UNIVERSITY OF CAPE COAST

PREVALENCE OF USE AND PERCEIVED IMPACT OF ENERGY DRINK CONSUMPTION BY SENIOR HIGH SCHOOL STUDENTS IN THE GA SOUTH DISTRICT OF GREATER ACCRA REGION

JANET YAA BEKOE

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BY

JANET YAA BEKOE

Thesis submitted to the Department of Health, Physical Education and Recreation of the College of Education, University of Cape Coast, in partial fulfilment of the requirements for award of Master of Philosophy Degree in Physical Education

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature …… Date…….

Name: Janet Yaa Bekoe

Supervisors' Declaration

We hereby declare that the preparation and presentation of this thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature:…… Date:……..

Name: Prof. Joseph Kwasi Mintah

Co-Supervisor's Signature:…… Date:……

Name: Dr. Charles Domfeh

ABSTRACT

The dual purposes of this study were to find out the extent of energy drink usage and its perceived impact. The study used the survey design in the Ga South District of Greater Accra Region. A total of 584 students from Odorgonno Senior High School, Ngleshi Amanfro Senior High School and Christian Methodist Senior High School participated in the study. A researcher generated questionnaire (JED-Q) was used for the study. A cronbach alpha reliability of .73 was obtained. In general, the overall consumption of energy drink was 273(46.7%). The three most consumed energy drinks were lucozade, blue jeans and gluconade. In addition, 269(46.1%) and 213(36.5%) of the study participants believed that energy drinks helped to improve performance during sports competitions, 252(43.2%) and 121(20.7%) agreed that they reacted more quickly when they consumed energy drinks, 215(36.8%) and 277(47.4%) consumed energy drinks because it gives them energy and 119(20.4%) and 262(44.9%) felt more alert when they consumed energy drinks. Also, 342(58.62%) had low knowledge while 242(41.38%) had high knowledge on energy drinks. Factors predicting energy drink consumption were taste = t (1,582) = 18.91, $p < .05$ (49%), accessibility = t (1,582) = 17.70, $p < .05$ (46%) and advert = t (1,582) = 5.54, $p < .05$ (13%). There was a significant difference in the energy drink consumption on gender χ^2 (1) = 6.08 $p < 0.05$. Also, sports player and non-sports players differed significantly in their energy drink consumption.

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DEDICATION

To my family.

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CHAPTER ONE

INTRODUCTION

Background to the Study

According to Smith, Fukuda, Kendall and Stout (2010), research into product specificity such as energy drink has become an important facet and an area of great concern. This is due to the composition of ingredients that make up the final product and the effects that these individual constituents of the product have on the organs of the human body as well as the health implications after consumption. One product that finds itself on the global and local market is the energy drink. Research indicates that energy drinks are the most popular dietary supplements apart from multivitamins particularly in the young adult population (Campbell et al., 2013). Since the 1960s, the market for energy drink has grown exponentially into a multibillion-dollar business. Again, it is the fastest growing sector in the beverage industry (Agriculture and Agri-Food Canada, 2008) holding a functional market share of 47.3% globally (Datamonitor, 2008).

Energy drink is a beverage made of caffeine with other combined ingredients such as taurine, guarana and B-vitamins and aims at providing extra energy for its consumers (Heneman, 2010). Energy drinks are soft drinks that limit or reduce fatigue, aid physical performance, enhance disposition and improve cognitive performance (Hagan & Buxton, 2012).

Energy drinks contain caffeine and is made to provide a short boost or aid alertness (Pennay & Lubman, 2012). Examples of brands of energy drinks are red bull, blue ox, power house, atomic energy, monster, rockstar, no fear, bookoo energy, cocaine energy drink, jolt cola, whoop ass, full throttle, rox, NOS, blue jeans, lucozade, gluconade, spike, Amp, venom, impulse, XS citrus blast, sobe adrenaline rush, dark dog, shark, EAS piranha, AMO, red rain, red dragon, diablo and burn (Hagan & Buxton, 2012; Reissig, Strain & Griffiths, 2009; Heidemann, Urquhart & Briggs, 2005; Schmidt, Lindsey, Caldwell & Hallman, 2008). Red bull, rockstar, monster and full throttle are the leading brands in the energy drink industry in the United States (Capps & Hanselman, 2012).

Energy drink began in Japan when Taisho pharmaceuticals released a drink named lipovitan D (Penalty, 2006). In 1960, the beverage energy drink first appeared in Europe and Asia but was not well known. The first energy drink to reach the US market was projected as a soft drink known as jolt cola. In 1980, jolt cola, which had a lot of sugar and caffeine, became a companion on many campuses (Retelny, 2007). The brand red bull was introduced onto the Austrian market in 1987 as the most popular brand. This brand happens to be the well-known brand. The red bull brand was introduced onto the US market 10 years later in 1997. Over 500 new brands of energy drinks circulated around the world by the year 2006 (Pennay & Lubman, 2012; Johnson, Voss & Turrisi, 2006).

Globally, 47.3% of the overall market shares is purported to be held by the energy drink beverage (Heckman, Sherry & De Mejia, 2010). Sales for energy drinks were over $500 million per annum only in the US with market

shares of 62.2% (Miller, 2008) with worldwide sales of $5.4 billion in 2006 (Packaged Facts, 2007). Today, the world abounds in over 2000 new products of energy drink (Oddy & O'Sullivan, 2009).

Energy drinks are made of different ingredients and herbal constituents in different proportions and quantities. Ingredients found in energy drinks are caffeine, sugar, carbohydrate, taurine, guarana, ginseng, glucose, riboflavin, sodium, pyridoxine, B-vitamins, gingko biloba, nicotinamide, green tea extract, yerba mate, inositol, citicoline, Beta alanine, quercetin, tyramine, yohimbine, vipocetine, synephrine, d-ribose, l-carnitine and citrulline malate (Campbell et al., 2013; Hagan & Buxton, 2012; Alsunni & Badar, 2011; Pomeranz, Munsell & Harris, 2013). Taurine, riboflavin, niacin, vitamins B-12, B-6 and B-2 abound in most energy drinks. While the importance of some of these vitamins to healthy living is undoubted, it would be best and more appropriate to put them in the form of a balanced diet than in the form of an energy drink (Paddock, 2008).

The primary concern for the use of energy drink revolves around the most active ingredient called caffeine, which is commonly used in the production of energy drinks in different quantities (Campbell et al., 2013). Caffeine, when consumed in high quantity has the ability to reduce insulin sensitivity, affect ones mental focus and level of concentration and also has the ability to affect the exercise and energy levels (Hagan & Buxton, 2012; Campbell et al., 2013). An energy drink of a single serving of eight to 12-oz has caffeine content ranging from 72 to 150-mg. Many bottles have 2-3 servings, which increase the caffeine content to 294-mg per bottle. Many adverse effects linked with the use of caffeine in different quantities have been

reported. In view of the above, consumption of energy drinks by pregnant women, nursing mothers, adolescents, and children is not recommended (Heneman, 2010).

Most people are not aware of the effects of caffeine when it is mixed with other products in energy drink or the content level of caffeine in various brands. For example, guarana and ginseng are stimulants that are mostly added to the energy drink beverage to aid the effect of caffeine (Heneman, 2010). One gram of guarana is equivalent to 40-mg of caffeine and may substantially increase the total amount of caffeine in an energy drink (Yunusa & Ahmed, 2011). Ginseng has the ability to make the effect of caffeine stronger, resulting in excessive sweating, nervousness and irregular heart beat (Heneman, 2010). Additives such as gingko biloba, taurine, amino acid and ginseng in combination with caffeine have been shown to have effects on the nervous and cardiovascular systems (Russo, 2011; Torbey, 2011; Franks, 2012; Rath, 2012).

The ingredient taurine in the red bull brand and other brands is another ingredient extensively used in energy drinks. Naturally, the human body has its own way of supplying taurine during metabolism (Paddock, 2008). In a day, 60-mg of taurine is produced (Laquale, 2007). But a single serve of red bull energy drink has 1000-mg of taurine. This makes the ingredient a controversial one even though research has it that taurines effect is limited. Perhaps, this is the reason why the red bull brand has not been accepted in many countries. Claims have been made in association with this ingredient being the cause (Paddock, 2008).

Another ingredient found in most energy drinks is sugar. Some energy drinks have extremely high amounts of sugar contents (up to a quarter of a cup in each serving of can). A high amount of sugar makes the energy drink calorific and has the potential of preventing fluid absorption (Hagan & Buxton, 2012). This can impede rehydration particularly in high concentration and can cause gastrointestinal distress (Van Nieuwenhoven, Brouns & Kovacs, 2005). According to the USDA dietary guidelines, sugar should be limited in our daily diets (Heneman, 2010). In most second cycle schools particularly for the resident students, beverages such as tea, oat and porridge made of different ingredients are served in the morning as breakfast of which sugar is often added. Students who will take an additional energy drink will have their sugar levels increased particularly for sedentary students.

> The World Health Organization (WHO) has a dietary goal, which seeks to promote and protect health through healthy eating and physical activity. The dietary goal, Global Strategy, has four main global strategy concerns; (1) reduce the risk of chronic diseases that stem from unhealthy diets; (2) increase awareness and understanding of the influences of diet and physical activity on the health and the positive impact of preventive interventions; (3) develop, strengthen and implement global, regional and national policies and action plans to improve diet; (4) monitor science and promote research on diet and physical activity (WHO, 2004, p. 23).

These objectives of WHO raise health concerns about the consumption of energy drinks. It is therefore expedient that every country put measures in place to meet the desired aims of healthy living through healthy eating.

Young adolescents and athletes are the major targets of energy drink producers' campaign (Asma & Jawaid, 2012). Energy drink companies use the cross-promotional mechanism to reach their consumer base (Agriculture and Agri-Food Canada, 2008). Before competitions, students consume this beverage with the sole aim of improving performance. In addition, a large number of students also consume it while studying for their exams to manage their stress levels (Asma & Jawaid, 2012). A survey conducted by Substance Abuse and Mental Health Services Administration (2011) in 16 countries indicated that boys drink more energy drinks than girls. In addition, 37% take energy drink while at home, 27% drink to achieve physical activity benefits and 20% take energy drinks at parties. Furthermore, 60% take energy drink because of the taste, while 30% use it to replenish lost energy. Energy drink popularity and the level of growth in its consumption by adolescents and young adults have brought some worries concerning the health and wellbeing of the adolescents who are not aware of the contents of energy drinks (Rath, 2012).

The market for energy drinks is increasing, as new products are developed to accommodate the needs of women, body builders and extreme sports enthusiast for various purposes. For example, Del Monte Foods, a production firm in 2007, produced its first product called Bloom energy purporting it to be solely for women. In addition, lucozade sport and revenge sport are energy drinks developed with the athlete in mind to boost or elevate physical performance and lower fatigue in endurance performance. Energy fizz developers caught the eye of their consumers through a different marketing strategy. They projected the drink by packaging it in a powdered

form, which is mixed with water before consumption for the needed effect. This is called on-the-go drink in the energy drink family. Other energy drinks are produced with aesthetic qualities, which are natural, gluten-free and diabetic or vegetarian friendly (Heckman et al., 2010). A wide range of pre-packed alcoholic energy drinks, have recently sprang up on the markets (Jones, Berry & Barrie, 2009). A growing proportion of young adults over the world combine energy drinks with alcoholic beverages (Brache & Stockwell, 2010; O'Brien, McCoy, Rhodes, Wagoner & Wolfson, 2008; Oteri, Salvo, Caputi & Calapai, 2007). The main effects associated with energy drink in combination with alcohol include wakefulness and alertness. In addition, the feeling of intoxication is also masked leading to a high consumption of alcohol over extended periods. The consequences include alcohol poisoning, impaired judgments, making poor decisions, engaging in risky sexual behaviours, violence and severe hangovers (Brache & Stockwell, 2010; O'Brien et al., 2008; Marczinski & Fillmore, 2006; Jones, Berry & Barrie, 2009; Ferreira, De Mello, Pompeia & Oliveira De Souza-Formigoni, 2006).

The Substance Abuse and Mental Health Services Administration (2011) has reported that emergency visit involving energy drink use from 2007 to 2011 doubled from 10,068 to 20,783 with more male patients than females in the United States of America. Further, patients aged between 18 to 35 years were the people who frequently visited the emergency facility. As a result, a group of doctors, researchers and public health experts suggest that some measures should be put in place to help protect children, adolescents and young adults from the possible risk of consuming high amounts of caffeine from energy drinks. They are also of the view that the levels of caffeine in

energy drink have the ability to pose serious potential health hazards. The consumption of beverages that abounds in high sugar content is an established public health concern with the emergence of energy drink as an independent risk for adolescents (Pomeranz et al., 2013). Owing to the increased reported cases as a result of the consumption of energy drinks, Germany has started tracking energy drink related cases while America has recently given unique reporting codes on all cases that are reported as a result of energy drink consumption (Bronstein et al., 2008; Starling, 2011).

Some researchers at the University of Maryland School of Public Health also believe that energy drink consumption has the ability to pose great threats to the individuals' health care. According to them, the consumption of energy drink is significantly injurious for three reasons. Caffeine has been related with serious health consequences in susceptible individuals. Secondly, the culture of mixing energy drinks with alcohol results in drinking high amounts of alcohol during a drinking spree with alcohol related effects such as sexual assault. Thirdly, adjustments for confounders for heavier drinking styles, the consumption of energy drink might encourage alcohol dependency and a possible adoption of nonmedical prescription for drug use (Arrie & O'Brien, 2011).

Another concern about energy drinks consumption is with the labelling and importation of energy drinks into countries by individuals, groups and companies. Most developed countries have regulations pertaining to the content and label of energy drinks that could be imported. Canada supports energy drink with clear specifications and directives concerning the amount of medicinal and non-medicinal ingredients as well as warning statements clearly

outlined on energy drink labels (Paddock, 2009). The regulation of Food and Drug Administration of America has certain requirements for beverages which are labelled as energy drinks. But most producers of energy drinks do not label their products as beverages. In addition, some label their products as dietary supplements (Pomeranz et al., 2013). However, warning recommendations are illustrated on the labels (Paddock, 2008). This turn of event is quite worrying since developing countries like Ghana do not have any regulation to control the inflow of energy drinks (Hagan & Buxton, 2012). This raises a lot of concern.

Ghana as a country has traces of some energy drinks sold on its market. A study by Mwaawaaru (2009) on the marketing strategy in terms of promotion and communication for energy drink in Ghana indicates that import volumes and annual import values into the country in 2008 was at 14,825,500kg with a worth of $11,549,783.77. Most of the energy drinks in Ghana come from Belgium, Germany, Netherlands, Thailand and United Kingdom. The quantity of imported energy drink supports the belief that the Ghanaian society is entangled in the energy drink mince.

Unfortunately, energy drink usage and sales are not under any strict regulations in Ghana (Hagan & Buxton, 2012). Thus, individuals and groups importing these beverages into the country are not under any strict bond. The youth including students are therefore exposed to these drinks anywhere and anytime. This explains why most local shops, grocery stores, food courts, gas stations, clubs and shopping malls indulge in the sale of the product openly (Asma & Jawaid, 2012). Other places for the sales include, drinking bars and super markets.

Energy drink consumption is a common practice among University athletes in Ghana. A survey conducted on selected athletes from seven public Universities in Ghana revealed that 62.2% reportedly took one can of energy drink to put back the energy that they have expended during a competition (Hagan & Buxton, 2012). In most second cycle schools, students who compete in various sports are seen openly holding different brands of energy drinks.

Statement of the Problem

The health status of everybody in a country is particularly important for people who participate actively in sports and those who do not. Students are no exception since they will grow to become the work force of every nation. What we eat has so much impact on our health conditions individually (Dixey et al., 2006). There have been reported cases of diseases and even death because of the excessive use of energy drink (Schmidt et al., 2008). Students are one group of the population who are exposed to some health conditions based on the intake of energy drink. The students' vulnerability to energy drink commercials, sale outlets, and other factors can promote an increase intake among them. However, there is no documentation about the prevalence, type, knowledge and factors promoting the consumption of these drinks among the school-going adolescents in the Ga South District of Greater Accra Region in Ghana. In most second cycle schools in Ghana, students who compete in various sports are seen openly holding different brands of energy drinks. The impression is that, these energy drinks help them to perform better during participation.

Purpose of the Study

The dual purposes of this study were to find out the extent of energy drink usage and the perceived impact it has on students in the Ga South District of the Greater Accra Region.

Research Questions

The following research questions guided the study;

1. What brand of energy drink do students of senior high school consume?
2. What is the frequency of energy drink consumption among senior high school students?
3. What is the perceived impact of consuming energy drink by senior high school students?
4. What is the level of knowledge of senior high school students about energy drinks?
5. Do males and females differ in their energy drink consumption?
6. Do sports players and non-sports players differ in the consumption of energy drink?
7. What factors influence energy drink consumption among senior high school students?

Hypotheses

The following hypotheses also guided the study;

1. Males and females differ in their consumption of energy drink.
2. Sports players consume more energy drinks than non-sports players.

Significance of the Study

The health and health status of students should be of great concern to parents and other stakeholders because it influences academic performance.

Findings from this study will contribute to the knowledge base about energy drink usage among adolescents in Ghana. Additionally, the result of these findings will help the Food and Drugs Board and other relevant authorities to make informed decisions about energy drink usage in Ghana.

Delimitations of the Study

The study was delimited to students of Christian Methodist Senior High School, Odorgonno Senior High School and Ngleshie Amanfro Senior High School in the Ga South District of Greater Accra.

Limitations of the Study

The multi-stage sampling method was used to select participants for the study. The participants were not necessarily the representation of all students in the Greater Accra Region.

Definition of Terms

Stimulants: A chemical agent that temporarily arouses or accelerates physiological or organic activity (Riddle, Fleckenstein, & Hanson, 2005).

Calorific: Is a measure used to quantify the energy in foods or the energy expended by the body (Berger, & Alford, 2009).

Dietary: Food and drink regularly provided or consumed for habitual nourishment (Brown, Ryder, & Nadeau, 1993)

Supplement: Something added especially to make up for a deficiency or make it complete (Capps, & Hanselman, 2012).

Irritability: A common symptom of anxiety that creates an excessive physiological response to stimuli (Carrillo, & Benitez, 2000).

Organization of the Study

The rest of the study was organized under chapters two, three, four, five, references and appendices. The literature review was addressed in chapter two under the following heading,

1. Historical and Market Overview of Energy Drinks
2. Prevalence of Energy Drink and Consumption
3. Differences and Similarities between Energy Drinks and Sports Drinks
4. Content of Energy Drinks
5. The Effects of Energy Drinks
6. Factors Influencing Energy Drink Consumption
7. Types of Energy Drinks
8. Theoretical Framework
9. Summary

The chapter three, which is the methodology, also focused on the research design, population, sample and sampling procedure. Other areas under the chapter that the research focused on were the research instrument used in data collection, reliability and validity of the instrument, pilot test, data collection procedures and data analysis plan. Chapters four and five dealt with the results and discussion, summary, conclusions and recommendations. A list of cited authors was outlined as well as the appendices.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

The consumption of energy drinks by adolescents has been of great concern based on the safety and efficacy of these drinks (Campbell et al., 2013). The purposes of this study were to explore the extent of energy drink usage and its perceived impact on senior high school students in the Ga South District of Greater Accra Region. The literature for the study was organized under the following sub-headings;

1. Historical and Market Overview of Energy Drinks
2. Prevalence of Energy Drink and Consumption
3. Differences and Similarities between Energy Drinks and Sports Drinks
4. Content of Energy Drinks
    a. Caffeine
    b. Carbohydrate
    c. Sugar
    d. Guarana
    e. Taurine
    f. Ginseng
    g. Inositol
    h. Yerba Mate
    i. B-Vitamins
    j. Sulphur

k. Glucuronolactone

l. L-Carnitine

m. Ginkgo Biloba

5. The Effects of Energy Drinks

a. Physiological Effects

b. Cognitive effects

6. Factors Influencing Energy Drink Consumption

a. Energy Drink Commercials and advertisement

b. Availability and Accessibility

c. Knowledge and Perception

d. Physical Activity Level

e. Taste

7. Types of Energy Drinks

a. Red Bull

b. Rox

c. Monster

d. Lucozade

e. Blue Jeans

f. Rockstar

g. Burn

h. Power Horse

8. Theoretical Framework

9. Summary

Historical and Market Overview of Energy Drinks

The history of the evolution of energy drink dates back to1901. It first originated from Scotland with the name Iro-Bru (Madiha, Sidra & Hajra, 2012). In the early 1960 in Japan, an energy drink known as Gatorade was manufactured to improve the performance of athletes and sports stars in University of Florida particularly the football team. The drink was designed to enhance hydration and prolong performance levels. In 1962, a Japanese company, by name Taisho Pharmaceuticals, launched lipovitan-D energy drink. Lipovitan- D contains B-vitamins, taurine, and ginseng, which are common constituents of the mainstream energy drink (Taisho Pharmaceuticals, 2009).

In 1980, in the United Kingdom, lucozade energy was manufactured to aid the recovery of patients in hospitals. However, the drink was promoted as an energy drink in 1980 with the aim of replenishing lost energy. In 1985, jolt cola energy drink was introduced in the United State of America (Higher Education Centre for Alcohol, Drug Abuse and Violence Prevention, 2010). Most energy drinks were lunched unto the global market in 1987. Since then, energy drink growth from that time has been enormous (Finnegan, 2003). In 1995, a major United State beverage company produced josta energy drink. But the production of this drink was discontinued in 1999 (Bolen, 2012).

In Europe in 1997, Spitz Company circulated power horse energy drink. In that same year in Europe, an Austrian entrepreneur known as Dietrich Mateschitz also pioneered red bull energy drink and ensured that it became the best-selling energy drink worldwide. Mateschitz developed the red bull energy drink on Krating Daeng, a Thai drink. In the year 2001, the Coca-

Cola company produced two powerade energy drinks in aluminum bottle cans. The use of the aluminum cans promoted by CCCL Container and Mistic Brands, Incorporation through the national lunch Mistic RE energy drink adopted the use of a recycled aluminum bottle. Since this introduction, many energy drinks are presented in aluminum cans. This trend led to the introduction of bigger can sizes in 2002 (Grosz & Szatmari, 2010). The energy drink market grew over 400% between the years 2003 and 2007 (Howard & Marczinski, 2010). Highlighting the enormity of this industry, 1.5 billion cans of Red Bull were sold in the United States in 2004 (Agriculture and Agri-Food Canada, 2008).

In 2007, energy drinks were produced in a powdered form and effervescent tablets which are added to water. It produces a more portable option to cans. Internationally in 2007, Thailand was reported as the highest per capita consumer of energy drinks of different brands. Additionally, Austria, Ireland, New Zealand, Slovenia and Kuwait were the seven highest consumer of energy drink (Pomeranz et al., 2013). In both 2010 and 2011, energy drinks showed the strongest growth in the top 10 consumable packaged goods grocery item category. Sales increased by 13.3% in 2010 over 2009, and by 16.7% over 2010 (Symphony IRI Group, 2012).

Prevalence of Energy Drink and Consumption

About 2000 brands of energy drinks can be found in over 140 countries (Oddy & O'Sullivan, 2009). Energy drinks are the most common dietary supplement apart from multivitamins among the population of young adults (Campbell et al., 2013). Caffeine intake through the consumption of energy drink and coffee has risen dramatically over the last ten years

(Mcilvain, Norland & Bickel, 2011) since erengy drinks are available to people particularly the youth. Initially, energy drinks main consumers were athletes. The market for energy drinks has grown and expanded exponentially into other niches of the markets. Today's market for majority of the energy drinks that are produced are targeted at young adults who are between the ages of 18 and 34 as well as teenagers (Heckman et al., 2010).

According to Seifert, Schaechter, Hershorin and Lipshultz (2011), 30% to 50% of adolescents and young adults consume energy drinks. Furthermore, 31% of 12-17 years consume energy drinks regularly. In the United States, some studies about caffeinated energy drink consumption of the adolescent averages between 60 to 70-mg/day which ranges up to 500-mg/day. Furthermore, energy drink consumption by children, adolescents and young adults have been established. In one study, 28% of 12-14 year olds, 31% of 12-17 year olds and 34% of 18-24 years consumed energy drinks regularly (Oddy & O'Sullivan, 2009). Due to the low cost and availability of energy drinks, a 73% prevalence rate is held by athletes in the United States (Froiland, Koszewski, Hingst & Kopecky, 2004) Also, Canadian athletes hold a 75% prevalence rate (Kristiansen, Levy-Milne, Barr & Flint, 2005).

In another study in Germany of 1265 adolescents, 53% had tried drinking energy drink before, 23% practically drank less than one can per a week and 3% took between 1-7 cans per a week. Based on gender, 31% of girls and 50% of boys between the ages of 10 to 13 years had taken energy drinks before. The study also indicated that children consumed energy drink in moderate quantity with a small group consuming extreme quantities (Viell, Grabner, Fruchel & Boczek, 1996). In New Zealand, energy drink

consumption is estimated for children between the ages of 7-13 years, teenagers between the ages of 13-19 years and young men between the ages of 19-24 years. In this survey, 70% of children and 40% of the teenagers after consuming one unit had gone beyond the adverse effect of one region of 3 mg/kg body weight in a day (Thomson & Schiess, 2011). According to Malinauskas, Aeby, Overton, Carpenter-Aeby and Barber-Heidal (2007), about two-thirds of energy drink consumers are males between 12 and 35 years of age. Those found between the age 20 and 30 are those who consume heavily. Some athletes rely on energy drink use because of the name with the indication that the product connotes with physical activity (Astornia et al., 2011; Malinauskas et al., 2007). In addition, athletes consumed energy drinks with the intention of enhancing their performance. Bonci (2002) found that high expectations have sprang up and most people consider it and consume energy drinks as a rapid method of gaining 'extra energy' to carry out the activities of the day, burn fat, increase lean fat mass, speed up the recovery from intense exercise and compensate for perceived deficiency in minerals. Duchan, Patel and Feuhcht (2010) also stated that younger athletes are increasingly using energy drinks due to the ergogenic effects of caffeine and the various other ingredients in these drinks which are claimed as “energy boosters” by the manufacturers.

The prevalence of use of energy drink is great among students who find themselves in the art fields, students whose breakfast pattern was not regular, those who have practiced cigarettes smoking, alcoholic beverage consumers as well as students who frequently participate in sports (Attila & Cakir, 2011). In a study by Aluqmany, Mansoor, Saad, Abdullah and Ahamd

(2013) on consumption of energy drinks by females in the secondary school, more than half of the students (52.2%) consumed energy drinks, with a non-significant difference between classes. One-fourth (25.6%) of the students used energy drinks to increase vitality and 20.8% for alertness. Less than half (45.0%) used them irregularly. The majority (81.2%) perceived differences between types of drink, mainly by taste. Slightly less than half (48.6%) changed the type of energy drink frequently because of peer pressure. More than two-thirds (69.6%) of the students did not know the active ingredients of energy drinks and 60.1% stated that they became more energetic by consuming energy drinks. In addition, the type of energy drinks preferred by these students were as follows; bioson 112(35.8%), red bull 32(10.2%), horse 82(26.2%), power 62(19.8%) and code red 25(8%). Further in this study, more than one-third (35%) attributed the popularity of energy drink use to advertisement. Less than one fourth (22.4%) developed mood changes.

Various studies have assessed the prevalence of energy drink usage based on gender differences. A study by Peymani et al. (2012) on consumption patterns revealed that male consumers of energy drink were 258 (57.5%). In another study by Hidiroglu, Tanriover, Unaldi, Sulun and Karavus (2013), male consumption of energy drink was more than the females ($p > 0.001$). Alsunni and Badar (2011) also established a statistically significant difference ($p > 0.001$) with 26.15% for females and 54.6% for males. The difference in consumption has been linked with the fact that most females have generally shown a slightly healthier way to food choices because of their concern about weight management and their strong beliefs in healthy eating (Wardle et al., 2004).

Practically, research on the consumption of energy drinks by young adults who take part in sports is not available in many developing countries. In addition Ghana, like many other developed countries is handicapped about information on literature regarding the consumption of energy drink even though the drink can be found in most shops. There is however evidence of the consumption of energy drinks among student athletes in the Universities in Ghana. About 62% of the student athletes consume a minimum of one can of energy drink per week. Also, 79.5% of the respondents indicated drinking between one and two cans in a week and 20.5% also reported drinking between three and four cans of energy drink in a week for various reasons (Hagan & Buxton, 2012).

Differences and Similarities between Energy Drinks and Sports Drinks

A beverage industry that is fast growing is the sports and energy drinks industry. It is marketed to adolescents and children for various reasons and uses. Sports drinks are quite different from energy drinks. They are beverages that are flavoured and are made up of carbohydrates, minerals, electrolytes such as sodium, calcium and magnesium Examples of sports drinks are powerade, allsports, hydrafuel, isostar, xcel, sponser, sport plus, isosports, staminade endure and Gatorade (Coombes, 2005). Sports drinks sometimes contain vitamins and other nutrients. Energy drinks on the other hand contain stimulants like caffeine and guarana. They also contain carbohydrate, protein, amino acid, vitamins, sodium and minerals. Sports drinks have 13-19 grams of carbohydrate per 8 ounces (American College of Sports Medicine, 2011). The carbohydrate content for energy drinks ranges from 18 to 25-g per 8 ounces (National Federation of State High School Associations, 2011). Sports drinks

caloric content is between 10-70 calories per serving while 10-270 calories per serving is the caloric content of energy drinks. According to Schneider and Benjamin (2011), a beverage containing carbohydrate beyond what is required to boost the body during and after exercise is not necessary. In addition, high caloric intake can increase the risk of obesity and overweight in adolescent and adults.

The consumption of sports and energy drinks by children and adolescents results in dental erosion. Both drinks have been identified to possess a pH in the acidic range of pH (3-4) where low pH results in enamel demineralization. Another ingredient found in both drinks is citric acid, which is also highly erosive even when the pH is neutralised. One important role of sport drinks in the diet of young athletes who participate in vigorous sports is to replenish carbohydrate, water and electrolytes (Schneider & Benjamin, 2011). According to the Australian Sports Dietitians (2009), energy drinks are totally different from sport drinks since it has no caffeine. In addition, sport drinks are responsible for rehydration after the body has undergone an intensive exercise over 60 minutes. A study by Itany et al. (2014) revealed that 15.7% of the respondents considered energy drinks to be the same as energy drinks.

Energy drinks on the other have the ability to dehydrate after consumption particularly when they are consumed during the periods of exercise (School Health Council, 2011). The human body does not respond to thirst until the body is dehydrated to a level of 8-2% of body weight. Moreover, if the level of dehydration is beyond 3%, electrolyte as well as supplementation is necessary to restore hydration levels to normal. This can

take about a day to achieve (Sagawa et al., 1992). For every 1% reduction in body weight which results from fluid loss increases the resting heart rate by 3-5 beats in a minute. The performance of an individual is affected when the rate of dehydration exceeds 1-2% of the human body (Casa, Armstrong, Mountain, Rich & Stone 2000). Water loss to the rate of 2% in the human body can result in impaired cognitive and physical performance. A prolong dehydration may result in cancer and renal system disorders. The link between dehydration and hyperthermia has shown to result in cardiovascular instability which puts the individual at risk for heat exhaustion (Ganio, Casa, Armstrong & Maresh, 2007).

Content of Energy Drinks

According to Smith et al. (2010) studies about components and food nutrient in beverages has become a common and appreciated aspect of sports nutrition, exercise training, performance and recovery. In addition, since the ergogenic effects of these single ingredients are supported, the importance of product specificity research has become important. Apart from caffeine, which dominates or serves as the major ingredient in energy drinks, other ingredients are also found in energy drinks. Examples of some of these ingredients include carbohydrate, sugar, taurine, ginseng, guarana, yerba mate, l-carnitine, inositol, glucuronlactone, yohimbine, gingko biloba, sulphur and green tea extracts (Heckman et al., 2010; Heneman, 2010). Health risks related to the consumption of energy drinks are associated with caffeine and the long term effects of consuming some energy drink ingredients (Breda et al., 2014).

Caffeine

Caffeine is graded as a pharmacologically active substance (Finnegan, 2003). Harnack and Stang (1999) have reported that the fastest growing population in caffeine use is the adolescent. About 74% of both national and international sports participants consume caffeine before they engage in any competition (Del Coso, Salinero, Gonzalez-Millan, Abian-Vicen & Perez-Gonzalez, 2012). Caffeine is the most common ingredient that is utilized in energy drinks. It can be acquired from raw fruits of more than sixty coffee plant varieties, which forms part of the methylxanthine family. Another source from which caffeine can be extracted is from tea, kola nuts and cocoa (Campbell et al., 2013). In addition, the double origin projects caffeine and makes it the most commonly ingested drug in the world. This stems from the fact that it can be obtained from foods, drinks such as chocolate, coffee, carbonated drinks, dietary supplements and medicines, which are bought without prescription.

Caffeine concentration occurs in a range such that brewed coffee has (56-100-mg/100-ml), instant coffee and tea (20-73-mg/100-ml), cola has (9-19 mg/100-ml) and cocoa has (7 mg/5 oz cup) (Nawrot, Jordan & Eastwood, 2003). It is in the gastrointestinal tract that caffeine is quickly absorbed (Harland, 2000). One characteristic of caffeine is that it has 10%-35% of protein (Sawynok & Yaksh, 1993) and when ingested into the body through the consumption of energy drink is absorbed quickly (Campbell et al., 2013) and goes through the cellular membrane with an unchanged efficiency and circulated to the tissues of the body (Carrillo & Benitez, 2000).

Caffeine is broken down by the liver and through the action of enzymes, three metabolites are produced namely; paraxanthine, theophyline and theobromine (GGraham & Spriet, 1995). Plasma concentrations are increased between 30 to 60 minutes after ingestion (Campbell et al., 2013) based on the gastric content (Sawynok & Yaksh, 1993). In addition, the rate of absorption is partly based on the physiochemical formulation properties of the dose for the product. A cardiovascular stimulant has the ability to increase epinephrine output through its anhydrous formulation if it is compared with brewed or caffeinated coffee of equal quantity. About 0.5%-3.5% of the content of caffeine can be excreted unchanged through urine and other selected amount through perspiration (James, 1997). In addition, the kidneys excrete caffeine and its metabolites with about 3-10 percent from the body through the urine unchanged (Magkos & Kavouras, 2005).

The caffeine content of most energy drinks ranges between 80-mg per 250-ml and some also contain as high as 400-mg (Sepkowitz, 2013). The lipid solubility nature of caffeine allows the ingredient caffeine to cross the blood brain barrier without encountering any difficulty (McCall, Millington & Wurtman, 1982) and the placenta and finds itself in the breast milk with a 0.61-l/kg volume of distribution (Baselt, 2000). One primary area of action for caffeine is the central nervous system and two of the metabolites of caffeine, which are theophyilline and paraxanthine (Fredholm, Battig, Holmen, Nehlig & Zvartau, 1999), can aid the pharmacological effect on the central nervous system. According to Spriet and Gibala (2004), it cannot be easily determined which of the systems caffeine has the ability to affect most.

There are however, some concerns regarding the content of energy drinks in relation to caffeine, which results in adverse effects such as caffeine intoxication. It is defined by some specific symptoms that arise because of caffeine consumption. Common attributes of caffeine intoxication are restlessness, tremors, tachycardia and psychomotor agitation (Clauson, Shields, McQueen & Persad, 2008). Some of the factors that lead to caffeine intoxication include lack of adequate labeling since most energy drinks are without labels of the correct quantity of caffeine that they contain (Gunja & Brown, 2012).

Another factor connected to caffeine intoxication is advertisement (Reissig et al., 2009). Oddy and O'Sullivan (2009) purports that caffeine when consumed in huge quantities can cause anxiety, agitation, sleeplessness, gastrointestinal problems and arrhythmias. People can accommodate caffeine in the human body in moderation (Hedges, Woon & Hoopes, 2009) but caffeine taken in heavy quantity through energy drinks are associated with devastating consequences such as mania, stroke and sudden death (Berger & Alford, 2009). In addition, vulnerable people such as children who have cardiovascular, renal or liver diseases, seizures, diabetes, mood and behaviour disorders or hyperthyroidism or those who are on specific medication are at a higher risk if they consume energy drinks (Lipshultz, Wilkinson, Messiah & Miller, 2009; Temple, 2009).

Seifert et al. (2011) further postulates that symptoms such as excitement, nervousness, restlessness, insomnia, flushed face, diuress and gastrointestinal problems can occur when caffeine of as little as 100-mg per a day is ingested into the body. In addition, other symptoms such as muscle

twitching, rambling flow of thoughts and speech, tachycardia arrhythmia, periods of inexhaustibility and psychomotor agitation will appear when levels higher than 1-g/day is ingested into the human body. For pregnant women with heavy intake of caffeine as much as 200-mg are likely to increase miscarriage risk as well as possible defects of babies with extreme ends of preventing fetal growth (Morris, 2010).

Caffeine is additive in nature (Australian Nutrition Foundation, 2012) and can cause symptoms such as headache, irritability and lethargy following an attempt of withdrawal (Pennington, Johnson, Delaney & Blankenship, 2010). Caffeine with an anti-inflammatory and bronchoprotective effect is a ventilatory substance. It also exerts stimulating effects by blocking the inhibitory action of adenosine at the binding site as well as subsequent increases in the levels in some brain regions of most neurotransmitters including adrenaline, noradrenaline, tryptophan and dopamine (Schlosberberg, 1984; Hadfield & Milio, 1989; Kirch et al., 1990; Hughes, 1996; Dager et al., 1999; Nehlig, 1999; Pettenuzzo et al., 2008). The adenosine blockage to the neutrons stops sleep promoting cells resulting in the speeding up of neutrons instead of slowing down (Ferre, 2008). Caffeine's ability to increase the secretion of epinephrine can result in a wide range of metabolic changes that affects physical and mental performance (Graham, 2001).

By law, energy drinks are supposed to conform to the Food and Drugs Administration nutrition and supplement labeling procedures. Unfortunately, FDA has no limits on the required ingredients in beverages like energy drinks. FDA ensures limits on the quantity of caffeine and other ingredients in soda (71-mg per 12 ounces) (Food and Drug Administration, 2007).

Carbohydrate

According Campbell et al. (2013) carbohydrate is another common ingredient in most energy drinks. It is often in the form of sucrose, glucose and maltodextrin. Some evidence from studies conducted show that carbohydrate feeding particularly during exercise performance of approximately 45 minutes or greater can enhance endurance capacity and participation. Carbohydrate feeding enhances endurance in ways such as keeping the level of blood glucose, ensuring high rates of carbohydrate oxidation, the sparing of liver and likely skeletal muscle glycogen. In addition, the ability to put possible effect on the central nervous system and the ability to simulate glycogen during reduced intensity exercise (Painelli, Nicastro & Lancha, 2012).

High levels of carbohydrates oxidation are mostly around 1-gm of carbohydrate in a minute or 60-g–hr^{-1}. Oxidation of glucose, sucrose, maltodextrins and amylopectin is at a peak rate while fructose, galactose and amylase are also oxidized at lower rates between 25–50% (Campbell et al., 2013). Most energy drinks have about 25–30 grams of carbohydrate in 240 ml (8 fluid ounces) serving. This amount meets the base figure of 30 grams/hour, which is needed when endurance exercise is being performed but is below 60-g-hr^{-1} which forms part of the upper range. The overall carbohydrate content of energy drink is on the ascendency, a problem may exist regarding the concentration of energy drinks. A 6-8% solution of carbohydrate is prescribed by the American College of Sports Medicine (2011) during the performance of prolong exercise.

Again, a typical energy drink gives carbohydrate at a higher concentration between 11-12% solutions. Delay in gastric emptying and a

gastro-intestinal distress are the results when carbohydrate fluids, which are higher than 10%, are ingested into the body through energy drink consumption. In addition, consuming large quantities of carbohydrates, especially in hot weather, can compromise hydration by slowing the rate at which fluid is absorbed into the bloodstream and can also be tough on the stomach (Pollard, Carol & Anding, 2006). An athlete is therefore required to mix the beverage with water or alternate water consumption with energy drink particularly during exercise performance. Contrary to the above view, Peltzer et al. (2011) purports that supplements from carbohydrates during exercise activity may be beneficial for reducing or totaling forgoing hypoglycemia and accompanying worrying of physical ability. In addition, even though an individual's carbohydrate ingestion may depict an appreciated level of performance during physical activity longer than 45 minutes, this intensity of the exercise as well as the duration not forgetting the training status of the participants.

Sugar

According to the Centre for Disease Control (2010), sugar is another ingredient that is found in energy drinks in hooping quantities. Lustig, Schmidt and Brindis (2012) also stated that eating of sugar has tripled over the world in the past 50 years where globally, sugar consumption by people averages more than 500 calories in a day through energy drinks. It is further purported that epidemiologically, increased sugar intake affects the health of human beings by inducing all disease related with metabolic syndrome. This involves hypertension, high triglycerides, insulin resistance because of the

breakdown of fat particularly in the liver and diabetes from high glucose production, human cancer and cognitive decline.

Other effects from the consumption of sugar have being associated with the hormone called ghrelin, which has the duty of sending hanger signals to the brain is dampened through suppression (Lustig, 2010). In addition, the hormone called leptin, which helps to bring the feeling of satiety, is interfered. Dopamine alerts in the brain are reduced which diminishes the pleasure gotten from food (Garber & Lustig, 2011). Meier (2013) believes that sugar in energy drinks is food energy that the human body can use. Except for sugar free energy drinks, most energy drinks contain varying amounts of sugar which is between the ranges of 21-34 grams per 237-ml can (Clauson et al., 2008). A long-term observational study for 19 months by Lidwig, Peterson, and Gortmaker (2001) reported a relationship that is positive between the consumption of sugar-sweetened beverages and the existence of childhood obesity. Thus, beverage consumption and the Body mass index of 57% of the participants had increased during the observational period with consistent results when the above mentioned mechanism was used. This is to say that consumption of beverages with high amount of sugar has a potential of causing obesity. Additionally, energy drink consumption increases the risk of obesity because of the content of sugar and the high calories (Clauson et al., 2008; Schneider & Benjamin, 2011).

Guarana

Guarana is a common natural additive in most energy drinks recently (Scholey & Haskell, 2008). It is from the seed of paullinia cupan, a South American plant that guarana is obtained and is noted for its stimulating effects.

Further, guarana has huge quantities of caffeine (4%-8%), theobromine, theophylline and tannis in high concentration. Also, of this ingredient after consumption are closely related even though the rate of reaction may be prolonged due to the presence of saponins and tannis (Babu, Church & Lewander, 2008)

Guarana ingredient is added to energy drinks to boost the energy level, induce weight loss, improve cognitive performance, enhance mental fatigue and mood and promotes physical performances at physiologically high dosages (Schneider & Benjamin, 2011; Kennedy, Galloway, Dickau & Hudson, 2008; Haskell, Kennedy, Wesnes, Milne & Scholey, 2007). Guarana also has the ability to induce lipid metabolism as a result of its methlxanthine component (Lima et al., 2005).

Another significant characteristic of the guarana extract is the presence of caffeine stores. Caffeine from guarana is released at a much slower pace compared to pure caffeine with a resulting lengthy stimulating effect (Scholey & Haskell, 2008). The slow release of guarana is because guarana is insoluble in water (Edwards et al., 2005).

Taurine

It is an amino acid which is found in animal tissues. The production of taurine is through the metabolism of methionine and cysteine. Further, it functions in different metabolic rates from osmoregulation to antioxidation to glycolysis. Foods such as meat, dairy products and fish contain taurine with an average 20 to 200-mg, which is found in our daily diets. Also, the ingredient which is a form of supplement in our diets is advertised to promote biliary

health, eye health and also prevent and treat congestive heart failure (Babu et al., 2008).

Taurine is found in significant quantities in the skeletal muscles and plays a major role in regulating contractile function. Taurine has the ability to increase the force that is produced by promoting sarcoplasmic reticulum's ca^{2+} accumulation and subsequent release. One critical way of ensuring the correct force output during the contraction of muscle is to balance the concentration of taurine (Woojae, 2003). Taurine has some effect on the neural system. According to Woojae (2003), this ingredient is present in whooping quantities throughout the brain and also performs a major role both in neuroprotection and neurotransmission enhancement. On the other hand, taurine has the ability to depress the activity of excitable membranes in the brain (Iida & Hiki, 1976; Huxtable, 1992) and also acts as an agonist of the sedating glycine receptors (De Saint, Wartine-David, Korn & Bregestovski, 2001; Font, Miguel & Aragon, 2001) and in the heat (Huxtable, 1992).

According to Saransaari and Oja (1999) taurine modulates the excitatory actions of several amino acids. Taurine in combination with caffeine can have some short-term diuretic action, which can cause loss of water and sodium (Hussy et al., 2001). Again, taurine and caffeine have the ability to influence the activity of angiotension II, which is an endogenously formed substance that increases arterial blood pressure and decreases the excretion of water and sodium by the kidney (Ohnishi, Branch, Holycross & Jackson, 1987; Holycross & Jackson, 1992; Brown, Ryder & Nadeau, 1993; Tseng, Kuan, Chu & Tung, 1993). It assumes the role of cytoprotection against exercise induce injury. In addition, when taurine is in high quantity it

produces defense against free radical mediating damage and potentiates the movement of calcium as well as cytoprotection in cardiac and skeletal muscles (Madiha, Sidra & Hajra, 2012). Some studies researching taurine, one of the major ingredients in energy drinks, revealed that it has the ability to interact negatively with caffeine and alcohol due to the effect that it has on cell volume and renal-mediated transport. This negative interaction has been illustrated by Schoffl, Kothmann and Schooffl (2011) in a case study of a patient who consumed an energy drink-alcohol mix containing 4,600-mg of taurine, 780-mg caffeine, and vodka with resultant acute renal failure. Thus, the effects that these interactions bring through the components in energy drinks seem to be as important to study likewise the effect of each single ingredient.

Ginseng

Another name for this ingredient is Panax ginseng which is a plant herb used for over 2000 years by people in countries such as Japan, Korea and China to enhance the memory, sustain stamina and to promote longevity (Babu et al., 2008; Lee, Hudson, Kilpatrick, Graham & Ross, 2005). It is a perennial shrub that has a height of about 60-cm and belongs to the araliacae plant family. The roots of this plant are only harvested after 5-6 years when the concentrations of ginsenoside are high (Mahady, Fong & Farnsworth, 2001). The processing of the roots includes drying and bleaching with sulfur dioxide to form white ginseng. Further, steaming of the roots and air-drying it forms red ginseng (Mahady et al., 2001).

Some health benefits of ginseng includes, stimulating the immune system, ability to improve physical and mental conditions and also has antistress, antiaging, antioxidant and anti-inflammatory properties (Lu, Yao &

Chen, 2009). Some effects and complications associated with the consumption of ginseng include diarrhea, vaginal bleeding, severe headache and Stevens-Johnson syndrome (Babu et al., 2008). In addition, the effects of ginseng are likely to be linked with contaminants such as phenylbutazore and aminopyrine. A ginseng abuse syndrome represents hypertension, rashes, insomnia, irritability, diarrhea, and sleep disturbances (Coon & Ernst, 2002).

Inositol

This ingredient found in energy drinks enhances a number of biological processes such as guiding the nerves and intracellular transport and modulating serotonin activities. In addition, clinical depression has been attributed to lower levels of inositol in the cerebrospinal fluid (Woosley, Waigandt & Beck, 2010). On the contrary, studies on high levels of inositol concentration show effective treatment results for persons suffering from diseases such as bulimia, panic disorder, agoraphobia and obsessive-compulsive disorder (Gina, 2004).

Yerba Mate

Yerba Mate as an ingredient in energy drinks originates from the llex paraguariensu plant which is found mostly in South America. It stimulates the central nervous system due to the high level of caffeine concentration. Approximately, the caffeine concentration in one cup of 8-oz size is equal to about 78-mg. Globally, the yerba mate ingredient has increased in popularity due to the bioactive components such as polyphenols, xanthines, flavonoids, saponins, amino acids, minerals and vitamins (Heck & De Mejia, 2007).

The presence of phytochemicals in yerba mate account for the anti-flammatory and antidiabetic properties. In addition, it is an inhibitor to

oxidative stress (Markowicz-Bastos, Moura De Oliveira, Teixeira-Matsumoto, De Oliveira-Carvalho & Ribeiro, 2007). De Morais et al. (2009) also purports that the consumption of yerba mate improves serum lipids in normolipidemic and dyslipidemic persons. Further, yerba mate enhances the reduction level of LDL-cholesterol of individuals undergoing statin therapy. Some concerns have been established about yerba mate and the occurrence of certain cancer types such as oral, esophageal, lung, bladder and renal cancer (Heck & De Mejia, 2007).

B-Vitamins

Another ingredient which is incorporated into many energy drinks is the B-vitamins. This consists of a group of 8 individual water soluble vitamins also referred to as 'B' complex with each playing a distinct role in cellular processes. A can size of 250-ml of energy drink may have 360% of recommended daily allowance of B-6, 120% of B-12 and 120% of niacin. Vitamins B2-(riboflavin), B3-(niacin), B6-(pyridoxine, pyridoxal, pyridoxamine) and B-12 are the common B-vitamins that are mixed with energy drinks. The popular claim about the consumption of high quantities of B-vitamins is that it has the ability to increase mental alertness, focus and improve mood (Wardlaw & Smith, 2009).The five hour energy drink contains vitamin B-12 in its synthesized form called cyancobalamin. While producers claim that the B-12 supplementation has beneficial effect, research also shows that cyanocobalamin has little to no effect on cognitive function (Ford & Flicker, 2010).

Sulphur

Sulphur abounds in high quantities in some energy drinks. A study revealed the sodium level in some energy drinks as 125-mg per a serving. In addition, several energy drinks have extreme levels such as 340-mg per 8-oz. serving. Energy drinks that are high in sulphur can result in high blood pressure, stroke and an increased possibility for heart disease (Pomeranz et al., 2013).

Glucuronolactone

This ingredient is popular in most energy drinks. An oral administration to humans is quickly absorbed, metabolised and excreted as glucaric acid, xylitol and l-xylulose (European Food Safety Authority, 2009). It is a natural chemical component found in all connective tissues and also found in many plant gums. By nature it is white, solid, odorless and soluble in both cold and hot water (Merck, 1889). Glucuronlactone can be processed into glucaric acid, xylitol and l-xylulose. In addition, it is used as a precursor for ascorbic acid synthesis (Baker, Bierman & Plough, 1960). High blood glucuronides remove toxins from the body, therefore it is classified as a detoxicant (Merck, 1889). About 350-mg of glucuronolactone have been found to be efficient for use (Hoffman et al., 2008).

L-Carnitine

L-Carnitine is an amino acid descent and plays a major role in fatty acid oxidation (Lheureux, Penaloza, Zahir & Gris, 2005). Adverse effect associated with the consumption of carnitine in energy drinks includes nausea, vomiting, abdominal pain, headache, stuffy nose, restlessness and sleeping difficulty and

diarrhea. Seizure disorder in patience has heightened to seizure frequency with the increase use of carnitine (Russell, 2007).

Ginkgo Biloba

Ginkgo extract is manufactured from the leaves of the ginkgo biloba tree which contains a complex mixture of components. The exact formulation of ginkgo extract in products available to consumers can vary from manufacturer to manufacturer (Kressmann, Muller & Blume, 2002). A clinical trial of ginkgo by researchers was supported by the National Institutes of Health (NIH) on 3,000 people between ages 75 or older from 2000 and 2008 on Ginkgo Evaluation of Memory (GEM). The study took tests of their thinking abilities. It was noted that 120 milligrams taken twice daily was not efficient in reducing the incidence of dementia, lessening cognitive decline, reducing blood pressure or hypertension, or reducing cardiovascular disease events (DeKosky et al., 2008). Gingko herb can cause some minor side effects in some people such as nausea, diarrhea, headaches, dizziness, heart palpitations, and restlessness. It has the ability to interact with other medication such as blood thinners and anti-depressants. A recent study found that ginkgo caused thyroid cancer in rats after being given ginkgo biloba extract for a period of two years (Srecher, Iyer & Tharakam, 2013).

The Effects of Energy Drinks

Energy drinks remain one of the most dynamic segments in the soft drink industry. Different brands have been introduced globally with some functional claims which are either cognitive or physiological.

Physiological Effects

Popular media as well as case reports have linked adverse events with energy drink consumption. A few studies have examined the physiological effects of the individual ingredients or potential synergistic effects. Further, some results of experimental studies have been either inconclusive or contradictory (Seifert et al., 2011). According to Terlizzi, Rocchi, Serra, Solieri and Cortelli (2008) the combination of caffeine and taurine often decreased heart rate. Thus, 70 minutes after consumption the heart rate returned to normal with an increased blood pressure. Also, Baum and Weiss (2001) in a study on the influence of taurine containing energy drink on cardiac parametres before and after exercise, caffeine and taurine contained in an energy drink raised the left atrial contractility in 13 athletes resulting in an increase in the left ventricular end-diastolic volume and stroke volume. The caffeine only group exhibited no changes in the left ventricular function. This they concluded could be the cause of the energy drink which improved the function of the cortical region necessary for anticipation and the preparation of movement.

Ruxton (2009) indicates that most energy drinks containing polyplenols from caffeine have been associated with positive vascular health and improved flow of blood based on its inflammatory, anti-oxidant and anti-cancer qualities. According to Nawrot, Jordan and Eastwood (2003), energy drinks improve alertness and vigilance. In addition, cessations sometimes result in weakness, lethargy and sleepiness. On other body systems, some studies conducted on adolescents' consumption of energy drink containing caffeine have indicated a negative effect on the balance of calcium resulting

from an increase excretion of calcium from the urine after a period of ten hours. Physiologically, caffeine intake causes coronary vasoconstriction, relaxes smooth muscles, cardiac chronotropic and inotropic effects, reduce insulin effects and regulates gene-expressions in premature neonates. In addition, heavy caffeine consumption raises urine flow, the excretion of sweat and changes blood electro levels (Seifert et al., 2011).

A study analyzing the positive and negative effects of energy drinks on athletes showed that improvement in sports performance is between 3% and 7%. In addition, energy drinks are consumed by more than 50% athletes before engaging in sports (Del Coso, Munoz & Munoz-Guerra, 2011). In a double-blind and placebo controlled experiment for basketball players, results showed that pre-exercise ingestion of 3-mg of caffeine in an energy drink significantly improved jump performance but had no influence on precision of basketball shots (Abian-Vicen et al., 2014). Relatedly, Share, Sanders and Kemp (2009), investigated the influence of 2-mg and 4-mg of caffeinated beverage on elite male shooters in basketball. Results showed no performance benefits during the target shooting. In another study by Gant, Ali, and Foskett (2010) the combination of caffeine and carbohydrate did not influence the precision of passing in soccer although 6-mg caffeine increased passing accuracy (Foskett, Ali & Gant, 2009).

Cognitive Effects

Energy drinks are known to increase the cognitive functions of reaction speed, memory, and vigilance (Scholey & Kennedy, 2004). Caffeine improves working memory performance in habitual caffeine consumers following both caffeine abstinence and normal caffeine intake (Addicott & Laurienti, 2009).

In a study, which used a lower caffeine dose no effect was established (Koppelstaetter et al., 2008). Again, caffeine has been found to enhance attention regardless of habitual caffeine consumption (Brunyé, Mahoney, Lieberman & Taylor, 2010; Yeomans, Ripley, Davies, Rusted & Rojers, 2002). Some researchers have examined the cognitive effects of energy drinks and attribute changes in cognitive performance and mood to the combined effects of caffeine, taurine and glucose in the energy drinks (James & Rogers, 2005).

Energy drinks which have a blend of caffeine, taurine and glucose may improve mood and cognitive performance. Adan and Serra-Grabulosa (2010) showed that caffeine and glucose together reduced reaction time and improved sustained attention and verbal memory. Another study evaluated the effects of caffeine, taurine and glucose alone and in combination on cognitive performance and mood in one day caffeine-abstained habitual caffeine consumers. A randomized double-blind, mixed design with 48 habitual caffeine consumers comprising 18 males and 30 females were deprived of caffeine for 24-hours. They later received one of the four treatments (200-mg caffeine/0-mg taurine, 0-mg caffeine/2000-mg taurine, 200-mg caffeine/2000-mg taurine, 0-mg caffeine/0-mg taurine), for four separate days. This was separated by a 3-day wash-out period. Between participants treatment was a glucose drink (50-g glucose, placebo). Following this administration, salivary cortisol and mood were measured. An attention task was administered. Thus, 30-minutes post-treatment followed by a working memory and reaction time task of 60-minutes post-treatment. It was realised that caffeine enhanced executive control and working memory, and reduced simple and choice

reaction time. Taurine increased choice reaction time but reduced reaction time in the working memory tasks. Glucose alone slowed choice reaction time. Glucose in combination with caffeine enhanced object working memory and in combination with taurine, enhanced orienting attention. Limited glucose effects may reflect low task difficulty relative to subjects' cognitive ability. Caffeine reduced feelings of fatigue and increased tension and vigour. Taurine reversed the effects of caffeine on vigour. No effects were found for salivary cortisol. Caffeine, not taurine or glucose, is likely responsible for reported changes in cognitive performance following consumption of energy drinks, especially in caffeine-withdrawn habitual consumers (Giles et al., 2012). In double-blind randomized study by Childs and De Wit (2008) a treatment group obtained 200-mg of caffeinated energy drink. With prolonged wakefulness, the controlled group significantly improved their reaction times while completing a computer task and questionnaires. A study by Howard and Marczinski (2010) on the acute effects of glucose energy drink indicated that compared with a placebo and no drink conditions for the go no-go task the energy drink doses decreased reaction times on the behavioural control task. Mathew, Smucker, Stafstrom, Helterbran and Kimberly (2009) also investigated attention and reaction time following the consumption of a 250-ml can of red bull, sugar free red bull and flavoured placebo in a double blind study. Results showed that no significant difference in the task performance was attributed to any of the drinks. Thus, mean scores between the drinks were insignificant (all p’s > 0.15) for any covariates in any of the models.

Some studies have shown positive impact in terms of the consumption of energy drinks in relation to certain ingredients. For example, caffeine

consumption has exhibited an increase in alertness in human studies (Hewlett & Smith, 2007). The consumption of as little as 32-mg to 50-mg of caffeine shown to improve alertness (Lieberman, Wurtman, Garfield, Roberts & Coviella, 1987). Improvements have shown 50 minutes after consumption of 140 mg of caffeine in well rested young adults (Kennedy et al., 2008). Further, a study by Stephens, Attipoe, Jones, Ledford and Deuster (2014) reported that 60% of energy drink users improved mental alertness after they had consumed energy drinks.

Factors Influencing Energy Drink Consumption

Many individuals in trying to fulfill their needs under the changing living conditions have resorted to the consumption of energy drinks. The consumption by these individuals are influenced by a number of factors such as energy drink commercials and adverts, availability and accessibility, knowledge and perception, physical activity level and taste.

Energy Drink Commercials and Advertisement

Tellis (2004) affirms that most producing companies of energy drink advertise to persuade consumers concerning the advantages of their products. Advertisements of energy drinks were initially not diverse at the beginning. Energy drinks were primarily targeted at athletes with an indication that they were directed to a specific group (Lal, 2008). Today, energy drink market targets teenagers between the ages of 12-17. Additionally, a total of 281.8 million dollars was spent on energy drink adverts in 2012 which represented 71% increase against 2010 (Harris & Schiwartz, 2013). Most of the energy drink firms use cross-promotional tactics to reach their consumer base by blending their product with extreme sporting events, such as the X-games,

NASCAR, as well as advertising their products in connection with popular music icons (Agriculture and Agri-Food Canada, 2008). According to Mwaawaaru (2009), television commercials and advertisement can be seen as a catalyst in speeding up the adoption of energy drink products. A model by Cacioppo and Petty (1980) depicts that people with both motivation and the ability to evaluate a message in an energy drink commercial are likely to think about the product. In addition, a targeted customer's motivation will originate from the presence of an endorser, the fame of the person endorsing the product, music and scenery.

Also, four factors play an important role in determining the effect of energy drink commercials and adverts on consumption impulses. They are imagery visualization, anticipated emotions, taste anticipation and hedonic rationalization (MacInnis & Price, 1987; Baumgartner, Pieters & Bagozzi, 2008; O'Doherty, Deichmann, Critchley & Dolan, 2002; Moore & Bovell, 2008; Kober, Kross, Walter, Hart & Ochsner, 2010). On the other hand, (Beverage Network, 2011) purports that marketing of energy drinks basically rely on non-traditional outlets such as extreme sports and celebrity endorsement and not through the use of television, radio as well as print media. Contrarily, a study on consumption pattern of nutritional health drinks and energy drinks. Social media such as television and the display of energy drinks at retail outlets were responsible for energy drink awareness creation. Thus, 72% of the students were influenced by television adverts (Jacob, Trooshi & Alkhoury, 2013). Adolescents' total exposure to energy drink advertising on television increased by 33% in 2012 compared with 2010. Teenages also saw 31% more adverts for Red bull than adults (Harris &

Schiwartz, 2013). Red bull energy drink, one of the leading competitors is up to date finding ways of keeping energy drink consumers coming back for more energy drinks. In addition, they have well planned advertising strategies and television commercials under way in countries such as Ghana. These strategies include sponsorships, sports events, entertainment functions and related promotional sales (Mwaawaaru, 2009).

Availability and Accessibility

According to Goldman (2013), among adolescents ease of access to energy drinks is increasing and is also a growing concern. Wansink, Painter, and Lee (2006), in a study found out that proximity and visibility of energy drinks leads to an increase consumption particularly in adolescence. Further, Wansink (2004) believes that proximity can facilitate the visibility of energy drinks which can cause an increase in temptation as well as hunger. In the Canadian Journal of Public Health, Hamilton, Boak, Ilie, and Mann (2013) purports that the easy access of energy drinks particularly from convenience stores and the appealing names of most energy drinks make the drinks appealing to the adolescents to consume.

According to Beverage Network (2011), energy drinks are distributed particularly in super markets, gas stores and convenience stores. In addition, between the periods of 2004 to 2009, 46%-53% volumes of energy drink sold occurred in convenience and gas stores. 10% and 13% of sales took place at super markets and food service outlets respectively. Further, availability and accessibility are two major ingredients that determine our energy drink choices. Thus, many people eat what they can find in shops, restaurants and canteens at work and school (Dixey et al., 2006).

Knowledge and Perception

The level of nutrition knowledge has some association with positive eating behaviours (Holloman, Caine-Bish, Ha & Lowry-Gordon, 2009; Wardle, Parmenter & Waller, 2000). The Alcohol and Drug Education and Prevention Information Service (2013) posit that adolescents consume energy drink because of the way these drinks are marketed. According to Reissig et al. (2009) the marketing of beverages such as energy drink revolves around their stimulating effect with the claim of having the ability to increase cognitive and physical performance. In addition, the marketing of energy drinks promotes the inclusion of herbs, minerals and vitamins despite the findings that caffeine is the major cause of the stimulating effect in energy drinks (Smit, Cotton, Hughes & Rogers, 2004).

The stimulating effect found in energy drinks reflect the responses given by adolescents such as better sports performance increase energy level during performance and compensates insufficient sleep (Malinauska et al., 2007; O'Dea, 2003). The beneficial effects of energy drinks are known to adolescents but they are less aware of the hazardous effects. O'Dea (2003) stated in a study that the lack of knowledge by adolescents on the negative effects is exposed when none of them reported any known effect and potential risk of energy drink consumption. This example shows a possible gab of consumer knowledge on the negative health challenges of energy drinks.

Physical Activity Level

According to Paddock (2008), students and athletes in their quest to enhance physical activity performance, incorporate a number of strategies into their training regime. One of such acts is the consumption of energy drinks.

Energy and macronutrients especially carbohydrate and proteins must be taken during times of high physical exertion. This is to maintain the weight of the body, replace glycogen stores and provide enough protein to build and repair worn out tissues. In addition, hydration is paramount by consuming sport drinks with carbohydrate and electrolyte to maintain blood glucose and also decrease the effect of dehydration or hyponatremia (American Dietetic Association, 2009). A study conducted by Badaam and Masroor (2013) in Aurangabad district of Melharashtra in Indian 30% of adolescent football players consumed energy drink. In addition, 60% of those consuming energy drinks took red bull, 20% took tzinga and 20% consumed other energy drinks. 80% reported consuming 1-2 servings a week whereas 20% took 3-4 servings a week. Further, 38% stated that they consumed energy drinks to regain the energy lost during a workout, 22% for performance enhancement and 33% for replacement of body fluid. However, 5.5% took the energy drink to reduce fatigue level. A report by Bawazeer and AlSobahi (2013) on the prevalence and side effects of energy drink revealed that 32.8% of the students consumed energy drink with the intention to get energy. In another study by Abian-Vicen et al. (2014) on adolescent basketball players jump performance, it was revealed that players improved upon their counter movement test from a height of 37.5-38.3 after consuming energy drink with a formulae of caffeine, taurine, sodium, l-carnitine and maltodextrin. According to the IOWA High School Athletic Association (2011), energy drinks do not provide the human body with high quality or long lasting energy. In addition, it may be harmful. The energy needed to sustain long schedules, difficult task and other daily activities can not be found in a can or bottle of energy drink. The perception

held that the drink is working and providing energy from the ingredients is deceptive (U. S. Anti-Doping Agency, 2007).

Taste

The sensory qualities of beverages and food are critical to dieting preferences and taste is the most important determinant of beverages (Leterme, Brun, Dittmar & Robin, 2008). Taste is repeatedly reported as the main influence on food behaviour. Additionally, taste puts together all the sensory stimulation that is produced by the introduction of food into the mouth (European Food Information Council, 2012). Energy drinks are seen as functional beverages and most people particularly adolescence have a driving urge which determines the type of energy drink that they select. A study by Bawazeer and AlSobahi (2013), on the prevalence and side effects of energy drink consumption among students, they reported that 5 out of 70 students representing 7.1% preferred sugar free energy drinks, 35 out of 70 representing 50% preferred regular (sweet) energy drinks and 42.9% representing 30 students did not take notice of what they drank. In another study conducted by Schmidt and McIntire (2008), about the factors that influenced participants' decision to consume energy drink, 53.4% stated taste as the driving force for their consumption. Understanding behaviours concerning food intake from the angle of taste is very crucial since it lies at the interface between the food an individual is exposed to and the quest to prefer certain foods in one's environment (Garcia-Bailo, Toguri, Eny & El-Sohemy, 2009). Taste preferences and food aversions develop through one's experiences and are greatly influenced by our beliefs, attitudes and expectations (Clarke, 1998).

Types of Energy Drinks

Since the inception of the production of energy drinks, the market has grown exponentially. Different brands are produced and marketed to people. Examples of some of the brands are red bull, rox, gluconade, lucozade, monster, rockstar, power horse, burn and blue jeans.

Red Bull

One of the commonest forms of energy drink that is found on the Ghanaian market is the red bull energy drink. In Asia in 1982, Dietrich Mateschitz mixed some syrups that most people add to their drinks to give them energy. He first developed an energy drink called red bull Krateng Dang only for the Asian market. Mateschitz later founded the company and lunched the product in 1987 (Hoover's Incorporation, 2011). Currently, red bull energy drink is present in over 166 countries and has 26 years of company history. It trades with the slogan, gives you wings.

The marketing claims of red bull energy drink are that it has the ability to stimulate metabolism, improves reaction speed and concentration, and improves performance particularly during times of stress and a functional product made for periods of physical exertion (Heidemann et al., 2005). Additionally, ingredients such as carbonated water, sucrose, glucose, sodium citrate, taurine, glucuronolactone, caffeine, inositol, niacin, D-pantothenol, pyridoxine-hcl and vitamin B-12 are found in it. Red bull is served in a can size of 250-ml or 8.4-oz with calories of 110 (Venster, Aufricht & Alford, 2012). From 1990 till date, sports medicine studies have been conducted on red bull energy drink to ascertain the effects. In a study carried out by the institute of Sport Medicine and Nutrition, the effect of red bull on athlete

performance was determined for 10 athletes using the cycle ergometer. The athletes performed trails of which different drinks were administered; a placebo, a controlled drink and red bull. The study revealed a significant increase in endurance at a relatively maximum intensity when red bull energy drink was administered to the athletes (Hoover's Incorporation, 2011).

The historical overview of red bull energy drink has shown that there has been little product innovation where red bull has only added the sugar free version of their product (Cirillo, 2009). Marketing claims have revealed that red bull is the current leader in the energy drink industry (Malinauskas et al., 2007). Mwaawaaru (2009) has also stated that the energy drink market in Ghana is led by red bull. Supporting evidence is given by an assessment survey of the energy drink market. In this assessment energy drinks held 62% of the market in the United States with red bull accounting for 42% of the 62% (Heckman et al., 2010). A survey by Brooke, Speckman, Hixon, Mckinley and Olberding (2011) revealed that red bull is relatively expensive despite the fact that it was effective towards their needs.

Rox

Rox is an Austrian company located in Innsbruck, Tyrol from 1995. Currently, it is represented in many continents particularly Africa, Asia and Europe. It is distributed in container sizes of 250-ml can, 440-ml can, 1000-ml PET and 1500-ml PET. The marketing claims of rox energy drink is that it has the ability to increase vigilance and wakefulness, improve concentration and reaction time, enhance metabolic processes and has the ability to aid the human body to break down harmful toxins. A serving of rox energy drink has 110 calories with ingredients such as carbonated water, sucrose, glucose,

sodium citrate, taurine, glucuronalactone, caffeine, inositol, niacinamide, calciumpantothenate, pyriodoxine-hcl, vitamin B-12, artificial flavours and colour. It has a shelf life of between 12-24 months with a slogan, moving mountains (Red Bull Website, 2008).

Monster

Monster energy drink has a market share of 27.9% and is particularly noted for in the 16-oz can size (Pierceall, 2010). In 1930, Hubert Hansen and his sons began a business and sold fresh non-pasteurized juice in Calfornia. This business was called Hansen's Juice Incorporated and later became the Fresh Juice Company of California. In 1977, Tim Hansen envisaged the demand for natural juice and juice blend and also formed Hansen Foods Incorporated. In 1999, acquired all the right to produce, sell and distribute fresh non-pasteurized juice using the Hansen's Trademark. In 2012, the company name was changed to Monster Beverage Corporation of which monster energy drink is one of their product lines (Monster Beverage Corporation, 2012).

Monster energy drink goes by the slogan, unleash the beast. This drink is served in a black can with an "M" logo inscribed on the can. In addition, the pull tab is punched in an "M" sign (Penalty, 2006). One common ingredient found in monster energy drink is caffeine at a quantity of approximately 10-mg/oz or 140-mg for a 16-oz can. Other ingredients include carbonated water, sucrose, glucose, citric acid, natural flavour, taurine, sodium nitrate, panax ginseng, l-carnitine, sorbic acid, benzoic acid, niacinamide, sodium chloride, glucuronolactone, inositol, guarana, pyridoxine hydrochloride, riboflavin, maltdextrin and cynocobalamin. This product has a warning label advising

consumers to desist from drinking more than 48-oz per a day (Centre for Science in the Public Interest, 2011).

Lucozade

Lucozade energy drink is one of the oldest brands of energy drinks which originated from England, New Castle in 1927. The drink was initially referred to as glucozade and was manufactured by chemist William Owen. This was an energy source for patients with cold and flu. The energy drink got its current name in 1929 (Lile, 2013). In 1938, the brand was bought by Thomas Beecham (Guardian Newspaper, 2013) and marketed nationwide. However, in 1970 sales of lucozade began to drop. The product was repositioned to replace lost energy with the aid of Olympic decathlete Delay Thompson, the brand icon.

Lucozade energy drink is a carbonated glucose drink and is presented in classic original, tropical, lemon, orange citrus clear and wild berry flavours. In addition, lucozade energy drink is presented in a tablet form for flavours such as classic, orange and lemon varieties (Superbrands, 2004). Ingredients of lucozade energy include carbonated water, glucose syrup, citric acid, lactic acid, potassium sorbate, sodium bisulphate, caffeine and ascorbic acid. It has a market share of about 60% and currently has sales worth £15 million.

Blue Jeans

Blue jeans energy drink is produced by Bekli General Trading in Netherland. It has berry flavour and it's served in a can size of 250-ml and 500-ml. Ingredients found in blue jeans energy drink include sugar, citric acid, sodium nitrate, carbon dioxide, vitamin, niacin, calcium pantothenate, pyriodoxine hydrochloride, riboflavin, cyanocobalamin, artificial flavour,

guarana, taurine and caffeine. With a shelf life of two years, blue jeans energy drink has marketing claims of rejuvenating your senses, exhilarating the soul and the ability to aid you through hectic times (Beverage Network, 2007).

Rockstar

Russell Weiner founded Rockstar Incorporated in the year 2001 with the collaborative effort of the father, Micheal Weiner who is a credited botanist and herbalist. Currently, rockstar energy drink has a market share of 11.5% with $18,839,000 sales. The product is enhanced with ingredients such as guarana, ginkgo, ginseng, caffeine and milk thistle. The marketing claims of this beverage are that, it is scientifically formed to give energy to those with active lifestyle such as athletes and rock stars. This energy drink was the first product to introduce the 16-oz can size and is strictly manufactured for vegetarians and vegans. It has the slogan, party like rock star with target audience of males between the ages of 18-24 years. Coca-Cola Company distributes rockstar energy drink in 19 international locations (Burke, Caracci, Cheng, Lee & Marigliano, 2010).

Burn

Burn is an energy drink owned and distributed by The Coca-Cola Company. Its official tagline is that, it fuels your fire. This product is distributed in over 80 countries including France, Spain, Italy, Poland, Turkey, Russia, Japan, Korea, Brazil, Afghanistan and Mexico. In Africa, burn energy drink can be found in countries such as Algeria, Burkina Faso, Democratic Republic of the Congo, Egypt, Ghana, Guinea, Liberia, Mauritius, Morocco, Nigeria, Reunion Island, Senegal, Sierra Leone, South Africa, Tunisia, Kenya. Burn energy drink is involved in musical shows as an initiative to support and

nurture promising talents in the electronic dance sector. In sports, Burn is involved in the sponsorship of extreme sports such as snowboarding, skateboarding, surfing, formula one racing and parkour. In addition, it provides sponsorship to some high profile athletes across the world. Ingredients found in burn energy drink are acidity regulator (citric acid, natrium citrate), antioxidants (ascorbic drink acid), arginine, aromas (theobromine), B-vitamins, caffeine, carbonated water, food colouring (E163, E150-d), ginseng, guarana, maltodextrin, preservative (E202), sugar, taurine and water. The content of caffeine per 100-ml is 32-mg (Wesley, 2002).

Power Horse

Power horse energy drink was launched in 1994 and is currently in over 50 countries. It is produced by Spitz company with a can size of 8.5-oz (250-ml). Power horse energy drink is the first European energy drink which was launched with a cola flavour. It also comes with a sugar free version for people who wish to avoid unnecessary calories. Power horse energy drink provides the body with ingredients such as taurine 400-mg, glucuronolactone 200-mg, caffeine 32-mg, sucrose 8.6-g, glucose 2.1-g, inositol 20-mg, vitamins-B6 2-mg, pantothenate 2mg, niacin 8mg. The marketing claims of power horse energy drink includes the ability to provide the body with an immediate energy boast, manages body electrolyte, stimulates metabolism, increases physical performance and mental alertness and supplies energy for high performance. As part of its advertising strategies, power horse energy drink sponsors beach soccer at the international level and supports players and teams in countries such as Ukraine, Italy, Germany, Spain, Russia, brazil and

United Arab Emirate. A cyclist by name Max Schrom is the brand ambassador for power horse energy drink (Power horse website, 2012).

Theoretical Framework

More often, theories are commonly used to explain health behaviours. The social cognitive theory (SCT) is mostly used to explain the dynamics and reasons behind certain behaviour patterns. Bandura (1986), the psychologist who pioneered SCT, theorized that individuals neither act only on innate forces nor only on external forces. Instead, human behaviour is multidimensional. SCT explains behaviour as a reciprocal causation which is called the reciprocal determinism (RD). This shows the relationship between personal factors, environmental influences, and behaviour (Bandura, 1986). Thus, the world and a person's behaviour cause each other.

Personal factors include forms of cognitive functioning such as knowledge, attitudes, intentions, and perceptions (Bandura, 1986; 2001). The environment (social environments) is comprised of many factors like symbolism (modelling) and social persuasion creates reciprocal effects on behaviour (Bandura, 1986). Bandura explained that one person's behaviour could influence the social environment, which can also influence the behaviour of others in that environment. Bandura further states that there may not be symmetry of strengths between influences. This means that personal influences may be stronger than environmental influences in certain situations and on the other hand, the environment may be the main contributor to the behaviour.

The theory of planned behaviour (TPB) is a theory that seeks to connect between attitudes and behaviour. It aims at predicting and explaining

the behaviour of humans in specific context. The theory purports that the behaviour of individuals is determined by the intentions of the individual. Further, the theory strives that the intentions that people have are largely influenced by the individual's attitude with much focus on behaviour, the subjective norm enclosing the execution of the behaviour as well as the individual's ideology of their control over behaviour (Ozturk, 2012).

According to a review by the (European food information council, 2012) physiological and nutritional needs are not the only reasons for which people make choices. Rather, there are other factors such as biological determinants (hunger, taste and appetite), economic determinants (cost, income and availability), physical determinants (access, education, skills and time), social determinants (culture, family, peer and meal patterns), psychological determinants (mood, stress and guilt) as well as attitude, beliefs and knowledge.

Dixey et al. (2006) postulates that the preference that people have for beverages and diet is largely determined by social, economic, climatic, geographical, infrastructural, religious factors as well as custom. Again, food habits are found in culture, traditions and history of which modifications are difficult. Other factors that certainly influence food are a psychological factor, which dictates our preference for food as well as our dislikes and aesthetic qualities such as age, physiology, mass communication, advertisement and friends. The theory of planned behaviour seeks to connect behaviour and attitudes whereas the SCT recognizes that behaviour is multidimensional. These two theories were used as a means to understand the consumption

pattern, knowledge and attitudes as well as factors which seeked to encourage these behaviours of senior high school students.

Summary

Over the world, different beverages are produced by manufacturers and producing companies. Energy drinks are among the most popular beverages on the international and local markets. There are different brands and forms that are produced with extreme aesthetic qualities. The beverage has been in existence since 1901 even though it did not bear the current name that it has now. Market overview and projections indicate that the energy drink beverage holds about 47.3%. The energy drink beverage is prevalent in many countries. Consumption is basically among the youth and the young adults. Based on gender the consumption of energy drink is predominantly high among males than females.

Energy drinks have different ingredients in it. The major ingredient that you can find in every energy drink is caffeine. It is an active ingredient and it abounds in different quantities in each energy drink. Concentrations of caffeine is in a range of 80 to 400-mg.The consumption of different amounts of caffeine are associated with some detrimental health effects which can be very devastating to the human body. Other ingredients such as taurine, ginseng, guarana, inositol and many more exist in energy drinks with their associated effects.

Energy drinks are not the same as sports drinks. One distinguishing feature of energy drinks is the presence of caffeine which you cannot find in sports drinks. Again, energy drinks have the ability to dehydrate the human body. Sports drinks on the other hand rehydrate the body with stores of fluid.

Physiologically, the consumption of energy drinks has the ability to reduce insulin effect, decrease heart rate, improve vigilance and alertness and increase jump performance. Cognitive effects also involve improving the working memory and enhancing attention.

Consumption of energy drinks are aided by some factors such as television commercials and advertisements, taste of the energy drinks, availability and accessibility, physical activity and knowledge level. The social cognitive learning theory suggests that personal factors such as attitude knowledge, the environment (symbolism) and social persuasions influence the behaviour of people. Energy drink consumption has been identified with senior high school students. Therefore, the researcher seeks to find out the most consumed brand as well as the perceived impact that it has on students.

CHAPTER THREE

METHODOLOGY

The dual purposes of this study were to find out the extent of energy drink usage and its perceived impact on senior high school students. This chapter contains the research design, the population, sample and sampling procedure, instrument used for data collection, data collection procedure and how data was analyzed.

Research Design

This study employed descriptive survey to explore the extent of energy drink consumption among senior high school students and the perceived impact energy drink consumption has on students. Osuala (2007) states that the aim of descriptive studies is to discover the relative incidence, distribution and interrelations among variables under study. In addition, descriptive survey studies involve both large and or small populations from which samples are drawn. These samples are mostly versatile and practical because they provide information on which generalization could be based.

Population

The population for this study comprised students from all the public senior high schools in the Ga South District of Greater Accra Region in Ghana. The schools were, Odorgonno Senior High School (N = 2350), Christian Methodist Senior High School (N = 1900) and Ngleshi Amanfro

Senior High School (*N* = 1624). The estimated student population of the schools in the 2012/2013 academic year was 5874 (Odorgonno Senior High School Admission Register, 2012; Christian Methodist Senior High School Admission Register; 2012, Ngleshi Amanfro Senior High Schools Admission Register, 2012).

Students in the three senior high schools are from an average socio-economic background. Out of the three schools, Odorgonno Senior High School has a boarding facility for both boys and girls. Ngleshie Amanfro and Christian Methodist Senior High Schools are day schools. In addition, Ngleshie Amanfro has a hostel facility for some of the students. All the three schools are of a mixed setting and the students are between the ages of 13 and 21 years.

Sample and Sampling Procedure

A multi-stage sampling technique was adopted to select 600 students from the three schools. According to Krejcie and Morgan (1970), a population that is between 7010 and 5010, a sample size not less than 382 can be used for the study. The multi-stage method of sampling is convenient and economical for large population surveys. It avoids the expensive and time consuming complication of a complete sampling frame (Babbie, 2007).

A 10% sample was calculated on each school population. Therefore, Odorgonno Senior High School (240), Christian Methodist Senior High School (192) and Ngleshi Amanfro Senior High School (168). In addition, 50% stratification was done according to gender. Thus, 120 boys and 120 girls from Odorgonno Senior High School, 98 boys and 98 girls from Christian Methodist Senior High School and 84 boys and 84 girls from Ngleshie

Amanfro Senior High School. The essence was to provide a greater control over the sample composition and a possible assurance of representativeness in the stratification of variables (Visser, Krosnick & Lavrakas, 2006). At random, a total of 12 classes were selected from each school with four from each form; (one, two, three). The systematic random sampling method was used to select 10 boys and 10 girls from each selected class in Odorgonno Senior High School. Eight boys and eight girls were also selected from each of the twelve selected classes from Christian Methodist Senior High School. In Ngleshi Amanfro Senior High School, seven boys and seven girls were also selected from each of the twelve classes. This activity was done by using the class register. The systemic sampling method is much simpler particularly when the list of sampling frame has been prepared (Richardson, Ampt & Meyburg, 1995).

Participants Background Information

A total of 584 students from three schools in the Ga South district in the Greater Accra Region participated in the survey. The participant ages ranged from 13 to 20 years. In Odorgonno Senior High School, 240(41.1%) students participated in the survey. Christian Methodist Senior High School and Ngleshie Amanfro Senior High School had 181(31.0%) and 163(27.9%) students, respectively. A total of 194(33.2%) form one students took part in the survey. One hundred and ninety six (33.6%) and 194(33.2%) students were surveyed from forms two and three respectively from the three schools. Three hundred and eighty (65.1%) of the study participants indicated that they participate in sports for their respective schools and 204(34.9%) did not take part in any sporting activities. Specifically, (N = 177, 30.3%) participate in

soccer, (*N* = 57, 9.8%) participate in volleyball, (*N* = 49, 8.4%) participate in basketball, (*N* = 42, 7.2%) participate in handball, (*N* = 53, 9.1%) participate in athletics and (*N* = 2, 0. 3%) participate in table tennis. In all, 297 males representing 51% and 287 females representing 49% participated in the study.

Instrument

A researcher generated questionnaire (Jane Energy Drink-Questionnaire) (JED-Q) was developed to collect data in this study. The questionnaire was developed based on the literature and constructs guiding the study. The Jane Energy Drink-Questionnaire contained two sections. Section 'A' (question 1 through 6) focused on participants' background information such as gender, age, school, form, whether they are athletes or not and the type of sports they played.

Section 'B' (question 7 through 36) solicited information on the types of energy drink consumed, frequency of energy drinks usage, perceived impact, level of knowledge on energy drink and factors influencing energy drink consumption. This section comprised questionnaire items 7 through 36. The subscale that measured types of energy drink is item 7. Item 8 also measured the frequency of energy drink consumption while items, 13, 23, 24, 28, 32 and 35 measure participants level of knowledge about energy drink usage. Subscale items 11, 16, 18, 20, 22, 29 and 34 measured perceived impact about energy drink usage. In addition, items, 12, 14, 15, 25, 26 measured advert as factor influencing energy drink consumption. Subscale items 9, 19, 27, 30, 33 also measured taste as factor and items 10, 17, 21, 31, 36, measured accessibility as factor influencing energy drink consumption.

The section 'B' was structured as a four point likert scale with responses of Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2) to Strongly Disagree (SD = 1) for positive items. However, a reverse rating of Strongly Disagree (SD = 4), Disagree (D = 3), Agree (A = 2) and Strongly Agree (SA = 1) were assigned to negative items. The participants were to tick (√) the column that best described their opinion on an item. (See Appendix A for copy of instrument).

Validity of the Instrument

Initially, the test items were given to two Master of Philosophy students to assess its face validity. In addition, a senior research assistant from the Department of Health, Physical Education and Recreation (HPER) and a lecturer from the chemistry department also read through and made the necessary suggestions for corrections to satisfy the content validity. Finally, my supervisor from the department of HPER examined the test items thoroughly for further refinement. The instrument was given to ten (10) students of Aggrey Memorial Senior High School in Cape Coast to respond and make suggestions. These systematic activities fine-tuned the instrument for the pilot study.

Pilot Study

Students from the University Practice Senior High School (Cape Coast) were used for the pilot study. The questionnaire was given to 30 students of which 10 students each were selected from form one to form three to complete. The students were encouraged to make comments about the test items. The questionnaire was self-administered and collected. Comments,

suggestions and unanswered test items were discussed to help fine tune the instrument.

Reliability of the Instrument

To establish the reliability of the instrument, data was collected from 30 randomly selected students from University Practice Senior High School. The internal consistency reliability (Cronbach Coefficient Alpha) for this data was calculated using SPSS Version 16.0. The questionnaire yielded an alpha reliability coefficient value of .682. In addition, the section B subscales yielded alpha values ranging from .697 to .500 thus factors affecting energy drink consumption (advert = .500); factors affecting energy drink consumption (taste = .640); factors affecting energy drink consumption (accessibility = .639); level of knowledge on energy drink = (.697). The alpha values were considered moderate (Taylor, 1990). The main study yielded a cronbach alpha of .73.

Data Collection Procedures

An introductory letter from the department of HPER helped me to gain permission from the Heads of the Schools involved in the study and also to establish a rapport with the teachers in the respective schools. A cover letter attached to the questionnaire explained the intent of the study to respondents. The cover letter briefly addressed the purposes of the study and assured the respondents of confidentiality and voluntary participation in the study. In addition, the respondents were made to complete an informed consent form before taking part in the study (See appendix C).

Physical Education teachers of the various schools assisted in the administration of the questionnaire. The teachers were educated on the

purposes, the procedure and form of the administration of the questionnaire. In the various schools, the teachers were required to gather the respondents from the various forms for the random sampling procedure to take place after which they helped to distribute the questionnaire to the respondents. The completed questionnaires were collected 30 minutes after they were distributed. This procedure was repeated in all the three schools.

Data Analysis

Data cleansing was done to put the collected data into the required order before the analysis began. The collected data was coded; SA = 4, A = 3, D = 2, SD = 1 for positive items with the reverse code for the negative items. In addition, analysis was done research question by research question with the use of predictive analytic software of SPSS Windows Version 16.0.

To analyze the type of energy drink mostly consumed by the senior high school students (Research Question one), the frequency of energy drink consumption (Research Question two) and the perceived impact of consuming energy drink (Research Question three), descriptive statistics of frequencies and percentages count were calculated. This is because the intention was to establish the counts used.

To determine the level of knowledge of the senior high students about energy drink, the frequency and percentage count was calculated to determine high knowledge and low knowledge. High knowledge was assumed if 50 percent or more of the participants scored correctly on a particular item. Low knowledge was determined where less than 50 percent of the students scored correctly on that item. (Research Question four). Chi-square was used to test the difference between male and female energy drink consumption as well as

the consumption between sports players and non-sports players. (Research Question five and six).

The multiple regression model was used to analyze the factors predicting energy drink consumption. The multiple regression model is a technique for determining the correlation between a criterion variable (dependent) and a combination of two or more predictor variables (the independent variable) (Babbie, 2007), Thus, a correlation was calculated first to determine how the variables were correlating after which the hierarchical multiple regression model was built. Energy drink consumption was measured in interval scale (4-point likert scale) and the independent variables such as advert, taste and accessibility were measured in interval scales (Research Question seven). Tables were used to present the results of the analysis.

CHAPTER FOUR

RESULTS AND DISCUSSION

The dual purposes of this study were to find out the extent of energy drink usage and its perceived impact on senior high school students in the Ga South District of Greater Accra Region. It was hypothesized that male and female participants in this study will differ in their energy drink consumption. Secondly, sports players would consume more energy drinks than non-sports players.

Research Question 1: What Brand of Energy Drink do Students of Senior High School Consume?

Frequency and percentage distributions were calculated to determine the brand of energy drink (blue jeans, lucozade, gluconade, red bull, rox, and monster) consumed by students in the Ga South District of Greater Accra Region. Frequency data revealed that 94(16%) of the participants always consumed lucozade energy drink, 405(69%) sometimes consumed and 85(15%) never consumed lucozade energy drink at all. Sixty (10%) participants always consumed blue jeans, 381(65%) sometimes took blue jeans and 143 (25%) never consumed blue jeans energy drink. For gluconade energy drink, 54(9%) participants always consumed, 290(50%) sometimes consumed and 240(41%) did not consume gluconade energy drink. Red bull energy drink had 23(4%) participants always patronizing, 154(26%) sometimes took the drink while 407(70%) never consumed red bull energy drink. Rox energy

drink also had 21(4%) participants always consuming, 103(18%) sometimes consumed and 460(78%) never took the drink.

For monster energy drink, 14(2%) participants consumed always. Fifty two (9%) also consumed sometimes and majority 518(89%) never consumed monster energy drink. Lucozade, blue jeans and gluconade were the three most patronized energy drinks. In addition, lucozade was the highest (85%) consumed energy drink by the students in the Ga South District of Greater Accra (See Table 1 for data).

Table 1: Frequency of Brands of Energy Drink Consumed by Senior High School Students in the Ga South District

Energy Drink	Not at All		Sometimes		Always		Total Usage
	f	%	f	%	f	%	
Lucozade	85	15	405	69	94	16	499
Blue jeans	143	25	381	65	60	10	441
Gluconade	240	41	290	50	54	9	344
Red bull	407	70	154	26	23	4	177
Rox	460	78	103	18	21	4	124
Monster	518	89	52	9	14	2	66

Among the energy drinks listed above, lucozade, blue jeans and gluconade were the three most consumed energy drink. Red bull, rox and monster were the least consumed energy drinks (See Table 1). The current study findings revealed that 85% (499) of the participants consumed lucozade. Even though there is limited data to indicate when lucozade penetrated the Ghanaian market, Lile (2013) purports that the production of lucozade dates back as far as 1927 and stands as one of the oldest brands of energy drinks on the international market and in Ghana. A possible reason for the high

consumption of lucozade energy drink could be due to the long existence of this brand as well as the different brands of flavours associated with this energy drink. Lucozade brands include classic, orange, tropical, lemon, orange citrus clear and wild berry flavour (Superbrands, 2004). The variety of brands associated with lucozade has made the product attractive to Ghanaians. It is not surprising that majority of the study participants consume lucozade.

The study findings again revealed that blue jeans energy drink was the second highest consumed energy drink by students in the Ga South District of Greater Accra Region. Four hundred and forty one (75%) participants consumed blue jeans energy drink. Blue jeans energy drink has developed a strong brand image through the sponsorship of important events in Ghana and internationally. A strong brand image of blue jeans energy drink may mean that the company has a powerful recognition where people will get to know the product since they may have easy access to the product. Again, blue jeans energy drink company has adopted a strategic distribution of its product which has helped them to establish some position in the energy drink market. They also run adverts in both the print and electronic media. The distribution pattern could be a tool which is aiding the consumption this beverage.

In this study, red bull, rox and monster were the three least consumed energy drinks by students in the Ga South District of Greater Accra (See Table 1). The study showed that 407(70%) study participants did not consumed red bull energy drink. This energy drink company was launched in 1987 (Hoover's Incorporation, 2011). Perhaps, this energy drink is not known well in Africa and in Ghana since the company has not been in existence for a long time as compared to some other brands. Hence, the low patronage in Ghanaian

schools. Again, red bull energy drink has seen little product change since its inception (Cirillo, 2009). This change is as a result of the inclusion of a sugar free version. Therefore, lack of innovations in the product lines could possibly be a factor hindering the consumption of red bull energy drinks by the students.

This study revealed that majority 518(89%) did not consume monster energy drink. This made monster energy drink the least consumed energy drink in this study. According to Beverage Network (2007), monster energy drink has been in existence for some time now but has suffered series of change of company name and product line. Further, the advertisement strategy of monster beverage incorporation could be responsible for the low patronage since it does not advertise through television and the media. They promote their products by giving shirts, towels, water bottles and other memorabilia at sponsored events and promotions (Hoover's Incorporation, 2011). This can prevent patronage since media advertisement is one of the strongest tools in communicating products to consumers. This continuous change in company name might have let people lose track of what the company produces leading to low popularity with a subsequent reduction in product consumption.

Research Question 2: What is the Frequency of Energy Drink Consumption among Senior High School Students?

Frequencies were calculated to determine the energy drink consumption among senior high school students. In this study, overall, 273(46.7%) participants in this study consumed energy drinks. Frequency data showed that lucozade energy drink had 243(41.6%) participants consuming at least a can in a week, 163(27.91%) participants took at least a

can of lucozade energy drink in a month, 93(15.92%) participants also took a can of lucozade in three months and 85(14.55%) participants did not take at all.

For blue jeans energy drink, 123(21.06%) participants consume at least a can a week, 221(37.84%) participants consumed at least a can a month, 97(16.61%) participants also took at least a can in three months while 143(24.48%) participants did not consume at all. One hundred and sixty-three (27.91%) participants also took at least a can of gluconade a week, 120(20.55%) participants consumed at least one can in a month, 61(10.44%) participants consumed at least a can in three months and 240(41.09%) participants also did not consumed gluconade energy drink at all.

Fifty-nine (10.10%) participants took at least a can of red bull a week, 77(13.18%) students took a can monthly, 41(7.02%) of students took at least a can of red bull in three months and 407(69.69%) did not take red bull at all. Further, the frequency data showed that 61(10.44%) participants consumed a can of rox energy drink a week, 45(7.70%) participants consumed at least a can of rox energy drink a month, 18(3.08%) participants also took a can of rox energy drink in three months while 460(78.76%) did not consume rox energy drink at all. For monster energy drink, 21(3.59%) participants took at least a can in a week, 28(4.79%) students took a can in a month, 17(2.91%) took a can in three months and 518(88.69%) did not consume the drink at all (See Table 2 for data).

Findings from the this study indicated that majority of the participants (243) for lucozade, (163) for gluconade, (123) for blue jeans consumed one can of energy drink a week. In a month, blue jeans, locuzade and gluconade

were the three highest consumed energy drinks with 221(37.84%), 120(20.55%) and 163(27.91%) consumption rates respectively. The consumption of energy drink by participants in three months further showed that lucozade, blue jeans and gluconade were still the highest patronized by senior high school students in the Ga South district of Greater Accra. This consumption pattern made them the highest consumed energy drinks by the students in this study.

This study finding is concordant with Oddy and O'Sullivan (2009) who indicated that young adults consume different forms of energy drinks. Other researchers including Campbell et al. (2013) have indicated that energy drinks are one of the most popular dietary supplements consumed by students. Heckman et al. (2010) have indicated that today's market for majority of the energy drink companies are targeted at adolescents. A study by Alsunni and Badar (2011) on energy drink consumption patterns revealed that 134 participants were irregular routine uses, 11 consumed one can in a day, 20 consumed 2-3 times in a week and 21 also consumed 4-7 times in a week. The above study did not indicate which energy drink was preferred by participants. But the major reason for their consumption pattern was to give the participant company when they are with their friends. Similarly, a study in India on adolescent footballers also revealed that majority (80%) of the participants in the study consumed 1-2 cans of energy drink in week. Additionally, 20% also consumed 3-4 cans in a week. These participants sought to regain the energy they had lost as the reason for their consumption pattern. The presentation above depicts different forms of consumption patterns from the present study. The three energy drinks (lucozade, blue jeans, gluconade) have been on the

Ghanaian market for some time now and have penetrated the market niche so well. They have attracted the attention of most consumers because they are popular. This has paved the way for continuous consumption by the people of Ghana. Again, students may be consuming these three brands quite frequently due to the price that they are being sold. Thus, the cost of the energy drink may be low and therefore these students are able to purchase them frequently.

Findings in this study revealed that monster energy drink was the least consumed energy drink. Twenty-one consumed at least a can in a week, 28 consumed a can in a month, 17 consumed a can in three months. Monster energy drink is among the energy drinks that have labelled their drink. Unfortunately the drink has more than 15 ingredients in it. In addition, the product has a warning label advising people not to consume more than 48-oz per a day (Centre for Science in the Public Interest, 2011). It also goes by the slogan, unleash the beast (Penalty, 2006). It is plausible that secondary school students in this study are adhering to the advice stated on the can and that has resulted in the low consumption. Another possibly explanation for the low consumption may be as a result of the amount of caffeine in the drink and the number of ingredients as well. Finally, the slogan for the product may also be a factor which is preventing people from consuming since the word beast is not a friendly one.

Table 2: Frequency of Energy Drink Consumption by Senior High School Students

Energy drink	Rox		Blue jeans		Gluconade		Lucozade		Red Bull		Monster	
	f	*(%)*	*f*	*(%)*	*f*	*(%)*	*f*	*(%)*	*f*	*(%)*	*f*	*(%)*
Not at all	460	(78.76)	143	(24.48)	240	(41.09)	85	(14.55)	407	(69.69)	518	(88.69)
At least a can in 3 months	18	(3.08)	97	(16.61)	61	(10.44)	93	(15.92)	41	(7.02)	17	(2.91)
At least can in a month	45	(7.70)	221	(37.9)	120	(20.55)	163	(27.91)	77	(13.18)	28	(4.79)
At least a can in a week	61	(10.44)	123	(21.06)	163	(27.91)	243	(41.61)	59	(10.10)	21	(3.59)

Research Question 3: What is the Perceived Impact of Consuming Energy Drink by Senior High School Students?

To determine the perceived impact that students get when they consume energy drinks, frequency and percentage counts were calculated. The frequency data in Table 3 showed that 121(20.7%) strongly agreed that they reacted more quickly when they consumed energy drinks, 252(43.2%) agreed, 101(17.3%) and 110(18.8%) either disagreed or strongly disagreed. Two hundred and sixty-nine (46.1%) participants strongly agreed that energy drinks helped to improve performance during sports, similarly 213(36.5%) participants agreed, 49(8.4%) participants disagreed and 53(9.1%) strongly disagreed that energy drink consumption improved performance. In addition, 119(20.4%) of the respondents strongly agreed that they felt more alert when they consumed energy drinks, 262(44.9%) agreed, 116(19.9%) and 87(14.9) disagreed and strongly disagreed, respectively. Meanwhile, 103(17.4%) participants strongly agreed that they consumed energy drink to stay awake when studying, 164(28.1%) respondents also agreed whereas 165(28.3%) disagreed and 152(26.0%) strongly disagreed. In addition, 215(36.8%) consumed energy drinks because it gives them energy, similarly 277(47.4%) respondents agreed while 43(7.4%) disagreed and 49(8.4%) participants strongly disagreed.

Regarding the issue that the consumption of energy drink promotes attention when studying, 100(17.1%) participants strongly agreed, 230(39.4%) agreed, 160(27.4%) disagreed and 94(16.1%) strongly disagreed. Additionally, 73(12.5%) participants strongly agreed that they take energy drinks to enjoy a party, 157(26.9%) agreed, 175(30.0%)

disagreed and 179(30.7%) of the respondents strongly disagreed (see table 3 for details). Findings of the study showed that most of the students in the senior high school agreed that they experienced some perceive impact after consuming energy.

Findings in the study revealed that 46.1% strongly agreed and 36.5% agreed that energy drinks help to improve performance during sports competitions. This finding is supported by Del Coso et al. (2011) who analysed the positive and negative effect of energy drink consumption on athletes. The study revealed that 50% of athletes who consumed these beverages during training and before competitions experience sports performance gains between 3% and 7%. In a double- blind and placebo study on basketball players, showed that the ingestion of a 3-mg caffeinated energy drink improved jump performance (Abian-Vicen et al., 2014). Share et al. (2009) also investigated the impact of 2-mg to 4-mg caffeinated energy drink on male students in a double trap shooting in basketball. Results showed improvement in performance during the target shooting. In addition Foskett et al. (2009) found that the ingestion of a 6-mg of caffeinated energy drink increased passing accuracy in a soccer activity. The caffeine in these energy drinks may be a contributing factor which is likely to enhance performance.

Table 3: Perceived Impact of Consumption of Energy Drink among Senior High School Students

Indicators	SA		A		D		SD	
	f	%	*f*	%	*f*	%	*f*	%
I react more quickly when I consume energy drinks	121	20.7	252	43.2	101	17.3	110	18.8
Energy drinks help to improve performance during sports competitions	269	46.1	213	36.5	49	8.4	53	9.1
I feel more alert when I consume energy drinks	119	20.4	262	44.9	116	19.9	87	14.9
I take energy drinks to stay awake when studying	103	17.6	164	28.1	165	28.3	152	26.0
I consume energy drinks because it will give me energy	215	36.8	277	47.4	43	7.4	49	8.4
Energy drinks promote attention when studying	100	17.1	230	39.4	160	27.4	94	16.1
I take energy drinks to enjoy a party.	73	12.5	157	26.9	175	30.0	179	30.7

Findings from this study again revealed that 63.9% agreed that they reacted more quickly when they consumed energy drinks. This is congruent with, Scholey and Kennedy (2004) who purported that energy drinks are individually known to increase the cognitive functions of reaction speed. Addicott and Laurienti (2009) found that caffeine has a greater ability to enhance reaction time in an abstained state only. Childs and De Wit (2008) in a study on a treatment group which received a 200-mg of caffeinated energy drink with prolonged wakefulness significantly improved reaction times while completing their computer task and questionnaires. Other studies have shown decrease in reaction time following the consumption of energy drinks. A study by Howard and Marczinski (2010) on the acute effect of a glucose energy drink on a well validated behavioural control task (cued go no-go task) indicated that compared with a placebo and no drink conditions, the energy drink dose decreases reaction times on behavioural control task. The genetic make-up of people are different and therefore people are likely to react differently to the consumption of energy drinks especially in the case where there are different amounts of ingredients in the different forms of energy drinks.

Findings from this study revealed that 36.8% and 47.7% of the participants strongly agreed and agreed that they consumed energy drinks because it gives them energy. A study by Bawazeer and AlSobahi (2013) on prevalence and side effects on energy drink consumption revealed that 32.8% of students consumed energy drinks to get energy in general. Despite the fact that the figures are not the same, they have a similar line of perception. Further support to the findings above, Meier (2013) purports

that the type of sugar found in energy drinks is food energy that can be used by the human body as source of energy. Contrary to the findings, energy drinks do not provide energy of high quality or long term energy reserve. Rather energy drinks are harmful to the human body (IOWA High School Athletic Association, 2011). The U.S. Anti-Doping Agency (2007) reports that the energy needed to maintain difficult and long training programmes as well as other daily responsibilities cannot be found in a can or bottle of energy drink. In addition, the perception that the drink is working and supplying energy from the ingredients is deceptive. For example, producers of the five-hour energy drink claim that energy drinks contain ingredients which provide energy. One major constituent of this energy drink is vitamin B-12 supplementation in a synthesized form known as cyancobalamin. Research has shown that cyancobalamin has very little effect on cognitive function (Ford & Flicker, 2010). Many energy drink adverts project themselves to give quick energy after consumption. It is therefore not surpising that most students believe that they will gain energy after consuming these energy drinks.

Findings from my study indicated that 65.3% felt more alert when they consumed energy drinks. Many studies in humans have shown a significant increase in alertness after the consumption of caffeinated energy drinks (Hewlett & Smith, 2007). In support of the findings to this study, a study by Stephens et al. (2014) reported that 60% users of energy drink exhibited an improvement in their mental alertness after consumption. According to Lieberman et al. (1987), the consumption of energy drinks with 32 to 50-mg of caffeine enhances significant improvement in alertness.

Similarly, in well-rested adolescents, a significant increase in their mental alertness has been observed after 50 minutes of consumption of an energy drink with 140-mg of caffeine level (Kennedy, Galloway, Dickau, & Hudson, 2008). The alertness component experienced by most athletes in this study could be as a result of the ingredients that are used in the manufacturing of energy drinks. Owing to the fact that caffeinated energy drinks have a relation with one's ability to be alert, there is no doubt that caffeine is likely to be one of the ingredients enhancing an individual's alertness.

Research Question 4: What is the Level of Knowledge of Senior High School Students about Energy Drinks?

To determine the level of knowledge among senior high school students about energy drink consumption, frequency and percentage counts were calculated. The agreed and strongly agreed columns were collapsed together and the disagreed and strongly disagreed columns were also collapsed together. A high frequency obtained for the disagreed option on items labelled 'a', 'b', 'e' showed that students have low knowledge on that item. For items 'c' and 'd', 'a' high frequency for the agreed option shows high knowledge on that item. A high frequency for the agreed option on item 'f' shows that students have low knowledge on that item. Frequencies representing high knowledge were put together likewise frequencies representing low knowledge. The average signified high and low knowledge. In all, 342 (58.61%) students had low knowledge while 242(41.38%) had high knowledge. The above description shows that most

students had low level of knowledge about energy drink beverage (See Table 4 for data).

Table 4: Frequency Data on the Level of Knowledge of Students about Energy Drink Consumption

Variable		Agree		Disagree	
		f	%	*f*	%
a.	Caffeine is the most active ingredient in ED.	203	34.8	381	65.3
b.	The consumption of ED can cause dehydration.	145	24.8	439	75.2
c.	EDs contain high amount of Sugar.	370	63.4	214	36.6
d.	EDs contain stimulants apart from caffeine and sugar.	391	66.9	193	33.1
e.	Consuming EDs can be harmful to your health.	147	25.2	437	74.8
f.	Sports drinks are the same as Energy drinks.	390	66.8	194	33.2

Note: ED stands for Energy Drink.

Findings from this study showed that 66.8% of the participants agreed that sports drinks are the same as energy drinks. The result showed that some students perceive sports drinks to be the same as energy drinks. This implies that the level of knowledge of some students in the Ga South district of Greater Accra is low. Sports drinks are different from energy drinks considering the content of these drinks and the calorific levels. Sports drinks have 13-19 grams of carbohydrate while energy drinks have

18-25 grams of carbohydrate. The calories contained in energy drink ranges from 10-70 per a serving while that of sports drink is between 10-270 calories (American College of Sports Medicine, 2011; Coombes, 2005; National Federation of State High School Association, 2011). A study by Itany et al. (2014) revealed that 15.7% of the respondents considered energy drinks as sports drinks. Even though the figure is comparatively lower, respondents in both studies had similar knowledge level. Holloman et al. (2009) and Wardle, Parmenter and Waller (2000) have indicated that an individual's level of knowledge on nutrition is associated with positive eating behaviours. Many energy drink cans have insufficient information on them. In addition, the nature of product marketing adopted by manufacturers of energy drinks projects the beverage as a sports drink. The insufficient information as well as the marketing strategy could be possible reasons why students are substituting energy drinks for sports drinks.

Findings in this study showed that 65.3% disagreed that caffeine is the most active ingredient in energy drinks. Caffeine is graded as the most pharmacological active substance in all energy drinks (Finnegan, 2003). The caffeine content of most energy drinks is in the range of 80-mg per 250-ml and could be as high as 400-mg. A lot of concerns have been raised about the active nature of caffeine when consumed even in a quantity of 100-mg per a day. Possible effects such as gastrointestinal problems, nervousness, restlessness, diuress and insomnia are likely to occur. Other symptoms such as tachycardia arrhythmia and muscle twitching can also occur for the consumption of caffeine levels high than one g/day (Seifert et al., 2011). Further, the severity of high quantities of this active substance

can result in stroke, mania and sudden death (Berger & Alford, 2009). Moreover, the action of caffeine after consumption acts as an adenosine receptor blocker in the brain (Pettenuzzo et al., 2008). Also, the active nature of caffeine causes an increase in the secretion of epinephrine which can lead to a variety of secondary metabolic changes that can affect physical and mental performance (Graham, 2001). The active nature of caffeine and the amount of caffeine in energy drinks are contributing factors to the occurrence of many diseases and illnesses that people suffer from after consuming energy drinks.

The findings of this study indicated that three-fourth (75.2%) of the students disagreed that the consumption of energy drinks could cause dehydration. The School Health Council, (2011) reports that energy drinks have the ability to dehydrate the body during periods of exercise. Our bodies do not detect thirst until we are dehydrated to a level of 8%-2% of body weight. Further, if dehydration levels exceed 3%, nutrients and electrolyte supplementation are necessary to restore normal hydration level which can take up to 24 hours to achieve (Sagawa et al., 1992). For every 1% decline in weight from fluid loss results in increases in resting heart rate by 3-5 beats per minutes. Performance begins to be affected when dehydration exceeds 1-2% (Casa, Armstrong, Montain, Rich & Stone, 2000). Long term dehydration leads to fatal illnesses such as cancer and renal system disorders (Sagawa, et al., 1992). In view of the fact that most energy drinks abound in different quantities of caffeine, (Centre for Disease Control, 2010) has reported that dehydration and caffeine are contributing factors to the onset of rhabdomyolosis among firefighters. Again, the link

between dehydration and hyperthermia has shown to result in cardiovascular instability that puts the individual at risk for heat exhaustion (Ganio, Casa, Armstrong & Maresh, 2007). Clearly, dehydration is undesirable during any strenuous physical activity. The act of drinking water is one of the most efficient ways of rehydrating the body during and after any exhaustion.

Findings from this study revealed that 74.8% of the participants disagreed that the consumption of energy drink beverages can be harmful to one's health. Thus, they are of the opinion that the consumption cannot cause any problem to the human body. Harnack and Stang (1999) have reported that the fastest growing population in caffeine use is the adolescents. Relatedly, the rise in caffeine use is associated with the development of caffeine containing beverages called energy drinks. Many studies have examined the effects of the potential individual ingredients on the health of humans.

Additives such as gingko biloba, taurine, amino acid, caffeine and ginseng have been shown to have effects on the nervous and cardiovascular systems (Russo, 2011; Torbey, 2011; Franks, 2012; Rath, 2012). Russell (2007), reports on some adverse effects associated with the consumption of carnitine in energy drinks such as headache, stuffy nose, abdominal pain, vomiting and diarrhoea. Similarly, some concerns have been established about yerba mate (an ingredient in energy drink) and the occurrence of certain forms of cancer such as lung cancer, bladder cancer, renal cancer and esophageal cancer (Heck & De Mejia, 2007).

Itany et al. (2014), in a study observed that 29.6% of their participants experienced at least one adverse effect after consuming an energy drink. They therefore concluded that modifying some wrong perceptions regarding the use and benefits of energy drink consumption is important. In a study by Aluqmany et al. (2013), 86.2% of the participants did not recommend the consumption of energy drinks to their friends. This may result from the withdrawal symptoms experienced by 34.9% of the participants in the same study. An observational study (19 months) reported a positive relation between the intake of sugar sweetened beverages and the prevalence of childhood obesity. Fifty-seven percent of the participating children had their BMI increased in the observational period. Even though the study was observational, results were consistent with the mechanism that the consumption of sugar sweetened beverages such as energy drinks could lead to obesity (Lidwig, Peterson & Gortmaker, 2001). Energy drinks also increase the risk of obesity due to their high calorie and sugar content (Schneider & Benjamin, 2011; Clauson et al., 2008). Many health effects encountered have an association with the ingredients that are used in producing energy drinks. Possibly, the severity of people's illness and diseases may have a link with the ingredients which is used in manufacturing the energy drink.

Research Question 5: Do Males and Females Differ in their Energy Drink Consumption?

Chi-square was calculated to determine whether there was any difference in the consumption of energy drink between male and female students in the Ga South district of Greater Accra. The result indicated that

gender χ^2 (1) = 6.08 $p < 0.05$ was statistically significant. Thus, more males (151, 25.9%) consumed energy drinks than females (122, 20.9%). Hence, the researcher fails to reject the hypothesis which stated that males and females differ in their energy drink consumption practice.

Table 5: Difference between Male and Female Students in their Energy Drink Consumption

	Consumption				
Variables	No *f (%)*	Yes *f (%)*	*P*	*df*	χ^2
Gender			0.02	1	4.07
Male	146(25.0%)	151(25.9%)			
Female	165(28.3%)	122(20.9%)			
Total	311(53.3%)	273(46.7%)			

The study findings revealed significant consumption difference between males and females students in the Ga South District of Greater Accra. This study finding is in agreement with Alsunni and Badar (2011) that males consume more energy drinks than females. Relatedly, Peymani et al. (2012) also showed that male consumers of energy drink were significantly ($p < 0.001$) higher than female consumers. Hidiroglu et al. (2013) also brought to bear that male students consumed energy drinks more than the females ($p < 0.001$). Similarly in the United States, report of emergency visits by patients to hospitals from 2007 to 2011 doubled from 10,068 to 20,783 with more male patients than females (Substance Abuse and Mental Health Services Administration, 2011). Research has also revealed gender differences in food choices. Wardle et al. (2004) have

shown that differences in food choices in relation to gender exist because most females attach much importance to healthy eating. In addition, they show such attitudes because of the concern that they have on weight management.

In this study, the use of energy drink might be less in females than in males because most Ghanaian females are physically inactive than their male counterparts. Energy drinks are mostly marketed for increasing performance, energy and vitality which is an attribute of most males. Therefore, most males are encouraged to consume than the females. Another possible explanation to this result is attributed to the marketing strategies which have males as their major targets rather than females. The non-existence of regulations in many countries has resulted in the aggressive marketing of energy drinks which are primarily targeted at males in particular. The male dominance in the study could also result in the high consumption pattern for males.

Research Question 6: Do Sports Players and Non-Sports Players Differ in the Consumption of Energy Drink?

To determine the difference in energy drink consumption between sports players and non-sports players, Chi-square was calculated. The results revealed that whether sports player or not χ^2 = (1) 6.08, $p < .0009$ was statistically significant. Thus, sports players 190(32.5%) consumed more energy drinks than non-sports players 186(31.8%). Hence, the hypothesis which states that sports players will consume more energy drinks than non-sports players fails to reject.

Table 6: Difference between Sports Players and Non-Sports Players in their Energy Drink Consumption

	Consumption				
Variables	No *f (%)*	Yes *f (%)*	P	*df*	χ^2
Sport players or not			0.009	1	6.08
No	125(21.4%)	83(14.2%)			
Yes	186(31.8%)	190(32.5%)			
Total	311(53.3%)	273(46.7%)			

The study findings indicated that 186(31.8%) students who played sports do not consume energy drinks. The study findings further revealed that 190(32.5%) study participants play sports and consume energy drink as well. The data above shows a slight difference in the consumption pattern energy drink between sports players and non-sports players. Froiland et al. (2004) have indicated that energy drink use among American college athletes is 73%. A 75% prevalence use is reported for Canadian college athletes (Kristiansen et al., 2005). Malinauskas et al. (2007) have indicated that student athletes take energy drink at an increased rate because many marketing advertisement relate energy drinks to positive sports performance. According to Bonci, (2002) very high expectations have erupted from the consumption of energy drinks because they are considered as a quick means to boost extra energy to get through the demands of the day, compensate for a related deficiency, burn fat and increase muscle mass. A total of 190(32.5%) participants who participate in sports consumed energy drinks in this study. Even though the prevalence rate in

America and Canada are quite higher than what was obtained in this current study, it shows that the attitude of consuming stimulants for athletic performance is gradually making way into sports at the second cycle level. In addition, 269(46.1%) and 213(36.5%) strongly agreed and agreed respectively that energy drinks help to improve performance during sports competitions. This is a further justification of the student believe in energy drink beverages as a stimulant for achieving athletic performance. The researcher is of the view that the result turned out this way because some student athletes have developed the quest to achieve laurels through the participation in physical activity. In addition, the temptation to improve athletic performance and be associated with the athletic identity could influence the consumption of energy drinks.

Research Question 7: What Factors Influence Energy Drink Consumption among Senior High School Students?

To determine the factors predicting energy drink consumption among senior high school students, a hierarchical multiple regression analysis was carried out. Before then, correlations were run between the dependent variable (consumption) and the independent variables (taste, advert and accessibility). Correlation results indicated that there was a high correlation (r = .71) between accessibility and taste, between consumption and accessibility (r = .70) and moderate correlation (r = .47) between accessibility and advert. However, advert correlated very low with all other independent variables and consumption (See Appendix C). Therefore, taste was entered into model 1 while accessibility and advert (combined) into model 2.

A hierarchical multiple regression results showed that in model 1, taste was significant *t* (1,582), 35.98, $p < .05$ and contributed 50% of the variance in the consumption of energy drink. In model 2, accessibility and advert were introduced. The model 2 was also significant *t* (3,580), 11.63, $p < .05$. This model contributed an additional 19% to the variance of energy drink consumption. Overall, the independent variables contributed 69% to the variance of energy drink consumption among senior high school students. In addition, taste contributed highest (49%) followed by accessibility (46%) and advert (13%) (See Table 5 for data). The findings therefore indicated that taste, accessibility and advert are useful predictors of the factors of energy drink consumption in senior high schools.

Table 7: Regression of Advert, Taste and Accessibility on Energy Drink Consumption

Variables		*b*	Beta	*R*	*R2*	*t*	*p-value*
Model 1		22.34		.71	.50	35.98	.001
	Taste	1.67	.71			24.34	.001
Model 2		11.76		.83	.69	11.63	.001
	Taste	1.15	.49			18.91	.001
	Access	.94	.46			17.70	.001
	Adverts	.39	.13			5.54	.001

Three research items were used to measure factors that enhanced energy drink consumption. The general regression model indicated a significant prediction of (69%) of the factors of energy drink consumption. All the three factors showed a significant prediction. For example, “taste”, “accessibility” and “advert” as factors predicting the consumption of energy

drink were significant. Probably, these three factors (taste, accessibility, advert) were significant in determining energy drink consumption in senior high schools because there are different reasons for which students consume different types of foods.

Data in this study showed that "taste" as a factor had the highest prediction of 49% of energy drink consumption. Taste has continuously been reported as the major influence on food behaviours (European Food Information Council, 2012). Moreover, the sensory qualities of beverages and food are critical to dieting preference and taste is the most important determinant of beverage consumption (Leterme et al., 2008). In support of this finding, a study by Schmidt and Mclntire (2008) found 53.4% stating taste as a driving force for their energy drink consumption. Most energy drinks abound in high quantities of sugar. It is therefore not surprising that taste was the highest predicting factor of energy drink consumption in this study.

Accessibility as a factor was the second highest predictor in this study with 46%. Wansink, Painter and Lee (2006), found out that proximity and visibility of beverages leads to an increase in consumption particularly in adolescence. Wansink (2004) also purports that proximity can facilitate visibility of beverages which can cause an increase in temptation and hunger. The easy accessibility of beverages from convenience stores makes them appealing to the adolescents to consume. Thus, availability and accessibility are two ingredients that determine adolescent beverage choice (Hamilton et al., 2013). Different forms of energy drinks are sold in almost every shop around. People are consuming it at an alarming rate because

they can easily walk to any shop and purchase any energy drink since there are no restrictions on the sale of energy drinks in Ghana.

"Advert" as a factor in this study had the least prediction with 13%. According to Lal (2008), energy drink adverts were initially targeted at only athletes with the indication that they were directed to a specific group. Currently, the adverts and claims by energy drink producers are directed towards all teenagers (Harris & Schiwartz, 2013). For example, lucozade energy drink realizing that sales had dropped quickly changed its advertising strategy to project the drink to have the ability to replace lost energy. Further, most energy drink firms have adopted the cross-promotional tactics to reach their consumer base by blending their product with extreme sporting events and also advertising their products in connection with popular music icons (Agriculture and Agri-Food Canada, 2008). The redirection plan is geared towards encouraging people to believe in the energy drink adverts and consume more of the energy drinks. It not surprising that various forms of energy drinks are being produced to meet different needs of people.

The social cognitive theory (SCT) of Bandura (1986) explains the dynamics and reasons behind certain behaviour patterns. Bandura theorized that an individual's behaviour is multidimensional. Thus, a person's behaviour (personal factors) and the world (environment) which involves modeling and persuasions create reciprocal effects on behaviours. This means that despite the innate urge that people may have in relation to their choice of food, there are other factors in the environment that may persuade the consumption of certain food choices. According to the European Food

Information Council, (2012) physiological nutritional needs are not the only reasons for which people make choices. Factors such as hunger, taste, appetite, cost, income, availability, access, education, time, culture, family, peer, meal patterns, mood, stress, guilt beliefs, knowledge and attitude have the ability to influence an individual's food choice. In this study, we experienced the impact of taste, accessibility and advert being factors enhancing energy drink consumption which relates greatly to the social cognitive theory. In summary, the food choices made by individuals are based on factors that are physiological, nutritional, environmental and sociocultural. In addition, our food choice addresses our psychological and emotional satisfaction.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The dual purposes of this study were to find out the extent of energy drink usage and its perceived impact on Senior High School Students in the Ga South District of the Greater Accra region. This chapter is composed of the summary, conclusions and recommendations gathered based on the findings of the study and suggestions for further research.

Summary

The consumption of stimulant beverages such as energy drinks by senior high school students is an attitude that is gradually creeping into the Ghanaian society. Various reasons have accounted for the consumption of these drinks. Energy drink consumption is at the peak for the youth who are between the ages of 18-34 years. Over the years Ghana has seen the proliferation of different types of energy drinks on its market. All these energy drinks have different marketing claims which are promoting the consumption. One can see the sale of energy drinks in virtually all shops, filling stations, super markets, shopping malls and gift shops. The increase in energy drink on the open market comes with increased consumption by young men and women whose health needs to be protected.

By consuming these drinks, students are presented with numerous challenging health conditions since they consume drinks which have numerous ingredients in relatively different proportions which are

determined by producers and manufacturers. In addition, they consume drinks with ingredients quantity which they have no knowledge or idea about.

As researchers make efforts to research into the content of individual ingredients of energy drinks, it is the responsibility of students to read the labels on these drinks to ensure safety. In addition, students will get to know the amount of caffeine, sugar, guarana and taurine content since these are the most prevailing ingredients in all energy drinks.

The framework for this study was in five stages, with each stage summarized into one chapter. Chapter one outlined the various types of energy drinks and the market shares purported to be held by the beverage energy drink. Also, the chapter highlighted the alarming rate at which new forms of energy drinks were been developed to accommodate the different needs of people.

Literature related to the study was reviewed in chapter two. Related literature was reviewed under the following subtopics; the historical overview of energy drinks, the content of energy drinks, the differences between energy drinks and sports drinks and the prevalence of energy drink consumption among the youth. Other areas reviewed include the different types of energy drinks, the effects of energy drinks, theoretical and conceptual framework and the factors influencing energy drink consumption.

This study used the descriptive survey design. The multi-stage sampling technique was used to select 584 students from three second cycle institutions: Odorgonno Senior High School, Christian Methodist Senior

High School and Ngleshie Amanfro Senior High School in the Ga South District of Greater Accra. A researcher generated questionnaire (JED-Q) was used to collect data. The 36 item questionnaire comprised two sections 'A' and 'B'. Section 'A' solicited participants' background information such as gender, age, school, form, sports man or not and the sports played. Section 'B' measured the brand of energy drink consumed and the frequency of consumption. In addition, section 'B' measured the level of knowledge, the perceived impact and the factors affecting energy drink consumption (advert, taste, accessibility) on a four-point-likert scale. The questionnaire was pre-tested at the University Practice Senior High School. The JED-Q yielded a high reliability co-efficient of 0.73 after the main study. Frequency and percentages were used to analyze participants' background information as well as research questions one to four. In addition, chi-square and multiple regression were used to analyze research questions five, six and seven.

Findings

The following findings were obtained from the study conducted. Most students in the Ga South District of Greater Accra consumed lucozade, blue jeans and gluconade. The least consumed energy drinks by students were red bull, rox and monster energy drinks. Most students were of the view that energy drinks helped to improve performance during sports. Most of the students had the view that sports drinks were the same as energy drinks. In this study, most students disagreed that caffeine is the most active ingredient in energy drink. The findings indicated that lucozade was the highest patronized energy drink. In addition, 234 students

consumed at least a can in a week. Most students disagreed that the consumption of energy drinks could cause dehydration. Most of the students disagreed that the consumption of energy drinks could be harmful to one's health. Among the three factors predicting the consumption of energy drinks, taste was the highest factor that influenced the consumption of energy drinks among senior high school students. There was significant difference in the consumption of energy drinks between male and female students in the Ga South District of Greater Accra Region. There was a statistically significant difference between sports players and non-sports players in their level of energy drink consumption.

Conclusions

Based on the findings of the study, it could be deduced that students had less knowledge about the ingredients of energy drinks. Also, consumption of energy drink among the students was high due to inadequate knowledge. This resulted in more than half of the students consuming energy drinks for high sports performance impact. The taste of energy drinks, advert and accessibility were the major contributing factors influencing the consumption of energy drinks.

Recommendations

In relation to the conclusion of the study the following recommendations were drawn;

1. The heads of schools should help organize education to increase knowledge about energy drinks.
2. Coaches and sports trainers should educate their players about the ill effect of energy drink consumption.

3. There is a need to explore the influence of energy drink consumption on sports performance among Senior High School Students.

Suggestions for Further Studies

1. A study is needed to explore the link between energy drink usage and sports performance of athletes in the Ga South District of Greater Accra Region.

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APPENDICES

APPENDIX A

UNIVERSITY OF CAPE COAST

FACULTY OF EDUCATION

DEPARTMENT OF HEALTH, PHYSICAL EDUCATION AND RECREATION

QUESTIONNAIRE FOR SECOND CYCLE STUDENTS

SECTION A: Background Information.

Instruction: Please mark (√) the box corresponding to your choice concerning each statement below.

1. Gender

   a) Male [ ] b) Female [ ]

2. How old are you?

   a) Below 13 [ ]

   b) 13-15 [ ]

   c) 16-19 [ ]

   d) 20 and above [ ]

3. I attend ……..

   a) Odorgonno [ ]

   b) Christian Methodist [ ]

   c) Ngleshie Amanfro [ ]

4. I am form ……..

   a) Form one [ ]

   b) Form two [ ] c) Form three [ ]

5. Are you a Sports man or woman? a) Yes [ ] b) No [ ]

6. Which of the following sports do you play or take part in your school team?

   a) Soccer [ ]

   b) Volleyball [ ]

   c) Basketball [ ]

   d) Handball [ ]

   e) Athletics [ ]

   f) None [ ]

   g) Others (specify) …..……

SECTION B

Instruction: Please indicate by marking (√) how you take any of the following energy drinks. Kindly answer all the questions.

7.	Energy Drink	Always	Sometimes	Not at all
	Blue Jeans			
	Lucozade			
	Gluconade			
	Red bull			
	Rox			
	Monster			

Instruction: Please indicate by marking (√) how often you consume any of the energy drinks.

8.	Energy Drink	One can a week	Two cans a week	One can a month	Two cans a month	One can every three months	Not at all
	Rox						
	Blue jeans						
	Gluconade						
	Lucozade						
	Red bull						
	Monster						

Instruction: Please respond to the following statements by marking (√) the column that most accurately represent your opinion of the extent to which you agree or disagree to these statements. Use the following scales **SA= Strongly Agree, A= Agree, D= Disagree, SD= Strongly Disagree.**

		SA	**A**	**D**	**SD**
9	I consume energy drinks because I want to find out the differences in the taste.				
10	I buy energy drinks because I have money.				
11	I react more quickly when I consume energy drinks				
12	I buy and take energy drinks because I want to be like the super stars in energy drink adverts.				
13	Caffeine is the most active ingredient in energy drinks				
14	I believe in the messages portrayed in the energy drink adverts.				

15	I am encouraged to buy energy drink because of the television adverts.				
16	Energy drinks help to improve performance during sports competition.				
17	I consume energy drinks because I have easy access to it.				
18	I feel more alert when I consume energy drinks.				
19	I prefer sweet energy drinks to sugar free energy drinks.				
20	I take energy drinks to stay awake when studying.				
21	I consume energy drinks because I get it from friends.				
22	I consume energy drinks because it will give me energy.				
23	The consumption of energy drinks can cause dehydration.				
24	Energy drinks contain high amount of sugar.				
25	A television advert which features a song that I can relate to an energy drink encourages me to consume energy drinks.				
26	Adverts of energy drinks made on bill boards encourage my energy drink consumption.				
27	I consume energy drinks because I want to know how it tastes.				
28	Energy drinks contain other stimulants apart from caffeine and sugar.				

		SA	A	SD	D
29	Energy drinks promote attention when studying.				
30	I consume energy drinks because they are sweet.				
31	I consume energy drinks because they are given to me by my coaches.				
32	Consuming energy drinks can be harmful to the body.				
33	The taste of an energy drink is a reason which encourages me to consume it.				
34	I take energy drink to enjoy a party.				
35	Sports drinks are the same as energy drinks.				
36	I buy energy drinks which are sold at my school canteen.				

APPENDIX B

UNIVERSITY OF CAPE COAST

DEPARTMENT OF HEALTH, PHYSICAL EDUCATION AND RECREATION

COVER LETTER

I am Janet Yaa Bekoe, an M.Phil (Physical Education) student at the Department of Health, Physical Education and Recreation. I am contacting you to participate in a research study on the topic; **"Prevalence of Use and Perceived Impact of Energy Drink Consumption by Senior High School Students in the Ga South District of Greater Accra Region".** Your participation will require you to complete a questionnaire, which will take 20-25 minutes of your time. You were selected among a poll of participants and your responses will be analyzed as a group. Please sign the column below before taking part in this research. You can call for further information concerning the study. Researchers contact: 0245236692 and Supervisors contact: 0202464739.

Name (optional) ……..

Signature …….

Date ……

APPENDIX C

INFORMED CONSENT

UNIVERSITY OF CAPE COAST

TOPIC: PREVALENCE OF USE AND PERCEIVED IMPACT OF ENERGY DRINK CONSUMPTION BY SENIOR HIGH SCHOOL STUDENTS IN THE GA SOUTH DISTRICT OF GREATER ACCRA REGION.

PARTICIPANT CONSENT FORM

I understand that:

I. My answers will be used in a thesis study.

II. My participation is completely voluntary and I may withdraw at any point of the study without penalty.

III. My identity will be protected in the reporting of the findings.

IV. All data will be secured and destroyed three years after the completion of the thesis.

I, …… have read the above information and agree to participate in this research.

Signed:…… Date:

……

Please send consent form to me at the address below.

Janet Yaa Bekoe

HPER Department

U. C. C.

Cape Coast

APPENDIX D

Correlation between advert, accessibility, taste and consumption

Variables	Consumption	Taste	Accessibility	Advert
Consumption		.71	.70	.20
Taste			.47	.05
Accessibility				.10

N = 584