Health, 2018). Reinforcements can be positive or negative and highlight the reciprocal relationship between the adolescent, the behavior, and the social and physical environments (Eldredge, Parcel, Kok, & Gottlieb, 2011). In a study completed by Ludden et al. (2017) among a series of adolescent peer group interviews, consumption of caffeine was associated with feelings of pleasure. This feeling is a positive internal self-reflected emotion tied directly into the behavior of consuming a caffeinated beverage the adolescent finds most

pleasurable (Eldredge et al., 2011). Thus, in this instance, internal reinforcement is positive and encourages continued caffeine use.

**Expectations.** Expectation in the SCT relates to the subjective anticipated cost of an individual's behavior or action (Boston University School of Public Health, 2018). An individual's expectations to the conclusion of a behavior may serve as a deterrent or as encouragement based upon the anticipated result (Boston University School of Public Health, 2018). Expectation is highly subjective based on the person, their prior experiences, and the value placed on the result (Boston University School of Public Health, 2018). In a study by Turton et al. (2016), adolescents were assessed for their attitudes and beliefs towards caffeine use. It was discovered that adolescents expected flavor enjoyment as well as energy boost (Turton et al., 2016). In this same study, adolescents also had the anticipated outcome of social image enhancement, a.k.a. to look "cool" (Turton et al., 2016). These findings highlight that both internal and external expectations play important roles in behavior development, continued behavior, and reciprocally, discontinuation of the behavior for adolescent caffeine use.

In summary, the SCT is a *social theory* that highlights the nature of behavioral and intellectual learning as socially dynamic with interrelated dependency between the person, the environment, and an individual's behavior (Boston University School of Public Health, 2018). The SCT has specific constructs of reciprocal determinism, observational learning, reinforcement, and expectations that explain the interactivity of the adolescent in relation to behaviors. The SCT is especially important and applicable to this DNP project, as it will illuminate adolescent caffeine use and knowledge by placing it in a social construct that allows

for influencing factors that affect daily caffeine behaviors such as knowledge of caffeine products, caffeine use expectations, and use reinforcements.

## **Synthesis of Evidence**

### **Evaluation of Supporting Articles**

Adolescent capacity to identify caffeine-containing items is not well documented. Considering adolescent caffeine use is at approximately 73% in the United States (Branum et al., 2014), and with well-documented side effects such as insomnia, headache, anxiety, dehydration, abnormal heart rhythm, restlessness, physiological dependence, and death (Ahluwalia et al., 2016), understanding adolescent knowledge of and interactions with caffeine are important to examine. Such studies have included caffeine overdose that totaled approximately 5,448 incidents in 2007 with 46% of the adolescents reported to be younger than 19 years of age (Seifert et al., 2011). In addition to inadvertent overdose, insomnia and sleep disturbances that accompany caffeine have been documented. An Arizona sleep study, there was found to be a correlated increase of risk for caffeine ingestion from inadequate hours of sleep and, reciprocally, adolescents were found to get inadequate sleep from caffeine and screen time use (Drescher et al., 2011; US. Department of Health and Human Services [HRSA], 2011). In this study, caffeine can be thought of as both the cure and cause of insomnia in the adolescent (Drescher et al., 2011) Local Arizona research also highlights excess calorie ingestion that accompanies caffeinated beverages, increasing Arizona adolescent's obesity risk (Malik et al., 2006). As previously noted, obesity is already a concern as 12.3% of Arizona adolescents in the 9th to 12th grades are currently classified as obese with 15.9% classified as overweight (Centers for Disease Control and Prevention [CDC], 2019).

With the elevated risk of caffeine ingestion from insufficient sleep and side effects of obesity and overdose, apparent attention to investigate caffeine knowledge among adolescents 13-18 years of age exists. To obtain more information, a search was conducted utilizing PubMed, PsycINFO, and CINAHL databases. The following keywords were utilized: adolescents, children, caffeine, behavior, knowledge, understanding, beverage, and awareness. Search criteria were restricted to full-text articles, studies published within five years, adolescents, and human subjects. CINAHL search yielded six results with one study being excluded because it focused on other non-caffeine related products. PubMed yielded 28 results with seven being excluded due to a focus not on adolescents, caffeine use, or adolescent knowledge of caffeine. PsycINFO search yielded eight results with one being excluded because of ages greater than 18 years. A total of 33 articles were yielded and retained with 10 articles highlighted due to their relevancy to this project's focus (Appendix A).

### **Strength and Weaknesses of Articles**

Thakre et al. (2015) examined the adolescent comprehension of caffeinated beverages by having 7th and 8th graders actively participate in selecting beverage products they thought contained caffeine. This study highlighted the adolescent's inconsistency in correctly identifying caffeinated beverages (Thakre et al., 2015). Thakre et al. (2015) displayed in their pilot study that adolescent literacy concerning caffeine is low and calls for educational intervention to inform adolescent consumers of caffeine in products, especially beverages. The weakness of this article is that it is limited to only 7th and 8th grade adolescents in a specific city in the U.S. This adds question into the applicability to other regions of the United States and the full age range of adolescents of 13-18 years.

Kole and Barnhill (2013) investigated the current state of FDA regulation on consumer products that contain caffeine. This article reveals how manufacturers utilize FDA regulation to market caffeinated products either as a conventional food or as a dietary supplement to augment the need to report synthetically added or naturally occurring caffeine on a food or beverage product label. This article strengthens the concept that adolescents may not always comprehend the dose of caffeine content in a beverage due to its omission from the label. A major weakness of the article is that a descriptive analysis of literature was performed instead of a systematic review.

Kristjansson and colleagues (2013) evaluated caffeine use among adolescents and ascertained a strong relationship to both violent behaviors and conduct disorder when accounting for differences in background factors, Attention-Deficit/Hyperactivity Disorder (ADHD) diagnosis, and peer delinquency. Kristjansson et al. (2013) display the need for caffeine to be better understood as a mood and behavioral drug. This study is limited in that it only evaluated 10th graders outside the United States.

Beauchamp et al. (2016) and Seifert (2013) both examined calls to Poison Control Centers regarding powdered caffeine and energy drinks with both articles finding a strong correlation between caffeine consumption and accidental adolescent overdose or toxicity. Each article referenced the inadequate labeling of caffeine concentration (Beauchamp et al., 2016; Seifert, 2013). With adolescents at high risk for inadvertent side effects and overdose, this calls attention to the need for consistent labeling for products containing caffeine (Beauchamp et al., 2016). Beauchamp et al.'s (2016) study is limited by its specific evaluation of Oregon, Alaska,

Guam, Utah, and Washington while Seifert et al. (2013) is limited to only evaluating calls related to energy drinks.

Richards et al. (2015) and Zarychta et al. (2017) evaluated associations between caffeine consumption, stress, anxiety, depression, and relationships between perceived parental behaviors (dietary behaviors, physical activity, & verbal pressure) and changes in adolescents' body mass index (BMI) (respectively). In Richards et al. (2015), caffeine showed a positive correlation between stress, anxiety, and depression. In Zarychta et al. (2017), adolescent observance of parental use of caffeine had a strong correlation of personal use in the future and increased BMI. Richards et al. (2015) and Zarychta et al. (2017) studies are geographically limited region outside the United States, thus may face applicability concerns to the U.S.

Seifert et al. (2011) evaluated the health effects of energy drinks on children, adolescents, and young adults and Mitchell et al. (2014) estimated caffeine intake in the U.S. population from the consumption of caffeinated beverages using a current (2010 – 2011) population-based beverage survey. Both pieces of literature are useful in highlighting the use of caffeine and providing an estimated breakdown of the source of caffeine (i.e., coffee, soda, tea, energy drinks, etc.) and its effects on adolescents. Seifert's study is limited in that only energy drinks are evaluated, while Mitchell et al. (2014) face concerns of milligram estimations of caffeine-containing beverages. Both studies are invaluable however to understand common products the adolescent consumes to obtain caffeine with highlights into potential adverse effects on adolescent health.

This literature review emphasizes caffeine, common vessels of ingestion (i.e., beverages, food, etc.), potential physical adverse side effects, associated behavioral side effects, and the

importance of role modeling in adolescent decision making to include dietary caffeine, labeling concerns, and reports of the adolescent's working knowledge of caffeine-containing items. The information presented in the literary review stresses a need to better understand the current adolescent comprehension of caffeinated products. A large gap in the body of knowledge exists in evaluating the adolescent's ability to demonstrate caffeine awareness in choosing caffeinated items. With caffeine being present in a variety of everyday beverage and food choices, adolescent comprehension of caffeine effects, the extent of prevalence in food and drink, and how to make informed consumer decisions is a necessary concern in the present day.

## **METHODS**

### **Design**

This DNP project utilized a non-experimental descriptive design in its evaluation of the adolescent's knowledge of caffeine. The non-experimental method allowed the project leader (the student of this project, Amy Mandile) to administer a caffeine pre-questionnaire (Appendix F), a short education session (Appendix G), followed by a three-item caffeine post-questionnaire (Appendix H) to assess new knowledge to a sample of 20 adolescent participants aged 13 through 18 years. The caffeine pre-questionnaire is broken down into three categories that include basic demographic information of the adolescent, the adolescent's behavior related to caffeine, and the identification of caffeine.

### **Setting and Participants**

The setting was the Happy Kids Pediatrics in Phoenix, Arizona as discussed in the earlier section *Stakeholders*. Initial site authorization was obtained and included in this paper (Appendix B). Secondly, The University of Arizona Institutional Review Board (IRB) determination form

was submitted to the College of Nursing at the University of Arizona (Appendix J). The inclusion criteria for this project were adolescents scheduled that day and with a self-disclosed age of 13 through 18 years, verbal permission from their parent, from the Phoenix area, and able to independently complete the questionnaires.

### **Intervention**

This DNP project had a start date of December 2, 2019 and was completed by December 9, 2019. Happy Kids Pediatrics was given a flyer (Appendix D) from the project leader that was placed on the front desk informing parents and adolescents of the project. The caffeine pre- and post-caffeine questionnaires were provided via paper and pencil.

The project leader conducted an information session of 10-15 minutes on December 2nd before the clinic's office hours that advised medical assistants, secretaries, nurse practitioners, and medical physicians of the purpose of the project and steps staff took to help administer and collect the questionnaires. A script (Appendix E) was distributed to the medical assistants and secretaries to inform participants of the project and if they would like to participate.

As adolescents checked-in, they were informed of the project by the secretary and if willing, handed the caffeine pre-questionnaire (Appendix F) and disclosure form (Appendix C) that notified the participant and parent of potential risks and benefits as well as the nature of the project with the ability to contact the project leader via phone and email with any concerns or questions (Appendix C). The caffeine pre-questionnaire (Appendix F) took the participant no more than five minutes to complete. Once completed, the participant handed the caffeine pre-questionnaire to the MA when taken to a room for their appointment. The MA handed the questionnaire to the project leader who was onsite. Once the provider saw the patient, the project

leader met the participant and parent in a private room allocated in the clinic and conducted a five-minute education session utilizing paper handouts (Appendix G) created by the project leader, and reviewed and approved by the Committee Chair of this project and by the pediatric professionals of Happy Kids Pediatrics. The project leader then administered a three-item caffeine post-questionnaire (Appendix H) that was returned directly to the project leader. Upon completion, participants were offered a healthy snack pack that contained pre-packaged carrots, a Fig-Newton bar, and a Kind Bar.

Participants were given the option to be entered in a raffle for a chance to win one of three \$20.00 USD prepaid VISA gift card. The raffle tickets were kept in a locked filing cabinet located within the Happy Kids Pediatric manager's office until the random raffling selection took place on December 9th, 2019. All raffle tickets were disposed of in the in-office locked patient protected receptacles for destruction after random raffling. The office secretary contacted the winners and sent the \$20 prepaid VISA gift cards via U.S. Mail using stamps and envelopes provided by the project leader (Appendix I).

### **Tools for Data Collection**

To date, there is not a validated questionnaire or survey that specifically details knowledge of caffeine literacy in adolescents aged 13-18 years. Most current data that has been extrapolated regarding adolescent caffeine use, caffeine product preference, timing of ingestion, and documented side effects have been the result of a student's creation. This DNP project utilized a 10-item multiple-choice caffeine pre-questionnaire (Appendix F) reviewed and approved by this project's Committee Chair and pediatric clinical experts at Happy Kids Pediatrics that was completed via paper-and-pencil by the adolescent. The questionnaires were

anonymous, asking only for age, grade-level, identified gender, and limited to 10 multiple-choice items to ensure expedient completion and to maintain the adolescent's attention (Vawter 2009). A three-item caffeine post-questionnaire (Appendix H) that focused on the identification of caffeinated drinks was used to evaluate the adolescent's understanding of the education session.

### **Data Analysis**

The data was categorized by each question with the three common pre-questionnaire results compared with the post-questionnaire results. Organizing the data in such a way allowed for the results to be compared between pre- and post-questionnaires, inferring how education impacted caffeine literacy. There was no need to transform the data into anonymous identifiers, as the questionnaires did not ask any personal questions related to personally identifiable information (Polit & Beck, 2017).

### **Ethical Considerations**

#### **Respect for Persons**

Adolescents are a special population as they possess the emerging capacity for adult mental processing, critical thinking, and autonomy, but are still a protected section of the general population due to their legal status as a minor (Santelli et al., 2003). Respect and autonomy were maintained throughout the project process with the use of the disclosure form that informed the parent and participant on the purpose and intent of the project. The adolescent's self-determination of choice to participate was respected by Happy Kids Pediatric office in which this project took place, by its staff, and by the project leader (Polit & Beck, 2017). Freedom from coercion was also highly regarded and enforced in this project by allowing full discretion of the adolescent to opt-out of the project without penalty at any time (Polit & Beck, 2017). This

project was designed to be anonymous and maintained respect to the teenager by removing identifying information (Polit & Beck, 2017).

### **Beneficence**

Beneficence is the obligation of the project leader to “minimize harm while maximizing the benefits” of the project (Polit & Beck, 2017, p. 139). Potential harms for this project included unintentional injury to the adolescent through the individual perception of performance in correctly identifying caffeinated products. This may have affected the teenager’s perception of self or fear of peer perception of self. The teenager was protected from this inadvertent harm by having all participants perform the questionnaires individually, maintain the confidentiality of the pre-caffeine and post-caffeine questionnaire answers, and transcription of answers to electronic format to ensure handwriting could not be identified. The use of a Happy Kids Pediatric office created a familiar and safe environment for adolescents with the provision of snacks serving as another vehicle that produced a sense of ease and comfort. The benefit of this project included identifying adolescent knowledge gaps in understanding caffeinated products.

### **Justice**

The right to fair treatment is a principle of justice in projects and nursing. Fair treatment is the equal handling, selection, and respect for all participants regardless of race, gender, social status, sexual orientation, culture, religion, and beliefs (Polit & Beck, 2017). In this project, all participants were treated with respect, dignity, patience, and kindness. An attitude of openness and acceptance helped to nurture the adolescents and engage them in a nonjudgmental way that allowed them to be willing to participate. The teenager was also given free will, regardless of parental permission, to opt-out of this project without prejudice or repercussion (Polit & Beck,

2017). Three \$20.00 USD prepaid VISA gift cards were available for all questionnaire participants. To ensure that the gift card was not be viewed as possible coercion for participation, the gift cards were randomly raffled to participants who opted-in to be eligible to win (Polit & Beck, 2017).

## RESULTS

Twenty-two (22) participants of approximately 105 adolescents of the age 13-18 completed the caffeine pre-questionnaire (Appendix F), the education session (Appendix G), and the caffeine post-questionnaire (Appendix H). The non-identifiable demographic data obtained from the pre-questionnaire reveals that 45% (n=10) of participants were aged 17, 36% (n=8) were age 18, and 18% (n=4) were 16 years of age (Figure 1). Identified sex revealed that 45% (n=10) of participants were female, 36% (n=8) were male, and 18% (n=4) identified as other.

Of the participants in the caffeine pre-questionnaire, 72% identified caffeine as a stimulant, 18% identified caffeine as a depressant, 9% identified caffeine as a vitamin, and 0% identified as other. Comparatively, in the caffeine post-questionnaire, 90% identified caffeine as a stimulant, 4.5% identified caffeine as a depressant, 0% identified caffeine as a vitamin, and 4.5% identified caffeine as other (Figure 2). In the caffeine pre-questionnaire, 78% identified they drank beverages such as soda or ate food products that contained caffeine, while 6% stated they did not, and 17% stated that they did not know.

When asked why participants did consume caffeine, multiple results were allotted for the participant to choose (Figure 3). Of the most popular reasons, “tastes good” was selected by 62% of participants; “makes me more awake” by 50% of participants; “helps me to focus” by 23%; “I don’t know” by 11%; “other reason” by 11%; “Makes me feel like I fit in with family/friends”

by 6%; and “I like the way it makes me feel” by 6% of participants. The temporal ingestion of caffeine for the participants reveals that multiple time selections were chosen. Half (50%) reported consuming caffeine in the morning, 63% identified afternoon consumption, and 44% identified nighttime consumption. All adolescents participated in the question related to sleeping and caffeine consumption with 33% reporting they did have trouble sleeping with caffeine use, and 67% reporting they did not have trouble sleeping with caffeine use.

The caffeine pre- and post-questionnaires (Appendix F & H) utilized a “select all that apply” format for the identification of caffeine products (Figure 4). In the caffeine pre-questionnaire, 89% identified energy drinks such as Monster, Red Bull, RockStar, and energy shots as having caffeine compared with 86% in the caffeine post- questionnaire. More (78%) identified that soda products such as Coca-Cola, Pepsi, Dr. Pepper, and Mountain Dew contained caffeine in the caffeine pre-questionnaire with 81% identifying the same products to contain caffeine in the caffeine post-questionnaire. Some 83% of participants in the caffeine pre-questionnaire and 95% of adolescents in the caffeine post-questionnaire identified coffee drinks as containing caffeine. A small amount 44% of adolescents identified tea drinks as containing caffeine in the caffeine pre-questionnaire with 45% identifying caffeine in the caffeine post-questionnaire. Eleven percent of participants identified chocolate drink products to contain caffeine in the caffeine pre-questionnaire with 15% in the caffeine post-questionnaire. Thirty-three percent of participants identified hydration drinks such as Gatorade, Powerade, and Vitamin Water to contain caffeine in the caffeine pre-questionnaire with 24% in the caffeine post-questionnaire.

Adolescents were also asked to identify obesity and diabetes as potential side effects of consuming sugary caffeinated beverages as true or false in the caffeine pre-questionnaire with 83% selecting that it was true and 17% stated that it was not true.

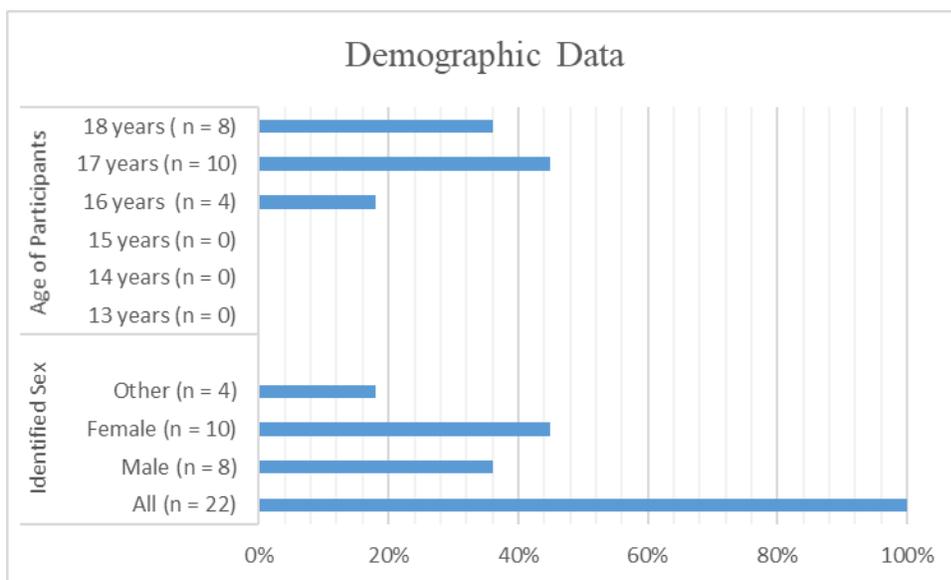


FIGURE 1. Demographic participant data.

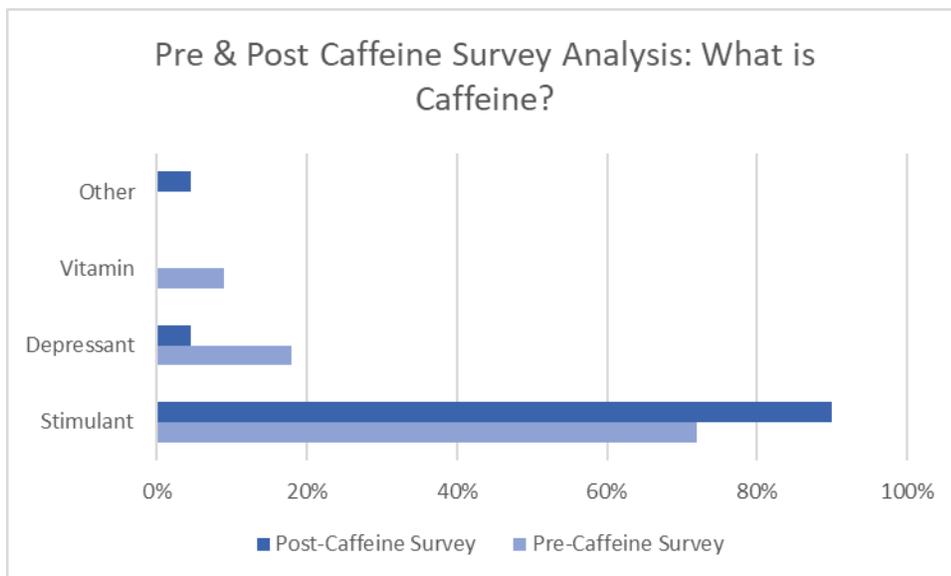


FIGURE 2. Pre- and post-caffeine survey analysis: What is caffeine?

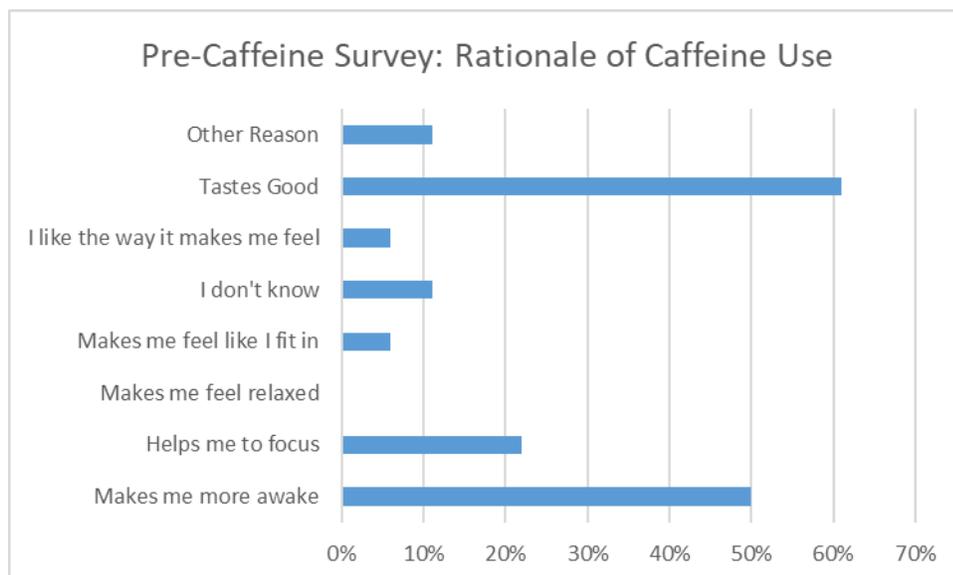


FIGURE 3. Pre-caffeine survey: Rationale of caffeine use.

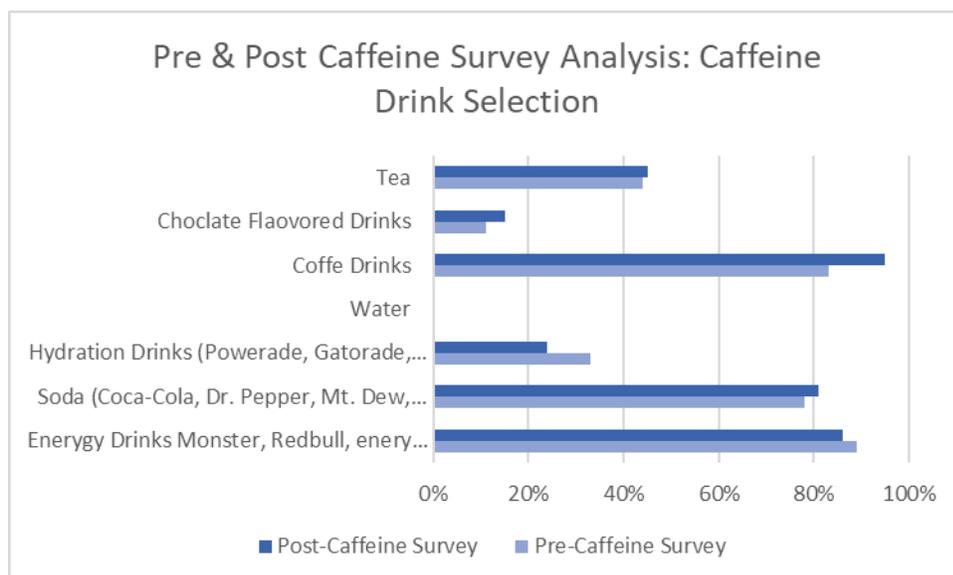


FIGURE 4. Pre- and post-caffeine survey analysis: Caffeine drink selection.

## DISCUSSION

### Summary and Interpretation

The purpose of this DNP project was to evaluate the knowledge adolescents, aged 13-18 years, have concerning common caffeine-containing beverage products they consume regularly.

To expand on this purpose, five aims were created to explain knowledge of caffeine, the rationale for its use, timing of its use, and if the adolescent experienced side effects of sleep disturbance when used.

The first aim of this project was to evaluate whether adolescents understood that they consumed caffeine with exploration taking place in the pre-caffeine questionnaire. The second aim of this study was to evaluate if adolescents identified caffeine as a stimulant, depressant, vitamin, or other substance to clarify if they understood the pharmacological effect of caffeine. The third aim of the study was to evaluate why the adolescent was engaging in caffeine consumption with the exploration of how caffeine made them feel in the pre-caffeine questionnaire. Based on the results, there is an indication that the adolescents who participated in this study are actively engaging in caffeine use, knowing of its stimulatory effect, with the rationales of (in order of most selected) tasting good, wakefulness, mental focus, other reason, uncertainty in why they were consuming it, liking the way it made them feel, and a sense of fitting in with family and friends.

The fourth aim of the study was to garner information on the timing of consumption to evaluate the negative side effects of sleep loss. Most adolescents of this project consumed afternoon caffeine with more than half stating they did not have trouble sleeping after caffeine use. The fifth aim was to appraise the adolescent's knowledge of everyday products to evaluate if teenagers are correctly identifying caffeinated products. A high number of teenagers in the pre- and post-caffeine questionnaires correctly identified coffee, energy drinks, and soda products as containing caffeine. Approximately one-third of teenagers in the pre-caffeine questionnaire identified hydration drinks such as Gatorade, Powerade, and Vitamin Water incorrectly as

containing caffeine, however, this number decreased to just below one-quarter after the caffeine education session, implying education on caffeine did prove somewhat beneficial to helping the adolescent identify caffeine products. The number of adolescents who correctly identified coffee and chocolate-flavored drinks as a caffeine product also increased post-education session. This data is suggestive that teenagers do already have a high understanding that certain products (coffee, energy drinks, tea, etc.) do contain caffeine. The project leader was surprised by the knowledge that adolescents of Happy Kids Pediatrics possessed regarding caffeine, its location in common beverage products, and their awareness of its stimulatory effects.

In discussing this project's results, the Social Cognitive Theory (SCT) and synthesis of evidence do support the questionnaire approach and the 'per question' content by observing the specific constructs of reciprocal determinism, observational learning, reinforcement, and expectations. The results obtained align as a reflection of the SCT in that many of the students expressed similar rationales for caffeine use in addition to temporal use, inferring a specific social norm of the timing to caffeine ingestion and reason for use among peers.

### **Implications of Project**

The implications of this project are three-fold. 1) Stakeholders such as adolescents and Happy Kids Pediatrics nurse practitioners and medical providers will gain a better understanding of the current state of knowledge adolescents have regarding caffeine. 2) In understanding the current state of adolescent knowledge, stakeholders can identify gaps of knowledge to implement education and guidance on day-to-day caffeine use. 3) Education about caffeine does show modest improvement in the understanding of caffeine to the adolescent. The results can enable future education series to be developed by nurse practitioners and medical physicians to inform

the adolescents of Happy Kids Pediatrics about caffeine products and daily use to help ensure a healthy future. Education series to be discussed with nurse practitioners and medical providers when results are disseminated in February 2020 to Happy Kids Pediatrics include providing caffeine daily limit concepts, and education on caffeine side effects for adolescent awareness.

### **DNP Essentials in this Project**

The DNP Essentials serve as a foundation for advanced nursing scholarship and clinical practice while providing benchmark expectations for the nurse practitioner student. The principal investigator of this DNP project utilized two DNP Essentials to support the evaluation of adolescent knowledge regarding caffeine. DNP Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health, is a foundation for disease prevention and health promotion (American Association of Colleges of Nursing [AACN], 2006). This Essential expects the nurse practitioner student to engage in analysis of data related to individual and population health, create culturally aware interventions to manage health, and evaluate/develop health delivery models to populations (AACN, 2006). This DNP project incorporated these expectations by succinctly focusing and researching the unique culture of the adolescent population, the drug caffeine, and appraise the teenager's health related to caffeine. The DNP Essential III: Organizational and Systems Leadership for Quality Improvement and Systems Thinking, guided the student to develop strategies for managing the ethical dynamics inherent in patient care and research (AACN, 2006). In this project, ethical considerations had to make regarding interactions, treatment, and management the adolescent population. DNP Essential III served as a baseline to develop the ethical principles of respect for person, beneficence, justice.

### **Limitations of Project**

One limitation was the participation group size with 22 of approximately 105 adolescents who took part in this project. Another limitation was the participant's age. Most participants were 17 and 18 years of age, with no adolescents of the ages 13-15 participating in the project, indicating that results are specific to adolescents 17-18 years only.

### **Conclusion**

Caffeine is common in everyday beverage products that older adolescents at Happy Kids Pediatrics office actively seek and partake. This project holds value in providing an introductory conversation about caffeine knowledge and use in adolescents at the Happy Kids Pediatrics. It is the hope of this project leader that future investigational projects will take place to add and expand on adolescent interactivity, knowledge, and use of caffeine to garner a better understanding of this drug in Arizona.

### **OTHER INFORMATION**

#### **Projected Budget**

The projected budget for this DNP project will be minimal. Estimated expenditures on products and services include printed fliers, cost to print questionnaires, cost to print consents, snacks for participants, and the cost for three \$20.00 USD prepaid VISA gift cards of that will be raffled to participants who choose to participate in the raffle (Appendix I).

APPENDIX A:  
SYNTHESIS OF EVIDENCE

Author/Article	Hypothesis/Research Question	Design	Sample (N)	Data Collection (Instruments/Tools)	Findings
<p>Beauchamp, G. A., Johnson, A. R., Crouch, B. I., Valento, M., Horowitz, B. Z., &amp; Hendrickson, R. G. (2016). A retrospective study of clinical effects of powdered caffeine exposures reported to three US poison control centers. <i>American College of Medical Toxicology</i>, 12, 295-300. doi:10.1007/s13181-016-0545-9.</p>	<p>Examine calls regarding powdered caffeine to a convenience sample of poison centers covering Oregon, Alaska, Guam, Utah, and Washington to determine demographics of exposures, reason for ingestion, amount ingested, effects, and outcomes</p>	<p>Retrospective Study of multiple poison control centers.</p>	<p><b>Sample:</b> 40 reported powdered caffeine exposures.</p> <p><b>Male = 28</b> Female = 12 Age &gt;19yrs = 21. Age 13-19 = 3. Age 6-12 = 2. Age 0-5 = 14. Pediatric exposure: 16. Symptomatic = 24. Adult inadvertent OD = 21.</p> <p><b>Setting</b> Poison Control Centers located in Oregon, Alaska, Guam, Utah, and Washington.</p>	<p><b>Data Collection</b> Retrospective chart reviews of Poison Control Centers located in Oregon, Alaska, Guam, Utah, and Washington.</p> <p><b>Data Analysis</b> The National Poison Data System totaled 802 caffeine exposure calls from 1/1/2013 – 06/30/2015. Charts were screened by single study investigator utilizing search terms: “Diet Aid: Phenylpropanolamine and Caffeine,” “Energy Drinks: Ethanol and Caffeine Containing; Energy Drinks: Caffeine Containing,” “Energy Drinks: Caffeine only,” “Caffeine,” “Powdered Caffeine,” and “Anhydrous Caffeine.”</p>	<p>The majority of calls to Poison Control symptoms reported an inadvertent powdered caffeine overdose. Lack of dosing instructions were found and may place patients at risk for overuse or overdose resulting in the need for medical assistance.</p>
<p>Drescher, A. A., Goodwin, J. L., Silva, G. E., &amp; Quan, S. F. (2011). Caffeine and screen time in adolescence: Associations with short sleep and obesity. <i>Journal of Clinical Sleep Medicine</i>, 7(4), 337-342. doi:10.5664/jcsm.1182</p>	<p>To investigate the associations between sleep duration and obesity incidence and risk factors among preadolescents and adolescents</p>	<p>Cross-sectional study</p>	<p>N= 319 Caucasians and Hispanic adolescents ages 10-17 years.</p> <p><b>Setting:</b> Tucson, Az</p>	<p><b>Data Collection</b> Sleep Habit questionnaire, polysomnography, and the Block Kids Physical Activity Screener were utilized to collect data regarding participants.</p>	<p>Hispanic ethnicity and parental reports of TST were found to be the most closely associated with BMI z-score. Decreased TST and increased caffeine intake and</p>

Author/Article	Hypothesis/Research Question	Design	Sample (N)	Data Collection (Instruments/Tools)	Findings
				<p><b>Data Analysis</b> Unpaired t-tests were used on categorical variables. Differences in proportions determined using binomial distribution and <math>\chi^2</math> Pearson correlation coefficients were calculated on all significant characteristics. All statistical procedures were conducted using SPSS 17.0. A significance <math>\alpha</math> level of 0.05 was used for all statistical tests</p>	screen time may result in higher obesity risk in the adolescent population.
Kole, J., & Barnhill, A. (2013). Caffeine content labeling: A missed opportunity for promoting personal and public health. <i>J Caffeine Res</i> , 3(3), 108-113. doi:10.1089/jcr.2013.0017	Current FDA regulation on labelling for added caffeine fails to protect consumers. Caffeine contains inherent harms. Calling for stricter regulation on labels highlighting added caffeine.	Descriptive		<p><b>Data Analysis</b> Review of FDA regulation of caffeine for content labeling.</p>	Consumable products with caffeine need to include caffeine quantity on its label to protect adolescents and enhance consumer knowledge and use.
Kristjansson, A. L., Sigfusdottir, I. D., Frost, S. S., & James, J. E. (2013). Adolescent caffeine consumption and self-reported violence and conduct disorder. <i>Journal of Youth and Adolescence</i> , 42(7), 1053-1062. doi:10.1007/s10964-013-9917-5	Caffeine is positively related with both violent behaviors and conduct disorders.	Cross-sectional study of 10 <sup>th</sup> grade students.	<p><b>Sample</b> N = 3747  Girls = 50.2%  Boys = 49.8%</p> <p><b>Setting</b> Iceland, all Secondary Schools, 10<sup>th</sup> grade only.</p>	<p><b>Data Collection</b> Random students were selected by Icelandic Centre for Social Research and Analysis. Anonymous questionnaires and envelopes were sent to all secondary schools in Iceland for selected students to complete and return sealed envelope to instructor.</p>	Caffeine use among adolescents is strongly related to both violent behaviors and conduct disorder when accounting for differences in background factors, ADHD diagnosis and current medication, and peer delinquency.

Author/Article	Hypothesis/Research Question	Design	Sample (N)	Data Collection (Instruments/Tools)	Findings
				<b>Data Analysis</b> Linear regression with interaction terms for SES, gender, and ADHD symptoms and peer delinquency.	
Mitchell, D. C., Knight, C. A., Hockenberry, J., Teplansky, R., & Hartman, T. J. (2014). Beverage caffeine intakes in the U.S. <i>Food Chem Toxicol</i> , 63, 136-142. doi:10.1016/j.fct.2013.10.042	Objective: estimate caffeine intakes in the U.S. population from the consumption of caffeinated beverages using a current (2010–2011) population-based beverage survey and the Kantar Worldpanel Beverage Survey.	Longitudinal Survey	<b>Sample:</b> N = 37602 Yrs: 2-5, N= 732 Yrs: 6-12, N = 1768 Yrs 13-17, N = 1772 Yrs 18-24, N=1178 Yrs 25-34, N = 4155 Yrs 35-49, N=9128 Yrs 50-64, N=12691 Yrs >65, N= 6178.  <b>Setting</b> USA	<b>Data Collection</b> Multiple Surveys were taken: One-time Beverage Consumption Panel Survey and a Beverage Diary Survey that respondents completed for 7 days. These results compiled the Caffeine database for reference of beverage use and associated mg using USDA Standard Beverage Reference database.  <b>Data Analysis</b> Overall estimates of mean caffeine consumption expressed as mg/day or mg/kg/day. Ages divided from 2 to >65yrs and caffeinated beverages divided into categories.	In 2010-2011 overall mean caffeine intake was attributed to coffee, followed by tea, and soda beverages. Age 50-64 consumed highest concentration of caffeine. Children 2-12 yrs consumption of caffeine increased. Energy drinks, energy shots contributed minimally to total caffeine intake.
Richards, G., & Smith, A. (2015). Caffeine consumption and self-assessed stress, anxiety, and depression in secondary school children. <i>Journal of Psychopharmacology</i> 29 (12), 1236-1247. doi:10.1177/0269881115612404	In secondary school children, what are the associations between caffeine consumption and stress, anxiety, and depression in both males	Longitudinal cross sectional Study	<b>Sample:</b> N = 6394 Site 1 = 2610 completed questionnaire. Site 2 = 2307	<b>Data Collection</b> School Information Management System (SIMS) acquired demographic information regarding students.	Positive relationships exists between total weekly caffeine intake and stress, anxiety, and depression.

Author/Article	Hypothesis/Research Question	Design	Sample (N)	Data Collection (Instruments/Tools)	Findings
	and females?		<p>completed questionnaire. Male = 48.5% Female = 51.5% Age = 11-17 years.</p> <p><b>Setting</b> Three Secondary School Academies. South West England.</p>	<p>Students completed questionnaire at school regarding common dietary foods consumed along with brands of caffeinated beverages consumed.</p> <p><b>Data Analysis</b> SIMS was cross referenced with the questionnaires of weekly caffeine consumption. Linear-by-linear trends were plotted followed by binary logistic regression analyses accounting for covariates.</p>	
<p>Seifert, S. M., Schaechter, J. L., Hershorin, E. R., &amp; Lipshultz, S. E. (2011). Health effects of energy drinks on children, adolescents, and young adults. <i>Pediatrics</i>, 127(3), 511-528. doi:10.1542/peds.2009-3592</p>	<p>Evaluate the health effects of energy drinks on children, adolescents, and young adults.</p>	<p>Systematic Review</p>	<p><b>Sample:</b> N = 121 References</p> <p><b>Setting</b> United States, but European, Canadian, Australian, New Zealand, and Chinese sources are also represented.</p>	<p><b>Data Collection</b> <b>PubMed search. Key terms:</b> “energy drink,” “sports drink,” “guarana,” “caffeine,” “taurine,” “ADHD,” “diabetes,” “children,” “adolescents,” “insulin,” “eating disorders,” and “poison control center” singly or in combination.</p> <p>Search was limited to: limited searches to English-language and foreign-language articles with English language abstract. s and selected articles by relevance to energy drink</p>	<p>1) energy drinks have no therapeutic benefit. 2) FDA regulations shields companies from listing concentrations of caffeine and other stimulant additives 3) Other added ingredients vary, are understudied, and are not regulated. 4) youth-aimed marketing and risk-taking adolescent developmental tendencies combine to increase overdose</p>

Author/Article	Hypothesis/Research Question	Design	Sample (N)	Data Collection (Instruments/Tools)	Findings
				<p>use in children and adolescents.</p> <p><b>Data Analysis</b> Primary literature and media sources selected for review were broken down according to relevance.</p>	<p>potential.</p> <p>5) high consumption is suggested by self-report surveys but is underdocumented in children.</p> <p>6) interactions between compounds, additive and dose-dependent effects, long-term consequences in children remain to be determined.</p>
<p>Seifert, S. M., Seifert, S. A., Schaechter, J. L., Bronstein, A. C., Benson, B. E., Hershorin, E. R., ... Lipshultz, S. E. (2013). An analysis of energy-drink toxicity in the National Poison Data System. <i>Clin Toxicol (Phila)</i>, 51(7), 566-574. doi:10.3109/15563650.2013.820310</p>	<p>Assess the incidence and outcomes of toxic exposures to caffeine-containing energy drinks, including caffeinated alcoholic energy drinks, and to evaluate the effect of regulatory actions and educational initiatives on the rates of energy drink exposures.</p>	<p>Systematic Review of US National Poison Data System</p> <p><b>Setting</b> USA</p>	<p>Total Calls to Poison Control N = 1662</p> <p>Energy Drinks w/alcohol: N= 182</p> <p>Energy Drinks w/o alcohol: N= 1480.</p>	<p><b>Data Collection</b> All closed cases coded as energy drink exposures between 10/01/2010 – 09/30/2011 analyzed.</p> <p><b>Data Analysis</b> Chi-square tests used for comparisons of age, sex, intentional &amp; unintentional exposure, alcohol, adverse effects. Spearman rank-sum used to analyze age differences. Linear model used to eval effects of educational/federal legislation actions on reported incidences. SAS 9.3 statistical software program used.</p>	<p>About half the cases of energy drink-related toxicity involved unintentional exposures by children 6 years old. Educational campaigns and legal restrictions on the sale of energy drinks were associated with decreasing calls to poison centers for energy drink toxicity.</p>

Author/Article	Hypothesis/Research Question	Design	Sample (N)	Data Collection (Instruments/Tools)	Findings
<p>Thakre, T. P., Deoras, K., Griffin, C., Vemana, A., Podmore, P., &amp; Krishna, J. (2015). Caffeine Awareness in Children: Insights from a Pilot Study. <i>J Clin Sleep Med, 11</i>(7), 741-746. doi:10.5664/jcsm.4848</p>	<p>Two main hypotheses:</p> <p>1) Majority of adolescents unaware of caffeine content in common beverages.</p> <p>2) Adolescents may wrongly perceive light-colored or clear drinks do not contain caffeine</p>	<p>Quantitative Study using Survey method.</p>	<p><b>Sample</b> N= 555 Male = 55.5% Female = 44.5% Median Age = 12 years for 7<sup>th</sup> grade, 13 years for 8<sup>th</sup> grade</p> <p><b>Setting</b> Cleveland, OH, Middle School</p>	<p><b>Data Collection</b> Two questionnaires were utilized and administered during classroom hours. 1) Caffeine Literacy and Sleep Study (CLASS) questionnaire 2) Cleveland Adolescent Sleepiness Questionnaire (CASQ)</p> <p><b>Data Analysis</b> Statistical Analysis utilizing SPSS software (version 22.0). <i>t</i> test to eval between group comparisons was utilized. Significance level was set to 0.05. And Proportions were compared using Chi-square test.</p>	<p>Lack of knowledge about caffeine content of particular drinks was noted in seventh and eighth graders of both sexes with nearly 29% unaware that their favorite drinks contain caffeine and more than 50% unable to correctly identify the drinks with the most caffeine.</p>
<p>Zarychta, K., Mullan, B., Kruk, M., &amp; Luszczynska, A. (2017). A vicious cycle among cognitions and behaviors enhancing risk for eating disorders. <i>BMC Psychiatry, 17</i>(1), 154. doi:10.1186/s12888-017-1328-9</p>	<p>Investigate relationships between perceived parental behaviors (dietary behaviors, physical activity, and verbal pressure) and changes in adolescents' body mass index (BMI) were mediated by adolescents' physical activity and dietary behaviors.</p>	<p>Longitudinal Study</p>	<p>N = 250 overweight or obese adolescents at T1.</p> <p>N= 150 adolescents at T2 (2mo. Later)</p> <p>N= 108 adolescents at 12.9mo. from</p>	<p><b>Data Collection</b> Data were collected three times, with a 2-month interval between Time 1 (T1) and Time 2 (T2), and a 13-month interval between T2 and Time 3 (T3) in the group of adolescents (N ¼ 100) aged 13e19.</p> <p><b>Data Analysis</b> SPSS version 2.2. Mediation analyses</p>	<p>Perceived parental modeling of healthy diet and frequent physical activity, but not verbal pressure, predicted adolescents' behaviors (diet, physical activity, and a combined lifestyle index) and, in turn, a reduction in their BMI.</p>

<b>Author/Article</b>	<b>Hypothesis/Research Question</b>	<b>Design</b>	<b>Sample (N)</b>	<b>Data Collection (Instruments/Tools)</b>	<b>Findings</b>
			T1). <b>Setting:</b> Central and Eastern Poland	utilizing PROCESS were conducted.	

APPENDIX B:  
SITE AUTHORIZATION



**happy kids** *pediatrics*

1345 E. Main Street Suite #201  
Mesa, Arizona 85203  
Phone (480) 888-0081  
Fax (480) 888-0088

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September 10, 2019

University of Arizona Institutional Review Board  
C/O Office of Human Subjects  
1618 E Helen St  
Tucson, AZ 85721

Please note that Ms. Amy Mandile, UA Doctor of Nursing Practice student, has permission of the Happy Kids Pediatric Clinic to conduct a non-experimental descriptive study at our facility for her project, "Knowledge Deficits of Caffeine Amongst Adolescents in Metropolitan Phoenix."

Ms. Mandile has been granted permission to access the clinic site, speak to the primary care staff, and provide a paper questionnaire to adolescent patients for the project titled, "Knowledge Deficits of Caffeine Amongst Adolescents in Metropolitan Phoenix." The study will be physically conducted at the health clinic located 1311 E. Thomas Rd, Phoenix, Arizona 85014.

Ms. Mandile's activities will be completed by December 31, 2019.

I understand that Ms. Mandile will obtain review and approval from the University of Arizona IRB for Fall 2019 prior to conducting this study.

If there are any questions, please contact my office at (602) 322-1315.

Signed,

  
Roman Carrasco, CEO

APPENDIX C:  
DISCLOSURE FORM

KNOWLEDGE DEFICITS OF CAFFEINE AMONGST ADOLESCENTS IN  
METROPOLITAN PHOENIX

**By Amy Mandile, BSN-RN, DNP-FNP Candidate**

The purpose of this project is to evaluate the knowledge deficits adolescents, aged 13-18 years have concerning common caffeine containing beverage products that they consume on a regular basis.

If you choose to take part in this project, you will be asked to take a 10-item prequestionnaire, listen to a 5-minute education session on caffeine, and then perform a 3-item post questionnaire. It will take approximately 10 minutes to complete this pre and post questionnaire. There are no foreseeable risks associated with participating in this project and you will receive no immediate benefit from your participation. Survey responses are anonymous.

If you choose to participate in the project, participation is voluntary, refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw at any time from the project. In addition, you may skip any question that you choose not to answer. By participating, you do not give up any personal legal rights you may have as a participant in this project.

For questions, concerns, or complaints about the project, you may call Amy Mandile, BSN-RN, DNP-FNP Candidate at 480-392-5686 or [a4mymandile293@email.arizona.edu](mailto:a4mymandile293@email.arizona.edu).

APPENDIX D:  
RECRUITMENT FLYER



## Teenagers Invited to Participate!

Looking at what you know about caffeine.

### **Participating is Easy as 1,2,3**

1. Starting December 2<sup>nd</sup> – December 9<sup>th</sup>, 2019, if you're a teenager between the ages of 13-18 years of age, you're invited to participate in a project to evaluate what you know about caffeine.
2. Participants will fill out a 10-item pre-questionnaire, sit down for a quick 5-minute information session about caffeine, and then apply their new knowledge to a small 3-item post-questionnaire.
3. Once you complete the questionnaires, you will be entered to win 1 of 3 \$20 VISA Gift cards! Every teenager that chooses to participate will automatically receive a healthy snack pack upon completion!!

---

This Project is being conducted by Amy Mandile, BSN-RN, a Nurse Practitioner student with the University of Arizona.

APPENDIX E:  
STAFF INSTRUCTIONS AND SCRIPT

## Staff Instructions & Script

- Assist with your other duties first such as checking the patient in, handing out any forms related to the office visit.
- Before patient/parent sits down to fill out other paperwork or wait to be called into their visit ask if they would like to participate.

Staff Script: Would *[patient name]* like to participate in a voluntary project on caffeine knowledge?

Staff Script: It involved a quick 5-minute pre-questionnaire followed up by the Nurse Practitioner student sitting down with you for some education on caffeine and post-questionnaire.

Staff Script: You will be entered to win 1 of 3 \$20 VISA gift cards when and a healthy snack pack when completed.

Thank you for your assistance in the completion of this project!

APPENDIX F:  
PRE-EDUCATION CAFFEINE QUESTIONNAIRE

### Caffeine Questionnaire

The information will be used for study purposes and all of your answers are private. No one else will see them. By answering the questions, you are agreeing to let me use this information in the study. Thank you for completing the questionnaire.

1. How old are you? \_\_\_\_\_.
2. What Grade Level are you currently in? (please circle one)
  - a. 7<sup>th</sup> Grade
  - b. 8<sup>th</sup> Grade
  - c. 9<sup>th</sup> Grade
  - d. 10<sup>th</sup> Grade
  - e. 11<sup>th</sup> Grade
  - f. 12<sup>th</sup> Grade
3. Identified Sex: (please circle one)
  - a. Male
  - b. Female
  - c. Other
4. What is caffeine? (please circle one)
  - a. Stimulant (makes you more awake)? \_\_\_\_\_
  - b. Depressant (makes you tired)? \_\_\_\_\_
  - c. Vitamin? \_\_\_\_\_
  - d. Other \_\_\_\_\_

5. Do you drink beverages/soda/pop or eat food that contains caffeine?

\_\_\_\_\_YES

\_\_\_\_\_NO

\_\_\_\_\_I DO NOT KNOW

6. Why do you drink caffeine? (select all that apply).

- a. Makes me more awake
- b. Helps me to focus
- c. Makes me feel relaxed
- d. Makes me feel like I fit in with friends/family
- e. I don't know
- f. I like the way it makes me feel
- g. Tastes Good
- h. Other reason:\_\_\_\_\_

7. What time of day do you have a caffeinated drink? (check all that apply)

Morning

Afternoon

Night

8. When I drink caffeine, I have trouble sleeping.

True

False

9. These drinks have caffeine (please circle all that apply).
- a. Energy Drinks (Monster, Red Bull, energy shots, RockStar)
  - b. Soda (Coca-Cola, Pepsi, Dr. Pepper, Mt. Dew, etc.).
  - c. Hydration Drinks (Power-aid, Gatorade, Vitamin water)
  - d. Water
  - e. Coffee Drinks
  - f. Chocolate flavored drinks
  - g. Tea
10. Drinks that have caffeine can lead to diabetes and/or obesity.

TRUE

FALSE

APPENDIX G:  
EDUCATION INFORMATION SESSION

## Education Information Session

## Caffeine: What is it?

- It's a drug known as a stimulant. This means it "wakes up" the body and brain.
- Caffeine is a drug that is found naturally and is also man-made.
- Naturally found in foods like coffee, cocoa beans, and tea.
- Man-made powder added to drinks like Sodas, Energy Drinks, and Energy Shots.




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## How Does Caffeine Affect Me?

- Caffeine is a stimulant. Meaning it "wakes up" the body and brain.
- Caffeine can also affect your sleep by keeping you awake.
- Caffeine can also affect your heart, making you feel like it's "racing".
- Caffeine can also make you feel anxious.
- When caffeine is added to items like sugary sodas, coffees, and energy drinks you're more likely to gain unnecessary weight.

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## How much caffeine is safe to consume?

- Our Canadian neighbors do recommend no more than 2.5mg/kg of body weight per day
- WHAT DOES THAT MEAN?
- This means if you are a teenager 13-18 years old and you weigh 150 lbs. you can have roughly 170mg of caffeine per day.
- BUT....WHAT DOES THAT MEAN???
- This means you can have 1 Grande sized Caramel Macchiato from Starbucks.
- 1 Grande sized Starbucks Caramel Macchiato = 150mg caffeine.

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# Now What?!!

Okay. Now What?

- Deciding to have caffeine in your diet is a personal choice.
- If you do drink or eat food with caffeine, limit your caffeine everyday.
- Don't eat/drink caffeine past noon to prevent trouble sleeping.
- Decrease or stop drinking caffeine if you feel your heart beating too fast or "skipping beats" and/or if you're feeling anxious.

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(This is where you can look at the same info I did.)

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APPENDIX H:  
POST-EDUCATION CAFFEINE QUESTIONNAIRE

### Post Questionnaire

The information will be used for study purposes and all of your answers are private. No one else will see them. By answering the questions, you are agreeing to let me use this information in the study. Thank you for completing the questionnaire.

1. What is caffeine? (please circle one)
  - a. Stimulant (makes you more awake)
  - b. Depressant (makes you tired)
  - c. Vitamin
  - d. Other\_\_\_\_\_
2. These drinks have caffeine (please circle all that apply).
  - a. Energy Drinks (Monster, Red Bull, energy shots, RockStar)
  - b. Soda (Coca-Cola, Pepsi, Dr. Pepper, Mt. Dew, etc.).
  - c. Hydration Drinks (Power-aid, Gatorade, Vitamin water)
3. These drinks have caffeine (please circle all that apply).
  - a. Water
  - b. Coffee Drinks
  - c. Chocolate flavored drinks
  - d. Tea

APPENDIX I:  
PROJECTED BUDGET

## Projected Budget

<b>Expense Items</b>	<b>Projected Cost</b>
<b>Printed Flier</b>	\$2.00
<b>Printed Questionnaires</b>	\$16.00
<b>Printed Disclosures</b>	\$4.00
<b>Snacks</b>	\$60.00
<b>3 VISA Gift Cards</b>	\$60.00
<b>Total</b>	\$142.00

APPENDIX J:  
THE UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD APPROVAL  
LETTER



Human Subjects  
Protection Program

1618 E. Helen St.  
P.O. Box 245137  
Tucson, AZ 85724-5137  
Tel: (520) 626-6721  
<http://hgw.arizona.edu/compliance/home>

**Date:** November 26, 2019

**Principal Investigator:** Amy Michelle Mandile

**Protocol Number:** 1910101088

**Protocol Title:** KNOWLEDGE DEFICITS OF CAFFEINE AMONGST  
ADOLESCENTS IN METROPOLITAN PHOENIX.

**Determination:** Human Subjects Review not Required

**Documents Reviewed Concurrently:**

**HSPF Forms/Correspondence:** *2019-10-11 IRB Determination College of Nursing - Mandile.pdf*

**Other Approvals and Authorizations:** *Mandile\_DNP Project\_Site Auth\_Signed.pdf*

**Regulatory Determinations/Comments:**

- Not Human Subjects Research as defined by 45 CFR 46.102(e): as presented, the activities described above do not meet the definition of research involving human subjects as cited in the regulations issued by the U.S. Department of Health and Human Services which state that "Human subject means a living individual about whom an investigator (whether professional or student) conducting research: (i) Obtains information or biospecimens through intervention or interaction with the individual, and uses, studies, or analyzes the information or biospecimens; or (ii) Obtains, uses, studies, analyzes, or generates identifiable private information or identifiable biospecimens. "

The project listed above does not require oversight by the University of Arizona.

If the nature of the project changes, submit a new determination form to the Human Subjects Protection Program (HSPF) for reassessment. Changes include addition of research with children, specimen collection, participant observation, prospective collection of data when the study was previously retrospective in nature, and broadening the scope or nature of the study activity. Please contact the HSPF to consult on whether the proposed changes need further review.

The University of Arizona maintains a Federalwide Assurance with the Office for Human Research Protections (FWA #00004218).

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