Youth and Energy Drinks: Harmless Boost or Long-term Death Sentence

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KEY WORDS
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INTRODUCTION

The first known energy drink dates back to 1929. This drink known as “Lucozade Energy” originated in the United Kingdom as a recovery drink to hospital patients (“Energy Drink”, 2012). In the 1960’s Japan introduced Lipovitan, but targeted only businessmen. In 1985 Jolt Cola, Inc. introduced Jolt Cola to the U.S. using the marketing strategy, “All the sugar and twice the caffeine” (“Energy Drink”, 2012). Ten years went by before Pepsi offered their design, Josta, but by 1999 production had been suspended on the drink. This may have been in part to release of Red Bull in 1997 by Austrian entrepreneur, Dietrich Mateschitz. His drink was based off of a Thai energy drink that was based off the Japanese product Lipovitan. Since 1997, Red Bull has dominated the energy drink market and has sustained a nearly 50% market share of over ten billion dollars. This is an amazing accomplishment when you take into account the number of products that are available today.

The short-term intended and adverse effects of these drinks have been documented in numerous articles and publications. However, what most consumers have failed to take into consideration are the possible long term side effects of ingesting what some consider toxic doses of certain ingredients. Even as deaths associated with these drinks have risen, youths and adults alike are consuming these beverages at alarming rates. Troubling statistics show that an ever increasing number of youth are drinking as many as six servings in one sitting. The concern is not only the chemical effects to the body but also the physical and psychological damage that is being done. Adolescents who regularly consume these types of drinks are also reported to engage in risky and violent behavior (Gutierrez, 2008). So the question to address is, “Youths and Energy Drinks – Harmless Boost or Long Term Death Sentence?”.

MARKETING

Creative marketing has been the driving force behind a number of these products over the last decade. While some participate in little to no advertising, companies like Red Bull spend millions of dollars on marketing and in turn gain billions of dollars in sales each year. In fact, the types of marketing are as different as the drinks themselves and work to appeal to the target audience. These types of marketing include television ads, billboards, internet advertising, sponsorship of athletes or sporting events, print ads, and limited free distribution. Product placement is of extreme importance to these companies as well. More often than not you will find an assortment of energy drinks near the bottled water or on the same grocery store isle that health foods can be found on. This gives the consumer the idea that these drinks are part of a normal, healthy diet. And don’t let these companies fool you on who their true audience is. That target audience, whether indicated or not, is often children and adolescents. If you don’t feel this is accurate, take a closer look at some of the ads and where they can be found. The language and images used remove all ambiguity about whom these products are meant to appeal to: teens and young adults.

Over the past decade the energy drink market has seen consistent increases in revenues between 50-60% each year. Also, with the competition including over 65 brands and numerous varieties of each, there is an ever increasing need to push the stated benefits or effects of the product. Companies are willing to spend a great deal of money to make sure their product stands out and catches the eye of potential buyers. Red Bull has a well known logo and the name itself is designed to imply dominance and aggression. Additionally the colors red, yellow, blue, and white are designed to exude energy, strength, power, confidence, and perfection. All these things are working together to play on your subconscious desire to be all these things. And if Red Bull has done their job, you feel as though you cannot be these things without it.

Red Bull is not alone in their pursuit of marketing perfection. Rockstar uses bright attractive coloring, star designs, attractive models, and the slogan “Party like a Rockstar” to appeal to their target audience. Their goal is to make you feel cool, sexy, wealthy, powerful, and famous. By drinking their product you can feel good all day, stay in shape, and most importantly, “Party like a Rockstar”. Another popular drink is Monster. The slogan “Unleash the Beast” is designed to appeal to the target audience by conveying that their product will give them a real sense of energy, makes them tougher, and boosts their mental and physical abilities. While only three products have been mentioned here, every energy drink in the market place has its own idea of how to get the attention of customers and draw them toward their product.

INGREDIENTS

Content labeling has always been inconsistent across North America, and due to the steady stream of new products entering the market further complicates the situation (Paddock, 2008). The ingredients used in energy drink sometimes vary as much as the drinks themselves. Most products will try to highlight or emphasize one or two in their marketing to try and gain an advantage over their competitor. Most likely you won’t see companies make connections to the caffeine and sugar content in the drink to the “energy boost” you receive. The advertising will focus on a variety of stimulants and/or vitamins that contribute to the increased feeling of energy. Figure 1 provides a table that

shows the amount of selected ingredients contained in some of the most popular drinks. In some cases the product did not have the ingredient indicated by the N/A, listed it as a blend without giving individual amounts, or listed it as an ingredient but did not include the amount.

Popular Drinks Caffeine Taurine Ginseng Guarana
Red Bull 80mg 1000mg N/A N/A
Full Throttle 144mg 605mg 167mg 1.3mg
Monster 160mg 1000mg 200mg Blend
Amp 74mg 10mg <30mg Unknown
5 Hour Energy 138mg Blend N/A Unknown
Rockstar 80mg 1000mg 25mg 50mg
NOS 260mg 1000mg 50mg Unknown
Figure 1

The primary exotic ingredient of energy drinks is the stimulant drug caffeine (Paddock, 2008). Caffeine is a known cardiac stimulant and has also been used as a mild diuretic. There is scientific evidence that caffeine raises both heart rate and blood pressure, which can increase alertness and enhance performance if consumed in small doses (Paddock, 2008). The World Anti-Doping Agency monitors caffeine use, but removed it from its restricted list because of the known negative and adverse side effects if taken in large doses. In most cases caffeine is used to provide an "energy boost" or a feeling of heightened alertness. As figure 1 notes, the levels of caffeine in the selected drinks vary greatly from 80mg to as much as 260mg per 12 ounce serving. As a comparison, a 12 ounce serving of caffeinated cola contains 35mg (Gutierrez, 2008). It is easy to target caffeine because of the well documented research on it, however most individuals know very little about ingredients like taurine, ginseng, and guarana.

Taurine is the most widely used medicinal ingredient in energy drinks after caffeine is also, perhaps, the least understood (Paddock, 2008). Taurine is believed to be essential for cardiovascular function, and development and function of skeletal muscle, the retina and the central nervous system (Taurine, 2012). There are also claims to its having antioxidant abilities. However, there is little to no evidence that it has any major influence on the body. The reasoning for including it in the contents of an energy drink is that it is theorized to lead to a feeling of having more energy. What we do know for sure is that it is a naturally occurring amino acid that the body can replenish on its own or receive from a well balanced diet. The average daily requirement is 60mg per day (Paddock, 2008). Referring back to figure 1, a typical amount in a single serving of an energy drink is 1000mg. Whether or not this level is toxic currently remains unanswered through research, but there are known side effects experienced by some.

Ginseng and guarana are the other two very common ingredients. Ginseng is believed to stimulate and relax the nervous system, encourages the secretion of hormones, improve stamina, lower blood sugar and cholesterol levels and increase resistance to disease. There are also claims that it can improve sexual health by various means. As a dietary supplement, guarana is an effective stimulant and it contains about twice the caffeine found in coffee beans. This fact alone makes it dangerous as caffeine amounts listed on energy drink labels does not normally include guarana in its total amount.

Vitamins are not listed within figure 1, but nevertheless are found in most energy drinks. The most popular is to use a blend of the vitamin B complex. This blend typically will include the following: B2, riboflavin; B3, niacin; B6; and B12. Because it comes in a small 5 ounce bottle, the "energy shot" known as 5-Hour Energy is the most famous for using this blend because it contains 8,333% of your daily value of B complex vitamins. It is important for the consumer to know that the body will only take what it needs and will filter off the surplus as a waste product. Therefore any benefit from this level of intake is minimal. These vitamins' importance to healthy living is undeniable, but the goal should be to ingest them in the form of a balanced diet rather than through an energy drink (Paddock, 2008). The greater concern with all the ingredients discussed is how they interact with each other once in the body.

PHYSIOLOGICAL EFFECTS

Caffeine, the most commonly used psychoactive drug worldwide, may be the only psychoactive drug legally available over-the-counter to children (Seifert, Schaechter, Hershorin, & Lipshultz, 2011). Caffeine is a strong CNS stimulant that triggers release of stress hormones resulting in a "fight or flight" response and is known to have the following effects on the body: stimulates adrenaline production, increases mental clarity, increases energy, improves muscle coordination, increases heart rate and respiration, increases basal metabolic rate, elevates blood sugar, elevates blood pressure, and reduces serotonin production (Veracity, 2005; Seifert, Schaechter, Hershorin, & Lipshultz, 2011). Caffeine is also useful as a diuretic and a mild laxative. Large doses and/or prolonged use have been associated with fatigue, headaches, moodiness, and depression. For healthy adults, a caffeine intake of 400 mg/day is considered safe even though side effects have been reported with as little as 200mg; acute clinical toxicity begins at 1 g, and 5 to 10 g can be lethal (Seifert, Schaechter, Hershorin, & Lipshultz, 2011). On the other hand, adolescent and child caffeine consumption should not exceed 100 mg/day and 2.5 mg/kg per day, respectively. Very few products fall within range when looking at a single serving, but the problem is that most packaging includes multiple servings. Serving size is one of the most often overlooked items on a nutritional label, especially by youths.

The effect of caffeine on the body chemistry of youths is the focus. Caffeine has been shown to improve attention, but it also increases blood pressure and sleep disturbances (Seifert, Schaechter, Hershorin, & Lipshultz, 2011). After cessation in children who habitually consume caffeine, attention decreases and reaction time increases transiently (Seifert, Schaechter, Hershorin, & Lipshultz, 2011). According to Veracity (2005), "Caffeine begins by initiating uncontrolled neuron firing in your brain, this excess activity triggers your pituitary gland to secrete a hormone that tells your adrenal glands to produce adrenaline." This response is also known as the "flight or fight" response. This response is typically how we survive or thrive in tense and unpredictable situations. Amazing feats of strength have been accomplished by this process. Consumption in the amounts seen in popular energy drinks, a rollercoaster of events begins to occur. When caffeine stimulates the production of adrenaline, your adrenal glands don't know that you aren't actually in a "fight or flight" situation. They pump your body up for action, but if you are simply sitting at a desk or maybe just trying to stay awake to study, you will soon suffer from the adverse side effects of that adrenal high. These include fatigue, headache, irritability, and confusion (Veracity, 2005). Caffeine is a drug, and what happens over time is that your body begins to require more and more to achieve the desired result. This leads to dependence similar to that seen with long term illicit drug use. The constant state of alertness your body suffers from is commonly referred to as Caffeinism.

Caffeinism is characterized by fatigue, anxiety, mood swings, sleep disturbance, irritability and depression (Veracity, 2005). A prolonged state of Caffeinism leads to adrenal exhaustion. At this point the body's ability to function normally without caffeine becomes extremely difficult. Caffeinism is characterized by two phases:
Phase 1 - Stress hormones are pumped out in excessive amounts suppressing immunity and increasing the risk for a number of health disorders. It also lowers production of

DHEA, a hormone critical to the optimum functioning of your immune, cardiovascular, reproductive, and nervous systems.
Phase 2 - Adrenal insufficiency or adrenal exhaustion. This condition bears a resemblance to the post-traumatic stress syndrome experienced by soldiers returning from combat. In effect, the adrenal glands simply wear out from chronic stimulation.
(Veracity, 2005)
Phase 2 Caffeinism has been compared to Post Traumatic Stress Disorder seen in military soldiers returning from war. Long term excessive use of caffeine (>300mg/day) is also associated with elevated blood-cholesterol levels, gastrointestinal irritation, a depletion of B vitamins within the body, and breast and prostate complications. Caffeine is akin to the Trojan horse; it parades itself like a gift but instead delivers a multitude of health problems. Don't make the mistake of thinking this is an all out war on caffeine. Caffeine at moderate levels has been shown to improve memory, alertness, and concentration as well as elevating mood.

Important to remember at this juncture, caffeine is not the sole ingredient in energy drinks that we are targeting. While ginseng has purported benefits to health, its effects at high dosage and how exactly it interacts with other ingredients is somewhat unknown. Guarana on the other hand is primarily used for its additional saturation of caffeine into the product of choice. That leads us to taurine. As discussed earlier, taurine is a naturally occurring amino acid that we can easily get from a balanced diet. Its inclusion as an ingredient for energy drinks rest more on the theory that it enhances the effect of caffeine. After the research we have looked at so far, do you really feel there is a need to enhance caffeine any further? The fact is that you won't really find that reasoning in the marketing of a particular product. What you are more likely to see are the suggestions that it improves metabolic processes and provides antioxidant properties in addition to its numerous reported physiological benefits. Again, it is all about creative marketing and finding out what the public is looking for to tell them a product is good for their overall health.

PSYCHOLOGICAL EFFECTS

Physiological effects and psychological effects can be connected. When looking at the effect of adrenal exhaustion (chronic fatigue, anxiety, mood and sleep disturbances, irritability, and depression), it is easy to see that there is going to be a correlation to psychological health. Several studies have found caffeine intake to be extremely high in individuals with psychiatric disorders (Veracity, 2005). Large doses of the ingredients found in energy drinks, most notably caffeine, have been linked to the depletion of amino acids. Depletion of amino acids results in low dopamine production. Low dopamine production further results in altered brain chemistry. This is an eerie correlation with the rise in bipolar disorder among teens today. Along with bipolar disorder, schizophrenia has also been linked to excessive caffeine use (Gurpegui, Aguilar, Martinez-Ortega, Diaz, & deLeon, 2004).

The link between psychological disorders and caffeine doesn't stop there. Adverse side effects like seizures and hallucinations associated with energy drink poisoning are included on the American Association of Poison Control Centers symptom list (Tanner, 2011). Additionally, Whalen (2002) notes that if an individual has a cerebral allergy to caffeine, symptoms of mental illness can manifest. Toxic dementia induced by a stimulant or other toxin affects function of all brain areas (Whalen, 2002). Several signs of toxic dementia are memory impairment, deterioration of social and intellectual behavior, and attention deficits (Whalen, 2002). Whalen (2002) further notes that Attention Deficit Disorder (ADD), assumed to affect children is indistinguishable from caffeine allergy. This is a disturbing parallel regarding the increasing rate of ADD diagnosis in youths today.

VIOLENCE AND RISK TAKING BEHAVIORS

Teenagers who drink large quantities of energy drinks such as Red Bull are more likely to engage in risky and violent behavior (Gutierrez, 2008). Having covered the array of physiological and psychological effects that these products have on the body, makes the statement all that much more believable. In a study published in the Journal of American College Health, Miller and colleagues found that a collection of behaviors known as "toxic jock syndrome" was correlated with high consumption of energy drinks (Gutierrez, 2008). Symptoms include substance abuse, unprotected sex and violence. The American Association of Poison Control Centers adopted codes late last year to start tracking energy drink overdoses and side effects nationwide; 677 cases occurred from October 2011 through December 2011 (Tanner, 2011). The majority of these cases involved children and teens. More alarming than that, statistics are showing that roughly 25 % of energy drink overdoses involve children under the age of 6.

CONCLUSION AND SUGGESTIONS

The Food and Drug Administration (FDA) does not regulate caffeine or additional ingredients contained in energy drinks like it regulates caffeine content in soft drinks (Paddock, 2008). In the U.S. these types of products may not be fully labeled, but they often include some type of warning label regarding safe consumption. Caffeine is the most widely consumed stimulant in the US and perhaps the world. In adults, caffeine can affect arousal, attention, reaction time, and sleep (Whalen, Silk, Semel, Forbes, Ryan, Axelson, Birmaher, & Dahl 2008). However, those same effects on youth have received little empirical study (Whalen, Silk, Semel, Forbes, Ryan, Axelson, Birmaher, & Dahl 2008).

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