Adolescents and Stimulant Drinks: The Implications of Popular Stimulant Drinks and Nutritional Supplements on Adolescent Development

A Research Paper

Presented to:

The Faculty of the Adler Graduate School

In Partial Fulfillment of the Requirements for
the Degree of Master of Arts in
Adlerian Counseling and Psychotherapy

By:

Carla M. Martinson

June 2011
Abstract

Energy drinks and nutritional supplements give humans the ability to over-compensate at maximum capacity. Adolescents and young adults use stimulant drinks such as caffeinated soft drinks, energy drinks and other nutritional supplements to provide the energy to keep up with the fast-paced society of today. Many adolescents depend on energy drinks and nutritional supplements to give them the energy to get through the day. Long-term use of energy drinks and nutritional supplements creates a host of problems. This literature review will dissertate contributing factors and consider consequences in adolescent use of popular stimulant drinks and nutritional supplements on adolescent development. Alfred Adler’s theories will be explored in relation to energy drink and supplement use and the impact among adolescents and adolescent development.
Adolescents and Stimulant Drinks: The Implications of Popular Stimulant Drinks and Nutritional Supplements on Adolescent Development

The 21st century provides countless innovative technologies and superior means of living, resulting in an extended life span (Beland & Kapes, 2003). To maintain the fast pace and status quo, people often do not have sufficient time in one day to complete all tasks (DeGreeff, Burnett & Cooley, 2010). For that reason, adults turn to caffeine and energy drinks to gain more hours of productivity with fewer hours of sleep (Howard & Marczinski, 2010). Bandura, a groundbreaking contributor to the field of psychology, hypothesized that adolescents observe, learn, and behave in the same way as they have in the past, by modeling adult behavior (Crain, 2010). As modeled by adults, adolescents of the 21st century consume energy drinks and caffeinated beverages to keep up with the fast-paced society of today (Howard & Marczinski, 2010). But, what are the effects of the use of energy drinks and caffeine on the adults of the future?

**Purpose of the Review**

This literature review will examine contributing factors and consider consequences in the use of popular stimulant drinks and nutritional supplements by adolescents. The information amassed in this review will provide the reader with an ample valuation of the need for regulation of popular stimulant drinks and nutritional supplements among adolescents. Upon completion of the review, the reader will be able to identify the positive and negative consequences of stimulant drinks and nutritional supplements on adolescents today. The reader will also be better equipped to develop an action plan, if necessary, to prevent and treat long-term effects of consumption.
Categories and Marketing Focus of Stimulant Drinks and Supplements

Health Education Research published an article entitled, “Consumption of Nutritional Supplements Among Adolescents: Usage and Perceived Benefits,” in which Jennifer O’Dea (2003) defined different categories of nutritional supplements, their usage, and perceived benefits among adolescents. In the results of this study, adolescents participated in the use of sports drinks, vitamin and mineral tablets, energy drinks, herbal supplements, Guarana, Creatine, high protein milk supplements, and coenzyme Q10. Depending on the choice of supplement used, adolescents purported a variety of reasons for usage: to promote better health, prevent illnesses, and do something positive for themselves. In addition, adolescents admitted using supplements for taste, to quench thirst, to improve sports performance, as a substitution for soft drinks, and for stimulant and ergogenic effects (O’Dea, 2003).

Sports Drinks

Popular sports drinks today include: Gatorade®, Powerade®, Accelerade®, Vitamin Water®, and Propel®. Gatorade® currently runs an advertisement, which promotes three types of Gatorade products to be consumed before, during, and after athletic performance. The pre-game fuel, 01 Prime™, contains a concentrated blend of carbohydrates and B vitamins. The marketing ad for this product reports that the ingredients help sustain the body’s ability to burn additional carbohydrates when taken fifteen minutes before competition (The Gatorade Company, 2011a, p. Prime). The during performance drink, 02 Perform™ (the original Gatorade drink that has been on the market for over forty years), provides performance hydration (The Gatorade Company, 2011b, p. Perform). This drink contains a mixture of sodium, potassium, and essential carbohydrates, which purport to aid in rehydration and replenishment of fuel to muscles and the mind during performance. O2 Perform™ is offered in a low calorie option and two different
powdered mixtures. Finally, Gatorade designed the 03 Recover™ drink to be consumed subsequent to a performance. 03 Recover™ contains a mixture of protein and carbohydrates suggested to quench thirst and assist in rehydration, and muscle recovery (The Gatorade Company, 2011c, p. Recover).

The Coca-Cola Company (2011) has a product on the market named, Powerade® ION4®, promoted as being the only nationally available sports drink to help replenish the four essential electrolytes lost through sweating: sodium, potassium, calcium, and magnesium. POWERADE® ION4® advertises as a drink that helps athletes with hydration and to play at the top of their game (The Coca-Cola Company, 2011, Powerade, p. What is Ion4).

Accelerade®, a product made by PacificHealth Laboratories, also offers several different forms of drink. Accelerade® - Advanced Sports Drink, advertised as containing carbohydrates and protein, claims to increase rehydration as well as endurance by 29%, decrease muscle damage by 83%, and increase endurance in subsequent workouts by 40% (Pacific Health Laboratories, 2011a, p. Accelerade). Pacific Health Laboratories promotes Accelerade Hydro® - Advanced Sports Drink as being ideal for less intense workouts (Pacific Health Laboratories, 2011b, p. Accelerade-Hydro). It contains the patented 4:1 carb-protein ratio, but with 50% less sugar and 33% less calories (Pacific Health Laboratories, 2011b, p. Accelerade-Hydro). Finally, Accel Gel® - Advanced Energy Gel is promoted as providing 13% more endurance with 50% less muscle damage, to be used prior to performance (Pacific Health Laboratories, 2011c, p. Accel Gel).

Glacéau Vitamin Water® manufactures three different formulas: Revive, Stur D, and Zero. Revive contains vitamin C and a combination of B vitamins to energize a person after exercise. Stur D advertises as being vitamin fortified to help develop strong bones. Zero, vitamin
water promoted to help with beauty, has zero calories with essential vitamins (Glacéau Global, 2011, p. Vitamin Water).

Propel® Zero markets as a product that will replenish and energize. This product contains vitamins C, E, and B, along with antioxidants. On the home page at www.propelzero.com, Propel® Zero claims that it “goes beyond hydration, replenishing you with antioxidant vitamins while quenching your thirst with great-tasting flavors – without adding calories” (Stokely-Van Camp, Inc, 2011, p. Propel Zero).

**Caffeinated Tea Drinks**

Arizona Beverage Company has an assortment of green tea drinks that contain plum juice, ginseng, or pomegranate juice. These drinks contain caffeine and are popular among young people (Arizona Beverage Company, 2011a, p. Green Tea). Along with green tea, there are also varieties of black tea, white tea, and herbal tea offered by Arizona. Arizona Beverage Company also has energy shots containing tea. P.M. Relax an energy shot is advertised as calming the senses and relaxing the body by using a combination of nutrients, antioxidants, vitamins and minerals (Arizona Beverage Company, 2011b, p. P.M. Relax). R.X. Energy, another energy shot contains green tea, and antioxidants including B-vitamins, taurine, and milk thistle (Arizona Beverage Company, 2011d, p. R.X. Energy). Finally, A.M. Awake, an energy shot contains vitamins, plant source minerals, phytonutrients, and green tea (Arizona Beverage Company, 2011c, p. A.M. Awake).

**Energy Drinks**

Popular energy drinks include Monster®, Red Bull®, Rockstar®, 5 Hour Energy®, Bawls®, and AMP®. Monster® uses the slogan “Unleash the Beast” and other attractive words similar to
ADOLESCENTS AND STIMULANT DRINKS

those used when promoting alcohol-containing products to adolescents and young adults. The website www.monsterenergy.com states:

Tear into a can of the meanest energy supplement on the planet, MONSTER energy.

We went down to the lab and cooked up a double shot of our killer energy brew. It's a wicked mega hit that delivers twice the buzz of a regular energy drink. MONSTER packs a vicious punch but has a smooth flavor you can really pound down. Unleash the Beast (Monster Beverage Co., 2011a, p. Monster Energy)!

Monster Beverage Company (2011) promotes several other drinks under the Monster name such as Kona Blend (a java coffee drink), Chai Hai, Super Dry, Vanilla Light, Toffee, Black Ice, Killer B, Import, Import Light, Assault, Absolute Zero, Rehab, M-80, Mixxd, Loca Mocha, Irish Blend, and Anti-Gravity with Nitrous Technology. Many of these names and advertisements used to promote Monster drinks include words relating to being high on drugs, drunk on alcohol, using drugs, or buying drugs. For example, Kona Blend uses the word blend, which is often used in selling tobacco or marijuana. Hai sounds similar to the word, “high” and may insinuate that someone would be high after consumption. Super Dry uses the word “Dry”, which is often used to describe an alcoholic beverage that is less sweet and lacking fruity flavor. “Import,” a word related to beer, is used to identify beer imported from another country. Nitrous Technology could be related to the chemical “nitrous oxide” used by dentists and commonly referred to as “laughing gas”. Adolescents use nitrous oxide to experience a brief high (Monster Beverage Co., 2011b, p. Products).

The Monster energy drink website also uses the marketing strategy of “Monster Girls,” which includes images of voluptuous women in bikinis and undergarments. These images entail
women with cleavage protruding from their clothing (Monster Beverage Co., 2011c, p. Monster Girls).

Red Bull® Energy Drink (2011) advertises itself as a “functional beverage” through the use of a combination of ingredients to vitalize the body and mind. Additionally reported on the website, Red Bull Energy Drink is for people who want to have a “clear and focused mind, perform physically, are dynamic and performance-oriented whilst also balancing this with a fun and active lifestyle” (Red Bull, 2011, n.p.). In short, Red Bull reports to give “wings to people who want to be mentally and physically active and have a zest for life” (Red Bull, 2011, n.p.).

According to Inaba and Cohen (2011) Red Bull also contains trace amounts of cocaine and most energy drinks do not have to list the caffeine content. Additionally, Red Bull has been banned in 2004 in France, Canada, Denmark, and Norway, but later reinstated in Denmark and Norway. Red Bull and other energy drinks can be responsible for increased heart rate, increased blood pressure, heart palpitations, dehydration, and death. Also, Red Bull offers risks to pregnant women and can result in miscarriage, low birth weight, and troubled delivery (Inaba & Cohen, 2011).

Another popular energy drink, Rockstar® (2011), advertises that it is the strongest energy drink on the market, containing Guarana, Ginkgo, Ginseng, and Milk Thistle. The website www.rockstar69.com raves, “scientifically formulated to provide an incredible energy boost for those who lead active and exhausting lifestyles–from athletes to rock stars” (Rockstar Inc., 2011, p. Products: Original).

Living Essentials LLC (2011), created the drink 5-Hour Energy® which comes in 1.5 ounce single shot containers. 5-hour ENERGY® shots contain Vitamin B6, B12, B3, B9, Citicoline, Tyrosine, Phenylalanine, Taurine, Malic Acid, Glucuronolactone, and caffeine.
Original 5-hour ENERGY® was introduced to the market in 2004, and is reported to be the “no nonsense way for working adults to stay bright and alert” (Living Essentials LLC, 2011, n.p.). The warning label for 5-hour ENERGY® cautions that one should, “consume only a half (1/2) a bottle for moderate energy or one whole bottle for maximum energy, not exceeding two bottles daily, several hours apart, to avoid nervousness, sleeplessness, and occasional rapid heartbeat” (Living Essentials LLC, 2011, n.p.). Additional cautionary information warns of a Niacin Flush, in which the skin becomes red and hot (Living Essentials LLC, 2011).

Bawls® contains guarana, a highly caffeinated berry found in the Amazon. The Bawls Guarana website describes Bawls® as having “a light, refreshing taste often compared to a citrus crème soda, but loaded with enough caffeine to keep you alert and bouncing through the day (or night!) (Bawls Acquisition, 2011a).” Bawls website contains the following information:

The FDA recommends that adults consume no more than 300mg of caffeine per day (about the content of 3 16-oz. cans of BAWLS). Of course, children and individuals sensitive to caffeine should consume much less. Having too much caffeine in your body can result in nervous issues, difficulty sleeping and a rise in blood pressure (Bawls Acquisition, 2011a, n.p.).

Bawls Guarana respectfully offers suggestions to consumers to include: encouraging customers to consume caffeine in moderation, avoid drinking multiple bottles at one time, and to continue consuming water as proper hydration, which is crucial to leading a healthy, balanced lifestyle (Bawls Acquisition, 2011b, p. The Low Down).

AMP®, a popular energy drink manufactured by Pepsi Companies, is labeled as a Mountain Dew product. The website for Amp reports that AMP helps one focus and become
ready for everything that comes along with life. AMP contains a blend of B-vitamins, Taurine, Ginseng, and Guarana (Pepsico, Inc., 2011).

**Vitamins, Minerals, and Herbal Supplements**

Vitamin and mineral tablets such as Vitamin B-12, B-Complex, Ginseng and Guarana, are popular on the market and contribute to boosting energy. Ginseng is a root that is usually taken orally as a nourishing stimulant. The root is typically available in dried form, either whole or sliced. Due to the leafy nature of Ginseng, it is often found in popular “tea” variety energy drinks. In subclinical doses, Ginseng does not have measurable medicinal effects (Therapeutic Research Faculty, 2011c, p. American Ginseng).

Silverman, Romano, & Elmer, authors of *Vitamin Book*, report on many of the different vitamins commonly found in energy drinks, herbal supplements, and sports drinks. According to Silverman et al., vitamin B6 plays a key role in the production of amino acids, the building blocks of protein. Vitamin B6 is also used in the creation of DNA, and is involved in over 100 crucial chemical reactions in the body. It helps form nearly all new cells. Food sources of vitamin B6 include fortified cereals, beans, meat, poultry, fish, and some fruits and vegetables. Vitamin B12 is involved in a variety of important functions including the production of amino acids and the processing of carbohydrates into energy. Many of the energy drinks and sports drinks include a variety of ingredients, which promote energy, such as B3, Citicoline, Tyrosine, Taurine, and Phenylalanine. For example, Niacin (Vitamin B3) is important for energy production and plays a key role in converting fats, proteins, carbohydrates and starches into usable energy. Food sources of Niacin include meat and dairy products, leafy vegetables, broccoli, tomatoes, avocados, nuts, and whole grains. Silverman et al. (1999), also explain that Citicoline is a water-soluble compound essential for the synthesis of phosphatidyl choline, a
constituent of brain tissue. Citicoline plays a role in neurotransmission and can help support brain function. Tyrosine, an amino acid that transmits nerve impulses to the brain, is present in meat, dairy, fish and grains. Phenylalanine is an essential amino acid that enhances alertness and is found in dairy products, avocados, legumes, nuts, leafy vegetables, whole grains, poultry and fish. Taurine is a naturally occurring chemical substance present in meat, fish and dairy products. Adult humans have high concentrations of Taurine in white blood cells, skeletal muscles, the heart and central nervous system. Taurine plays a role in digestion; is used to process potassium, calcium, and sodium in the body; and maintains the integrity of cell membranes (Silverman, Romano, & Emer, 1999).

According to Passwater (1997), Creatine is produced naturally in the human body from amino acids, primarily in the kidneys and liver. Creatine supplements, sometimes used by athletes, bodybuilders, wrestlers, sprinters and others who wish to gain muscle mass, typically consume 2 to 3 times the amount that would be obtained from a very-high-protein diet. Creatine, a nitrogenous organic acid, occurs naturally in vertebrates and helps to supply energy to all cells in the body, primarily muscle, which is achieved by increasing the formation of Adenosine triphosphate (ATP). Approximately 95% of the human body's total Creatine is located in skeletal muscle (Passwater, 1997). Exercise performance results are variable, with some research suggesting benefits, and other studies showing no effects.

Increasing muscle mass, improving exercise performance in athletes and improving muscle mass in older adults exist as the most common uses of the synthetic form of Creatine (Therapeutic Research Faculty, 2011b. p. *Creatine*). Creatine is proven effective in brief high-intensity athletic performance of young, healthy individuals. Older adults do not seem to benefit from Creatine use for brief high-intensity performance and creatine does not seem to enhance
ADOLESCENTS AND STIMULANT DRINKS

strength or body composition in individuals over 60 years of age (Therapeutic Research Faculty, 2011b. p. Creatine).

Due to the non-harmful effects of Creatine, it has been allowed by the International Olympic Committee, National Collegiate Athletic Association (NCAA), and professional sports (Therapeutic Research Faculty, 2011b. p. Creatine). Creatine is also used for congestive heart failure (CHF), depression, bipolar disorder, Parkinson’s disease, muscle and nerve diseases, gyrate atrophy eye disease, high cholesterol, and to slow the decline of amyotrophic lateral sclerosis (ALS, Lou Gehrig’s disease), rheumatoid arthritis, and McArdle’s disease. Americans purchase more than four million kilograms of Creatine each year (Therapeutic Research Faculty, 2011b. p. Creatine).

The Therapeutic Research Faculty, (2011) published information on Coenzyme Q-10 (CoQ-10). Coenzyme Q-10, a vitamin-like substance found within the body, comes from meats and seafood. Within the body, CoQ-10 mainly exists in the heart, liver, kidney, and pancreas. Scientists have been able to create a synthetic form of Coenzyme Q-10, which has medicinal uses (Therapeutic Research Faculty, 2011a. p. Coenzyme Q-10).

Coenzyme Q-10 is commonly used in the treatment of heart and blood vessel matters such as congestive heart failure, chest pain (angina), high blood pressure, and heart conditions associated with cancer drugs. Additionally, Co Q-10 is advantageous for conditions such as diabetes, gum disease, breast cancer, Huntington’s disease, Parkinson’s disease, muscular dystrophy, increasing exercise tolerance, chronic fatigue syndrome, and Lyme disease (Therapeutic Research Faculty, 2011a. p. Coenzyme Q-10).

Therapeutic Research Faculty (2011) rates effectiveness of coenzyme Q-10 to improve athletic performance as likely ineffective. Some people think that it might increase energy due to
its Adenosine triphosphate (ATP) producing effects, however, Therapeutic Research Faculty disagrees (Therapeutic Research Faculty, 2011a. p. Coenzyme Q-10).

Caffeine

Weinberg & Bealer (2002) explained that caffeine, a bitter, white crystalline xanthine alkaloid and psychoactive stimulant, was first found in coffee in 1820 by the German chemist Friedlieb Ferdinand Runge. Caffeine, found in varying quantities in the seeds, leaves, and the fruit of some plants, acts as a natural pesticide that paralyzes and kills certain insects that feed on the plants. It was most commonly consumed by humans in infusions extracted from the bean of the coffee plant and the leaves of the tea bush, as well as from various foods and drinks containing products derived from the kola nut. Other sources of caffeine included: yerba maté, guarana berries, and the yaupon holly. In humans, caffeine acts as a central nervous system (CNS) stimulant, temporarily warding off drowsiness and restoring alertness. Caffeine is the world's most widely consumed psychoactive substance but, unlike many other psychoactive substances, it is legal and unregulated in nearly all jurisdictions. L. R. Walker, A. A. Abraham, & K. P. Tercyak (2010), argued that caffeine remained the most widely used psychostimulant in the United States with eighty to ninety percent of the population using it. Beverages containing caffeine, such as coffee, tea, soft drinks, and energy drinks, maintained popularity in North America. Ninety percent of adults consumed caffeine daily (Weinberg & Bealer, 2002).

Inaba and Cohen (2011) argued that caffeine consumption of more than 350mg daily can lead to anxiety, insomnia, gastric irritation, high blood pressure, nervousness, and flush face. Caffeine can cause death at doses as low as 10 grams, which is equal to one hundred cups of coffee. Caffeine can also make it more difficult to lose weight as it causes increased insulin to be released resulting in sugar becoming metabolized and triggering hunger (Inaba & Cohen, 2011).
Adolescent Development

Adolescence is a time of dramatic psychological and physiological changes. William Crain, author of the book, *Theories of Development* (2010), proposed the idea that adolescents become disturbed and confused by new social conflicts and demands. Crain cited Erikson’s eight stages of life in which Erikson believed that adolescence was a time to establish a new sense of ego identity. During this time, adolescents felt as though their impulses had a will of their own. Crain pointed out that it is not the impulses that created problems on their own, but rather the thought that one may not look good to others or meet others’ expectations. Along with fitting in during these years, adolescents began to worry about their future place in the world. Many times adolescents felt overwhelmed by all stimuli presented to them. Additionally, due to the need for adolescents to fit in socially, they were also anxious to identify within groups. During these years, adolescents felt the need to break away from their parents, yet they remained emotionally tied to their parents (Crain, 2010).

According to Alfred Adler, the challenges of adolescence may seem overwhelming, thus allowing exogenous factors to create psychological problems. Adolescence is a time when new situations cause mistakes in the adolescent’s style of life to become evident. This is a time when adolescents are stimulated by their new freedom. Adolescents who had been trained to be compliant, or in Adlerian terms cooperators and contributors, may have been distracted by their new freedoms. Other adolescents, inadequately prepared to take on new freedoms and adult responsibilities, became discouraged and motivated more by the threat of failure than the sense of the ability to be a winner (Griffith & Powers, 2007).

An Exogenous Factor usually exposes a challenge, a shift, or an interruption on the path of the adolescent’s perceived “normal” life. These factors demand responses, which, based on
previous training or self-training, adolescents may feel unprepared or unable to cooperate, and they may lack the courage necessary to face these challenges (Griffith & Powers, 2007).

**Adolescent Brain Development**

The National Campaign to Prevent Teen Pregnancy conducted a study on adolescent brain development (Weinberger, Elvevåg, & Giedd, 2005). Findings indicated that adults had the ability to make wise decisions in complex situations, control impulses, and plan effectively, whereas adolescents did not. The article explained that the prefrontal cortex, responsible for higher order skills, lacked full maturity until the third decade of life. This study provided helpful information for society and policy makers when considering changes in laws relating to adolescents. At the same time, as suggested by the authors, leaders should remain careful not to forget that adolescents have positive qualities and the ability to contribute to society.

Weinberger et al., (2005) argued that the human brain created several new connections just before puberty. These connections remained active if used, however unutilized connections did not remain active. This process made the brain more lean and efficient. As these connections matured, the brain built a coating called myelin, which acted like insulation and sped communication from one area of the brain to another. Additionally, the connection areas that utilized the neurotransmitter Dopamine increased the density of the prefrontal cortex. Dopamine managed the reward response, which remained a key factor in adolescent brain development. This process provided humans with more mature judgment and impulse control (Weinberger et al., 2005).

Drastic maturation of the brain took place during adolescence, as shown in Magnetic Resonance Imaging (MRI) (Weinberger et al., 2005). MRI’s indicated that the prefrontal cortex functions included impulse control, planning, and decision-making. MRI images also showed
that the prefrontal cortex continued to grow throughout the adolescent years. These findings gave adults good reason to surround adolescents and encourage them to make healthy decisions. The role of healthy adults in the lives of adolescents will be reviewed later in this paper (Weinberger et al., 2005).

**External factors in adolescent brain development.** Windle (2003) predicated that the brain not only developed physically from within the body, but also received influence from external factors such as school, peers, and society. These external interactions were vital in protecting and stabilizing the brain during the adolescent’s vulnerable transition period. Any interactions that took place during this developmental time could have a lifelong impact. External interactions occurring during adolescence set the stage for learned behaviors into adulthood. For example, if an adolescent used alcohol or drugs, the likelihood of the adolescent developing lifelong chemical dependency increased (Windle, 2003).

S. J. Lupien, B. S. McEwen, M. R. Gunnar, & C. Heim, C. (2009) did a review on the chronic exposure to stress hormones. Whether chronic exposure to stress hormones occurred during the prenatal period, infancy, childhood, adolescence, adulthood or aging, it had an impact on the brain structures involved in cognition and mental health. Stress triggered the activation of the hypothalamus pituitary-adrenal (HPA) axis, culminating in the production of glucocorticoids by the adrenals. Studies in human adolescents proposed that the adolescent period is associated with heightened basal and stress-induced activity of the HPA axis. Various forms of psychopathology, including depression and anxiety, increased in prevalence during adolescence. Adolescence was also a period in which the long-lasting effects of earlier exposures to stress became evident. Adolescents who grew up in poor economic conditions had higher baseline glucocorticoid levels, as did adolescents whose mothers were depressed in the early postnatal
period. High, early-morning, glucocorticoid levels that varied markedly from day to day during the transition to adolescence, were not associated with depressive symptoms at that time, but the high levels predicted increased risk for depression by age sixteen (Lupien et al., 2009).

What science does not mention in adolescent brain development. Steinberg (2009) from Temple University argued differently in regards to adolescent brain development in the article entitled, “Should the Science of Adolescent Brain Development Inform Public Policy?” Steinberg discussed his involvement in a pretrial investigation at Guantanamo Bay involving a detainee accused of building and setting Improvised Explosive Devices (IED’s) in Eastern Afghanistan as an assistant to al-Qaeda and Taliban operatives. This detainee was fifteen years old when captured by American Soldiers. His defense wanted to argue special consideration under the law based on his immature brain development. This article gave a clear view of the implications of using the immaturity of adolescent brain development too broadly. For example, if society promoted that the adolescent brain did not have the capacity to make informed decisions such as driving a car, purchasing energy drinks, and buying alcohol, society also made the statement, “adolescents are not responsible for their actions.” If this had occurred, adolescents may have felt weak, inadequate, and become irresponsible. Rather, society could promote strength and courage, which could set an example for adolescents and help them to learn how to become responsible. Perhaps the freedom of choice helped the neuronal connections in the adolescent brain to develop the critical thinking skills and executive functioning needed to evolve into adulthood (Steinberg, 2009).

In the trial at Guantanamo Bay, Steinberg (2009) argued in defense of this fifteen-year-old boy. The military defense suggested that it would take adult reasoning to build such a device as an IED; therefore, he should have been tried as an adult. Steinberg argued that the
developmental functioning required for the creation of such a device formed between the ages of five and seven years old. Steinberg also pointed out that neuronal science had not concretely identified the exact age of brain development in which the maturity level remained adequate for responsible decision-making. Therefore, if society changed the age limits on certain public policies, certain arguments would remain, such as “who is responsible for making the decision?” Additional considerations when negotiating public policy included age limits and capabilities at these age limits (Steinberg, 2009).

Steinberg (2009) suggested that adolescents seemed easily aroused at the beginning of adolescent development, during a time when areas of the brain developed reward-processing connections. However, brain-systems responsible for harm avoidance and self-regulation matured later in adolescence and into early adulthood. Despite growth in MRI technology and adolescent brain development, it remained unclear if brain development or environmental factors affected harm avoidance and self-regulation. As of today, the laws vary in relation to using environmental or biological evidence to support law making or changing (Minnesota House of Representatives, Research Department, 2010). For example, fourteen year-olds can be tried as adults in most states in the United States (Steinberg, 2009). At age 14, the brain is not fully developed, thus policy makers must have used other evidence to support allowing 14 year olds to be tried as adults. Furthermore, adolescents cannot purchase alcohol until age 21 or rent an automobile until age 25 (Minnesota House of Representatives, Research Department, 2010). At age 18 adolescents can purchase and smoke nicotine products, legally gamble, rent R rated movies, and serve in the military. At the ages of 14 to 16, adolescents can make lifelong decisions to marry and find gainful employment. The United States has created confusion with
the lack of consistency regarding law making in the past while new scientific findings have amplified the confusion (Steinberg, 2009).

The Minnesota House of Representatives (2010) states that a minor is a person under the age of 18. The age requirement to purchase mood-altering substances remains at 18 to purchase nicotine and 21 to purchase alcohol. Both alcohol and nicotine dependence and abuse exist as diagnoses in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision, (DSM-IV TR). With evidence of negative effects, age limits on purchasing and using these products remains beneficial. The DSM-IV TR (2000) also lists caffeine-induced intoxication, caffeine-induced sleep disorder, and caffeine-induced anxiety disorders as diagnoses. This leads to the question: Why is there no age limit on the purchase and use of caffeine containing products? Presently, a five year old can legally purchase caffeine-containing products; even though the possibility of caffeine induced, disorders exist.

Adolescent Chemical Use and Environmental Factors

Since categorization of stimulants includes the drug caffeine, it will be important to consider what factors of alcohol and drug use play a role in addiction to any mood-altering chemical. Fields (2010) authored the book “Drugs in Perspective”, which proposed causes, assessment, family issues, prevention, intervention, and treatment in adolescent chemical use. Fields argued that the most common risk factor for adolescent chemical use was low self-concept. The author also suggested that parents and schools have discussed characteristics of low self-concept as under-achievement, shyness, and aggressive or anti-social behavior (Fields, 2010).
Low Self-Concept

Fields (2010) argued that the word self-concept should be changed to sense of self, a more active term. Under this definition a person with a sense of self is a unique, worthwhile individual with emerging talents and skills. This individual also feels as though he or she can accomplish things by developing, prioritizing, achieving, solving problems, resolving conflicts, accepting and carrying out responsibilities, and having the maturity to develop and grow. Finally, this sense of self includes an individual’s ability to trust and be trusted and have the ability to set appropriate boundaries in intimate relationships (Fields, 2010).

Fields (2010) quoted an article by Robinson (1975) entitled “Beyond Drug Education” that promoted the concept that we cannot dissuade people from the use of chemicals, but rather we can empower them to enhance their development of self. Robinson (1975) suggested that educational programs should help students develop skills to control destructive impulses, understand their values, needs, and desires, make wise decisions, resist negative peer pressure, find nonchemical means to fulfill and satisfy, and think intelligently and rationally. Fields argued that families in the United States tend to neglect promotion of the adolescent’s sense of self (Fields, 2010).

Reclaiming adolescents with a low sense of self. When an adolescent lives in a situation that does not promote a positive sense of self, Archbishop Desmond Tutu suggests that, “someone needs to throw them a lifeline.” (Brendtro, Brokenleg, & Van Bockern, 2002, p. ix). Brendtro et al., (2002) authored the publication entitled, “Reclaiming Youth at Risk, Our Hope for the Future”, which focuses on discouragement, the Circle of Courage, and the reclaiming environment. This book begins with a forward by Archbishop Desmond Tutu, who argued that we have given adolescents lack of hope by speaking of them as statistics, teaching them that
success is everything no matter how brutal an individual might have to be to obtain it, and establishing our whole society on superiority. Tutu suggested that the solution to this dilemma is to care for each individual as part of our family and to look at children, not as problems, but as individuals with potential to share if they are given the opportunity. *Reclaiming Youth at Risk* presents Native American philosophies of education and caring for children along with European traditions. These philosophies included courage and discouragement, which have long been seen as an instrumental virtue, even before the twentieth century and Alfred Adler (Brendtro et al., 2002).

This publication suggested four features of a reclaiming environment for adolescents. The first feature, “experiencing belonging in a supportive community, rather than being lost in a depersonalization bureaucracy,” (Brendtro et al., 2002, p. 4) included Adlerian concepts such as belonging and community, which will be brought to the forefront later in this review. Secondly, “meeting one’s needs for mastery, rather than enduring inflexible systems designed for the convenience of adults,” (p. 4) touched on the impact adult behavior has on adolescents. Third, “involving youth in determining their own future, while recognizing society’s need to control harmful behavior,” (p. 4) involved balancing the needs of both adolescents and society. And lastly, “expecting youth to be caregivers, not just helpless recipients overly dependent on the care of adults,” (p. 4) pointed out helplessness and can be counteracted by helpfulness, which Adler suggested as a positive quality of a mentally healthy individual (Brendtro et al., 2002).

*The circle of courage*. Brendtro et al., (2002), presented a solution to helping adolescents at risk: “The Circle of Courage”. The Circle of Courage was derived from the Native American philosophy of child rearing. The Circle of Courage offered four components to foster healthy
child rearing: the Spirit of Belonging, the Spirit of Mastery, the Spirit of Independence, and the Spirit of Generosity (Brendtro et al., 2002).

The Spirit of Belonging, in Native American culture, began with a group of individuals coming together to raise a child (Brendtro et al., 2002). “Children experienced a network of caring adults” (Brendtro et al., 2002, p. 46). Children were raised as being related to the entire band, therefore, with an innate sense of belonging and responsibility. This feeling of belonging makes all adolescents more receptive to guidance from other community members. Dr. Menninger, (n.d.) Pioneering American Psychiatrist, stated that, children of today pursued, “artificial belongings” since this need was not filled by families, schools, and communities (as cited in Brendtro et al., 2002, p. 48).

When an adolescent’s need for competence had been satisfied, further achievement was reinforced (Brendtro et al., 2002). When the need was not met, adolescents became frustrated and expressed troubled behavior and succumbed to helplessness and inferiority. In the Native American culture, the Spirit of Mastery began with listening to elders for wisdom, followed by training, which helped young people find a balance between work and play. Striving for mastery was not viewed as being competitive, but rather to achieve one’s goals (Brendtro et al., 2002).

Native American culture also taught of the Spirit of Independence by focusing on self-imposed goals instead of on demands from others (Brendtro et al., 2002). Native American child rearing used the idea of guidance without interference. These two concepts included the philosophy of treating the child with dignity and respect. The concept of independence did not propose ending nurturing, but rather, “Children’s ability to separate and manage on their own is anchored in the degree of the security of their attachments” (Brendtro et al., 2002, p. 56).
Finally, children in Native American culture had been taught, during early years, through stories told by the elderly, that the Spirit of Generosity was a virtue (Brendtro et al., 2002). Prestige was attained by those who gave unreservedly and those with nothing to give were pitied. According to Native American Culture, “The greatest brave was he who could part with his cherished belongings and at the same time sing songs of joy and praise” (Brendtro et al., 2002, p. 59).

**Impact of Stimulant Drinks on Adolescents**

**Advertisements by Energy Drink Manufacturers Target Adolescents**

The Committee on Nutrition and The Council on Sports Medicine and Fitness from the American Academy of Pediatrics published a study entitled, “Sports Drinks and Energy Drinks for Children and Adolescents: Are They Appropriate?”. Schnieder and Benjamin (2011), lead authors, reported sports and energy drinks as being marketed to adolescents for inappropriate uses. Schnieder and Benjamin pointed out that energy drink manufacturers use the terminology “sports performance” similar to manufacturers of sport drinks. Typically, sports drinks have added benefits such as replacing electrolytes lost during sweating, and most do not contain caffeine, as do energy drinks. However, the added sugar counteracts any possible benefits (Schnieder & Benjamin 2011).

**Energy Drink Consumption Related to Internet and Video Game Usage**

Calamaro, Thornton, Mason, & Ratcliffe, (2009) argued that sleep deficits, a common result of consuming energy drinks and caffeine, were found after adolescents stayed up late using new media technology. They found, in combination with using new media technology and staying up late, that energy drinks and caffeine play a major role in teens falling asleep in school and difficulties falling asleep during weeknights (Calamaro, et al., 2009).
Alcohol Use, Energy Drinks, and College Students

The truth about Energy Drinks, however, is that they can be deadly, especially when mixed with alcohol (Worthley, Prabhu, De Sciscio, Schultz, Sanders & Willoughby, 2010). Worthley et al. (2010) argued that energy drink consumption along with alcohol causes sudden cardiac death and myocardial infarction, by altering platelet and endothelial function.

In 2007, Malinauskas, Aeby, Overton, Carpenter-Aeby, & Barber-Heidal, published results from a study on energy drink consumption patterns in college students. Since Red Bull arrived on the market in 1997, energy drinks had continued to gain popularity among youth and young adults. The authors found that fifty-one percent of four hundred ninety-six students surveyed consumed more than one energy drink a month. Malinauskas et al., found that these college students used energy drinks when sleep deprived, for energy, to drink with alcohol and when studying for an exam or working on a course project. Students reported experiencing crashing, jolt effects, headaches, and heart palpitations in relation to energy drink usage (Malinauskas et al., 2007).

Curry & Stasio, (2009) completed a study supported by the University of Tampa, Tampa, FL, attempting to find the neuropsychological performance after a person consumes a drink containing both alcohol and an energy drink. Studies exist on the effects of caffeine and the effects of alcohol, but not both of them combined. Many young adults perceived that energy drinks or caffeine could counteract the negative effects of alcohol. These young adults drank a caffeinated energy drink or other caffeine drinks before getting behind the wheel while intoxicated, thinking that their driving abilities would improve. However, not only were these young adults inaccurate in their assumptions, they subjected themselves to increased risk of other complications such as cardiac arrest (Curry & Stasio, 2009).
Addiction

Motives for Mood-altering Chemical Use in Adolescence

Adolescents used mood-altering chemicals for a variety of reasons argues Fields, (2010). One common use was for a desired effect, such as pleasure, relaxation, excitation, relief from negative emotional states, and enhancement of positive emotional states. For example, stimulants such as cocaine or amphetamines were used to increase stimulation, activity, and action. These reasons for stimulant use were consistent with the reasons for stimulant energy drink or caffeine use among adolescents as presented in the article by O’dea (2003). The downside to these effects was the negative responses of the body to long-term use, such as abuse, dependence, and addiction.

Defining Addiction

In 2006, the Substance Abuse Mental Health Services Administration (SAMHSA) (2007) published the National Survey on Drug Use. Results indicated that an estimated 22.6 million Americans (12 and older) were classified with substance dependence or abuse (9.2 percent of the population). As decades have passed, there have been many changes in the field of addiction, including the wide range of definitions for addictions (Fields, 2010). The current standard used by the field of psychiatry and psychology is contained in the Diagnostic Statistical Manual, edition four, text revision (DSM IV-TR) (2000). According to the DSM IV-TR, the following is criteria for substance abuse and dependence:

- DSM IV-TR Definition of Dependence and Abuse states:(APA, 2000, pp 197-198)
  - “Criteria for Substance Dependence

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

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

- (2) Withdrawal, as manifested by either of the following:
  (a) the characteristic withdrawal syndrome for the substance (refer to Criteria A and B of the criteria sets for Withdrawal from the specific substances)
  (b) the same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms

- (3) the substance is often taken in larger amounts or over a longer period than was intended

- (4) there is a persistent desire or unsuccessful efforts to cut down or control substance use

- (5) a great deal of time is spent in activities necessary to obtain the substance (e.g., visiting multiple doctors or driving long distances), use the substance (e.g., chain-smoking), or recover from its effects

- (6) important social, occupational, or recreational activities are given up or reduced because of substance use
▪ (7) the substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite recognition that an ulcer was made worse by alcohol consumption)”

○ “Specify if:

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

▪ Without Physiological Dependence: no evidence of tolerance or withdrawal (i.e., neither Item 1 nor 2 is present)

▪ Course specifiers (see text for definitions):
  • Early Full Remission
  • Early Partial Remission
  • Sustained Full Remission
  • Sustained Partial Remission
  • On Agonist Therapy
  • In a Controlled Environment (p. 197)”

○ “Criteria for Substance Abuse

▪ A. Maladaptive pattern of substance use leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring within a 12-month period:
• (1) recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home (e.g., repeated absences or poor work performance related to substance use; substance-related absences, suspensions, or expulsions from school; neglect of children or household)

• (2) recurrent substance use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired by substance use)

• (3) recurrent substance-related legal problems (e.g., arrests for substance-related disorderly conduct)

• (4) continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance (e.g., arguments with spouse about consequences of intoxication, physical fights)

B. The symptoms have never met the criteria for Substance Dependence for this class of substance” (DSM IV-TR, APA, 2000, 199).

Alfred Adler’s Viewpoint on Addiction

The Ansbachers provided Alfred Adler’s viewpoint on addiction in the publication entitled, The Individual Psychology of Alfred Adler (1956). As explained earlier, drinks and supplements containing stimulant properties can be another form of addiction. Adler separated his views on alcohol addiction and drug addiction. Adler asserted that, among drug addicts there
existed less “movement and direction toward a successful solution of outer and inner confrontations” (Ansbacher & Ansbacher, 1956, p. 163). Adler believed some causes of addiction to have been environment, temptation, acquaintance with drug life morphia, and medicinal cocaine used to treat certain illnesses. In the early 1900’s it was common to use cocaine as a topical anesthetic for things such as toothaches (Inaba & Cohen, 2011). When Adler used the word morphia, he meant morphine or other opiate, pain, or sedating medicines. Adler mentioned that these addictions were only effective in situations in which the individual had a problem, which seemed unsolvable. During the years that Adler was alive, energy drinks, sports drinks, and other stimulant supplements were not in existence as they are today. When using Adler’s writings in this review, the reader can assume that this includes popular stimulant drinks and supplements when using the words addiction or alcoholism. Therefore, stimulant drinks and nutritional supplements could be used when a situation seems unsolvable such as competing for first prize in an athletic contest. Adler spoke of alcoholism in a different light, in that taste was involved as another element leading to addiction. Adler remarked that the beginning of addiction of any kind began with “an acute feeling of inferiority marked by shyness, a liking for isolation, oversensitivity, impatience, irritability, and by neurotic symptoms such as: anxiety, depression, and sexual insufficiency” (Ansbacher & Ansbacher, 1956, p. 423). He also argued for the opposite. The beginning of addiction may also have been due to, “a superiority complex in the form of boastfulness, a malicious criminal tendency, a longing for power” (Ansbacher & Ansbacher, 1956, p. 423). The beginning feelings of addiction gave the individual a feeling of being unburdened, and, in the instance of full-scale drug addiction, the addict experienced failures in love, at work, and in social relations as a direct result of the addiction (Ansbacher & Ansbacher, 1956).
**Excitement seekers.** Mosak and Maniacci (1999), authors of the title, *A Primer of Adlerian Psychology*, expounded on the analytic, behavioral, and cognitive components of the Individual Psychology of Alfred Adler. Mosak and Maniacci used the term “Excitement Seekers” when discussing Adlerian people types, as they found it important to put names to Adler’s way of explaining people and behavior. The authors related to excitement seekers as “stimulant junkies” or “sensation seekers” (Mosak & Maniacci, 1999, p. 71). Today’s culture is “stimulus-bound”, in that there are bright lights, loud music, busy roadways, vibrant, electronic billboards, and hundreds of television and radio stations. To demonstrate culture today, one could mention the insensibility in situations in which people have the television powered on, not to watch it, but just for the stimulation. Mosak and Maniacci reported that when excitement seekers were living on the more useful side of life they were constructive, creative, and adventurous involving exploration, discovery, creativity, risk, and novelty. These individuals had sought out adventure and worked hard to create new possibilities. However, when excitement seekers had been more destructive than useful, they often engaged in high-risk behaviors such as creating fights, taking drugs, thrill seeking, gambling, and putting their own and other’s lives in danger (Mosak & Maniacci, 1999). Excitement seekers may find themselves using stimulant drinks and supplements to boost the excitement.

Mosak and Maniacci (1999) provided education for adults to identify excitement seekers as children and adolescents. These individuals are fussy and require more contact and stimulation than others require. Even if they are successful, they are not satisfied. They reach satiation at higher levels than others and tend to learn more slowly than their peers. Excitement seekers absorb a lot of information, process it slowly, and do not learn from their mistakes unless repeated trial and error occurs. They want to see and have more of everything. Their safety is not
as important as exploring. However, contrastingly, these individuals can be bold and innovative. Either they can lead others into new insights or they can get themselves into deep trouble.

Excitement seekers can become poly-drug users and seek intimate relationships for the feeling of love and passion rather than interest in the other person. Poly-drug users are individuals whom use more than one mood-altering chemical. For example, if an individual drinks alcohol and smokes marijuana this individual would be named a poly-drug user. Alternatively, if a person smokes cigarettes and uses energy drinks, this individual would also be a poly-drug user. Unless these individuals learn to create excitement with their intimate partner, rather than in spite of them, they often are not good for long-term relationships. If excitement seekers use constructive approaches to life, they can offer joy to others. In contrast, if excitement seekers are destructive resorting to behaviors such as addition, the result may be death. The sad part about these types of individuals is that they often live so close to the edge that they fall off (Mosak & Maniaci, 1999).

**Caffeine’s Effects on Mental Health**

**Behavioral, Physiological, and Subjective Effects of Caffeine on Children and Adolescents**

Age restrictions on caffeine consumption or purchasing of caffeine containing products in the United States does not exist (Temple, Dewey & Briatico, 2010). Therefore, if adolescents can purchase and consume caffeine containing products it is important for adults to consider the effects of consumption. Temple, et al. published a study which discussed the behavioral, physiological, and subjective effects of caffeine on adolescents. Caffeine use among adolescents had associations with obesity and sleep loss. Temple et al. studied the effect of caffeine consumption among adolescents on diastolic blood pressure, heart rate, and food intake. Findings included a broad range of effects. The level of these effects depended on gender and chronic
caffeine consumption. Caffeine types used in this study included tea, soda, energy drinks, coffee, chocolate, and Excedrin/No-Doze. Reports indicated that caffeine intake from 100mg to 400mg caused nervousness, jitteriness, anxiety, and nausea. Reports also indicated decreased levels of sluggishness in adolescents. Temple et al. found that the withdrawal effects associated with caffeine included headaches, drowsiness, and fatigue. Also, findings indicated that caffeine consumption in adolescents related to greater body mass index (BMI), greater intake of unhealthy food, and lower intake of health foods such as fruits, vegetables, and milk. Soda, the primary source of caffeine in adolescents, contained a high amount of sugar. Authors concluded that higher intake of caffeine and sugar simultaneously promoted intake of more unhealthy foods in adolescents. These findings were valuable since sugar proved a natural reward in brain chemistry and had similar associations to drugs such as cocaine, amphetamines, and nicotine. Caffeine and sugar simultaneously activated Dopaminergic properties in the brain, reinforcing properties of sweetened foods and beverages. The addiction process can begin at a young age with caffeine and sugar intake. Studies showed that with each additional sugar-sweetened beverage consumed, there existed an additional sixty percent chance of obesity in adolescents (Temple et al., 2010).

Temple et al., (2010) also determined that there exists evidence of gender differences in the body’s response to caffeine and sugar. Boys found caffeine intake more reinforcing over a two-week period than girls did. The gender difference related to circulating steroid hormones, which became evident during menstrual cycles in females and altered intake patterns and motivation to use caffeine. Boys used caffeine drinks for different reasons than girls. Boys reported reasons for using energy drinks as (in descending order): energy, rush, concentration,
friends, and performance. Girls’ reports included (in descending order): concentration, friends, energy, rush, and performance (Temple et al., 2010).

Temple et al., (2010) pointed out that the marketing of energy drinks aims more toward boys, which results in yet another gender difference in consumption of caffeine containing products. Temple et al., found that girls typically consumed tea while boys consumed energy drinks. This also affected the gender differences between food associations, since tea generally did not contain sugar and energy drinks do contain sugar. Girls were more concerned about their physical appearance, thus avoiding sugar-containing products (Temple et al., 2010).

The Association of Caffeine Use to Attention Deficit Hyperactivity Disorder

Khantzian (as cited in Fields, 2010) observed over two-hundred narcotic addicts and found that these individuals used opiates to treat a life of rage and violent behavior as an anti-aggressive agent. Also, Khantzian, in his work with cocaine addicts, found that these individuals would use cocaine to self-medicate chronic depression, hyperactivity, restless syndrome, attention deficit hyperactivity disorder (ADHD), cyclothymic disorder, and bipolar disorder. The desired treatment for use of mood-altering chemicals to treat these issues was to find healthy alternatives to treat themselves and learn to cope in a more socially accepted, healthy way (as cited in Fields, 2010).

Caffeine use remains associated with obesity and eating habits, but does caffeine consumption among adolescents associate with mental health disorders such as Attention Deficit Hyperactivity Disorder (ADHD)? Children’s Health Care published an article by Leslie Walker, Anisha Abraham, and Kenneth Tercyak (2010) arguing that caffeine use among adolescents relates to the diagnosis of ADHD. This article also included cigarette smoking and its association to caffeine use, with similar findings to those of caffeine (Walker et al., 2010).
Walker et al., (2010) suggested that many adolescents with the diagnosis of ADHD also consumed caffeine on a regular basis. This association may have been due to adolescents using caffeine as a medicating property to help them stay focused. Maintaining attention to a task had its difficulties for adolescents with ADHD and caffeine helped with this inattention trait. However, if adolescents not diagnosed with ADHD consumed high amounts of caffeine, they experienced symptoms of ADHD such as fidgeting, which resulted in misdiagnoses of ADHD. Therefore, it would be important for health care professionals to screen for caffeine use when considering an ADHD diagnosis. Many decades ago, caffeine existed as a treatment for ADHD, but has since been ruled-out as a primary approach. Walker et al., suggested that studies showed that non-pharmacological substances such as caffeine remain effective, but the side effects of using caffeine may counteract any possible benefit (Walker et al., 2010).

Current treatments for ADHD consist of mostly psychostimulant medications such as Concerta, Vivance, Metadate, Adderral, and Ridalin. Peterson, Potenza, Zhishun Wang, Zhu, Martin, Marsh, Plessen, and Yu (2009), searched for proof of the effectiveness of psychostimulants in Magnetic Resonance Imaging (MRI) studies on youth with and without ADHD both on and off ADHD psychostimulant medications. Previous studies on the effects of these stimulant medications consisted of only adults and non-human subjects. This study concluded that psychostimulant medications affect four different areas of the brain as shown in MRI results. The four areas of the brain affected include striatum, the anterior cingulate cortex, the prefrontal cortex, and the inferior frontal gyrus. The prefrontal cortex, not fully developed until the third decade of life, is the area responsible for higher order skills and has increased density from the neurotransmitter Dopamine. Dopamine remains responsible for the reward
Adolescents taking medication for ADHD may be at higher risk of hardwired dependence on psychostimulants throughout their lives (Peterson et al., 2009). Psychostimulants affect the prefrontal cortex and Dopamine during adolescence. Addiction experts have found that the neurotransmitter Dopamine is related to addiction to mood-altering chemicals (2009). Therefore, psychostimulants such as caffeine and energy drinks can be associated with addiction problems into adulthood (Peterson et al., 2009).

The Effects of Caffeine on Additional Psychiatric Disorders

Lara (2010) argued that caffeine, a mood-altering chemical, is used by about 80% of the world population, with little attention paid to the fact that people voluntarily manipulated their mind pharmacologically on a daily basis. He discovered that caffeine, being such a widely used chemical, must have had at least some reinforcing effect and was tolerated well at high doses. Also, caffeine was low in cost and easily accessible by all age groups and ethnic populations. Sources of caffeine were most often found in the form of coffee, tea, energy drinks, soft drinks, chocolate, and over-the-counter medications. Although several other ingredients existed in caffeine containing products, caffeine seemed to be the most effective mentally active substance. However, at high doses, caffeine caused symptoms of a condition called “caffeinism”, such as “anxiety, restlessness, nervousness, dysphoria, insomnia, excitement, psychomotor agitation, and rambling flow of thought and speech duplicating a clinical picture known as mixed mood state” (Lara, 2010, p. s240). Caffeine withdrawal caused headaches, fatigue or drowsiness, anxiety, and depression. Caffeine dependence was evidenced by withdrawal symptoms, persistent desire or unsuccessful efforts to cut down or control use, and tolerance. Caffeine at higher doses was regarded as an inducer of anxiety. The presence of certain anxiety disorders influenced the perceived effects of caffeine. According to Lara, earlier studies have shown that patients with
panic disorder, generalized anxiety disorder, and depression reported higher sensitivity to anxiogenic effects of high doses caffeine (typically higher than 400 mg). Discordantly, caffeine was shown to have a 55% reduction in obsessive-compulsive (OCD) symptoms for OCD patients (Lara, 2010).

**Depression, Anxiety, and Mountain Dew Consumption**

Rising obesity rates among adolescents has forced some national beverage companies to cease sales of caffeinated beverages in schools (Luebbe & Bell, 2009). Caffeine consumption of certain sodas had a harmful impact on adolescents. Luebbe & Bell, compared Mountain Dew consumption to mental health issues such as depression and anxiety in adolescents. Luebbe & Bell concluded that weekly caffeine use had a strong relationship to depression, mostly mediated by caffeine withdrawal symptoms (Luebbe & Bell, 2009).

**Behavioral, Physiological, and Subjective Effects of Caffeine on Children and Adolescents**

Age restrictions on caffeine consumption or purchasing of caffeine containing products in the United States did not exist (Temple, Dewey & Briatico, 2010). Therefore, if adolescents can purchase and consume caffeine containing products it is important for adults consider the effects of consumption. Temple et al., from the University at Buffalo, published a study, which discussed the behavioral, physiological, and subjective effects of caffeine on adolescents. Caffeine use among adolescents had associations with obesity and sleep loss. Temple et al., studied the effect of caffeine consumption among adolescents on diastolic blood pressure, heart rate, and food intake. Findings included a broad range of effects, and the level of these effects depended on gender and chronic caffeine consumption. Caffeine types used in this study include tea, soda, energy drinks, coffee, chocolate, and Excedrin/No-Doze. Reports indicated that caffeine intake from 100mg to 400mg caused nervousness, jitteriness, anxiety, and nausea.
Reports also indicated decreased levels of sluggishness in adolescents. Temple et al., found that the withdrawal effects associated with caffeine included headaches, drowsiness, and fatigue. Also, findings indicated that caffeine consumption in adolescents related to greater body mass index (BMI), greater intake of unhealthy food, and lower intake of health foods such as fruits, vegetables, and milk. Soda, the primary source of caffeine in adolescents, contained a high amount of sugar. Authors concluded that higher intake of caffeine and sugar simultaneously promoted intake of more unhealthy foods in adolescents. These findings were valuable since sugar proved a natural reward in brain chemistry and had similar associations to drugs such as cocaine, amphetamines, and nicotine. Caffeine and sugar simultaneously activated Dopaminergic properties in the brain, thus had reinforced properties of sweetened foods and beverages. The addiction process can begin at a young age with caffeine and sugar intake. Studies showed that with each additional sugar-sweetened beverage consumed, there existed an additional sixty percent chance of obesity in adolescents (Temple et al., 2010).

Temple et al., (2010) determined that there exists evidence of gender differences in the body’s response to caffeine and sugar. Boys found caffeine intake more reinforcing over a two-week period than girls did. The gender difference related to circulating steroid hormones, which became evident during menstrual cycles in females and altered intake patterns and motivation to use caffeine. Boys used caffeine drinks for different reasons than girls. Boys reported reasons for using energy drinks as (in descending order): energy, rush, concentration, friends, and performance. Girls’ reports included (in descending order): concentration, friends, energy, rush, and performance (Temple et al., 2010).

Temple et al., (2010) pointed out that the marketing of energy drinks aims more toward boys, which results in yet another gender difference in consumption of caffeine containing
products. Temple et al., found that typically, girls consumed tea and boys consumed energy drinks. This also affected the gender differences between food associations, since tea generally did not contain sugar and energy drinks do contain sugar. Girls were more concerned about their physical appearance thus avoiding sugar containing products (Temple et al., 2010).

**Behaviors of Parents with Adolescents**

Research on energy drinks and other stimulant type drinks such as caffeine containing soda is limited since energy drinks are relatively new to the market. However, research on parenting in relation to adolescent alcohol use indicated ways in which parents can reduce adolescent alcohol use. Ryan, Jorm, Kelly, Hart, Morgan, & Lubman, (2011) provided helpful behaviors for parents in reducing problematic alcohol use to include: parental modeling, not providing substances, chemical-specific communication, parental disapproval of use, parental discipline, rules about chemical use, parental monitoring and the quality of the parent-child relationship. Utilizing these parenting tools with the use of energy drinks and other stimulant type drinks provides parents with a guide to help with all chemical use.

**Adlerian**

**The Individual Psychology of Alfred Adler**

Ansbacher & Ansbacher (1956) pulled together the writings, teachings, and interactions with Alfred Adler and published *The Individual Psychology of Alfred Adler: A Systemic Presentation in Selections from His Writings*. Ansbacher & Ansbacher argued that often times the study of adolescence promoted this time in an individual’s life as being a “dangerous crisis at which the whole character of an individual could change.” (p. 439) Adolescence, a time of new experiences and changes, resulted in mistakes in the style of life. An adolescent’s goal, to prove that he/she has grown out of childhood, remained his/her primary focus. Adlerians believed that
many of the behaviors exhibited by adolescents are an effort to show independence, equality with adults, and manhood or womanhood. The authors mentioned that adolescence is a time when some individuals begin to smoke, stay out late at night, and swear (Ansbacher & Ansbacher, 1956).

Adler noticed that each human being is confronted by three tasks as early as birth (Ansbacher & Ansbacher, 1956). The three tasks include social task, work task, and the love task. The social task is the same concept as community feeling, which is living amongst other human beings. The work task comes from the belief that we are born onto this earth and we must contribute something to offer in exchange. Finally, the love task, insinuates that since humans are born into society, which includes two sexes, they must meet the challenge of sexual cooperation that future generations are dependent upon. Ansbacher & Ansbacher argued that adolescence is a time during which parents allow more freedoms and independence. If the parents do not allow for this independence and instead try to control the adolescent, “adolescent negativism” may surface. Thus, Adler hypothesized; if the child were not trained adequately, he/she would not be equipped to face the three life tasks. Adler offered encouragement as a solution to this problem. If adolescents lack courage, they may simply mimic the adults in their life. For example, if the father of the adolescent is engaging in spending money freely, flirting with women, or having love affairs, then the adolescent will also engage in similar behaviors (Ansbacher & Ansbacher, 1956). Additionally, if the degree of activity is not sufficient, the adolescent may begin criminal behavior. Adler often used the term “degree of activity” when discussing what is observable movement of an individual toward a goal (Griffith & Powers, 2007, p. 22). For example, an individual may have a goal of “perfection,” thus; all movement would be an effort to be perfect, such as having a perfectly kept home. At worst, if the adolescent
does not have enough courage or degree of activity to face the life tasks then he or she settles for neurosis. Neurosis is exposed when adolescents are confronted with social challenges that they are not equipped to meet (Ansbacher & Ansbacher, 1956).

**Compensation**

Griffith & Powers (2007) argued that Alfred Adler viewed impaired persons as compensating for their disadvantages. A solution to this perception of disadvantage is encouragement. Adler believed that a misbehaving child has felt discouraged at one point in time or another. The solution to discouragement is encouragement (Griffith & Powers, 2007).

**Cooperation and Contribution**

Symptoms of discouragement or behavioral problems begin when an adolescent is confronted by problems requiring social preparation as the solution (Griffith & Powers, 2007). The two Adlerian terms offered as solutions to social problems are cooperation and contribution. Cooperation, according to Adler, was the “distinguishing characteristic of the successful human being” (Griffith & Powers, 2007, p 18). Adler suggested that because humans are social beings, human problems are social problems, requiring cooperation for the solution. If a person has a “personal problem”, Adler felt as though these “personal problems” were the result of a person’s hesitation to engage cooperatively with others (Griffith & Powers, 2007).

Contribution is a term for understanding Adler’s assessment of a person’s movement on the useful side of life (Griffith & Powers, 2007). Since children grow into adolescents and eventually adults, it is of great value that caregivers put effort into training children as contributing members of society. The only solution to continuously driving inferiority is the feeling of being valuable, which derives from the contribution to the common good of all humans. According to Adler, every human strives for significance, but people make mistakes
when they do not see the value of the contributions to the lives of others (Griffith & Powers, 2007).

**Inferiority Feelings**

Inferiority Feelings are universal human feelings of incompleteness, smallness, weakness, ignorance, and dependency and are derived from one’s first experiences in infancy and early childhood (Griffith & Powers, 2007). These feelings continue to be experienced to greater or lesser degree throughout adolescence and into adulthood. For a well-adapted individual, these feelings serve as motivation to overcome barriers in life. These feelings of inferiority can help adolescence to grow and to contribute to the community (Griffith & Powers, 2007).

**Community Feeling/Social Interest**

The German term, which Adler used, for the definition of community feeling was “Gemeinschaftsgefühl” (Griffith & Powers, 2007, p. 11). There is not one word in the English language that directly translates and gives full meaning to “Gemeinschaftsgefühl,” but the most accurate of these is community feeling. The term community feeling captured the individual’s understanding of the need to belong in the community and cosmos of which he/she existed. The understanding of the need to belong requires an understanding of the adolescent’s contribution to the community as being affected by his or her actions. The sense of being one amongst fellow human beings, community feeling/social interest must be trained. The “more developed the community feeling, the more diminished the inferiority feeling” (Griffith & Powers, 2007, p. 11).

When one has never experienced situations or types of people, one may have difficulty stepping outside of his or her own frames of reference (Carlson, Watts & Maniacci, 2005). Adler promoted the three Life Tasks that also relate to community feeling, which could be the focus of identifying where the discouragement lies: social task, work task, and love task (Carlson, Watts & Maniacci, 2005).
“Making, taking, or finding a place for oneself”

“Making, taking, or finding a place for oneself” is a phrase Dreikurs & Soltz (1964) used to describe the movement of an individual to create and establish an ideal social role. Dreikurs argued in the publication, *Children: The Challenge*, that children searched for a place within their family system and within the sibling relationship. Even into adolescence, they looked for a ways in which they could belong to, and contribute to, the family. This process began as a contest between siblings for the throne, the position typically held by the oldest sibling, as if he or she were the king. When perceived by the oldest child that the second born child overtook the oldest child’s contribution, Adlerians use the term dethronement. This same type of interaction and competition held a form in social groups into adolescence. Some common social groups consisted, in the mid 1950’s of “brains, greasers, jocks, and nerds” (Griffith & Powers, 2007, p. 66). This peer interaction became a creation of the family system at a more complex social level. These groups neither guided nor pushed away the adolescents who encountered them. But, they provided reference groups in which adolescents could see how they could make a place for themselves in line with previously found strategies and roles within the smaller unit of the family system (Griffith & Powers, 2007).

**Mistaken Goals of the Discouraged Adolescent**

When adolescents became discouraged within the family system and had a difficult time finding a way to contribute or belong to the family, they may have become discouraged. When adolescents felt discouraged and lacked a sense of belonging, they may have compensated and chosen a mistaken goal, which gave them a false sense of superiority (Griffith & Powers, 2007). Dreikurs and Soltz (1964) outlined these goals as attention, power, revenge, and a display of inadequacy. Attention was the annoying or disruptive behavior that said, “I might be inadequate,
but I will not let you ignore me”. Power was the angry, insistent behavior that was often the next in line when the attention getting did not work as intended. Revenge claimed identification by bitter, hurtful words and actions, often in response to the harsh punishments of retaliatory power, and expressions of the unhappy convictions of children who believed they were worthless. Finally, the display of inadequacy was the reflection of despair of doing anything that was successful or appreciated (Dreikurs & Soltz, 1964).

Recommendations for Future Therapeutic Approaches and Research Direction

Natural or Logical Consequences

Dreikurs & Grey (1968) wrote the book, *The New Approach to Discipline: Logical Consequences*, which was a system for teaching children in an atmosphere of mutual respect with natural or logical consequences. This book taught parents a practical method, which they could employ to allow children to experience the satisfying and unpleasant consequences of their choices and actions. Dreikurs and Grey recognized that the emerging path in which society in the United States was taking, honoring democracy and freedom, presented a need for new parenting styles. Using praise/reward and shame/punishment methods was fading from popularity. Natural consequences were neither praise/reward nor shame/punishment and attended to the child's behavior without parental intervention. Parents were encouraged to allow their children to experience the natural consequences from the child’s own actions. Logical consequences discussed and agreed upon among the family, perhaps in a weekly family meeting, provided children and adolescents with a developing sense of themselves as a valuable player in shaping family life, as well as their own individual lives (Dreikurs & Grey, 1968).

Understanding and Dealing with Adolescents

Eckstein, Rasmussen & Wittschen, (1999) discussed typical adult-adolescent interactions and the difficulties that can arise. Eckstein et al. suggested that adolescents who lack strength
due to the belief that adults will take care of them, were pampered or not equipped to meet social challenges. Pampered adolescents lacked the tools to meet life's trials since they had continuous shelter from life's adversities provided by parents. Even into the college years, pampered children struggled with sticking to one course of professional study. When a trial came to the forefront with coursework, the pampered student often switched majors out of fear of failure. Youthful sanguinity, the approach to which many adolescents adhered, offered hope in trying times and courage to take on the challenges of life into adulthood. However, neglected and pampered adolescents often took on a negative pessimistic outlook on life. Pampered individuals not only struggled in college, they continually struggled in other life areas such as love, relationships, and work (Eckstein et al., 1999).

Eckstein et al., (1999) focused on the process in which, adolescents matured earlier or later than their peers, thus having had negative emotional reactions when they felt that they did not belong in their peer group. Things such as “bad hair days” appeared catastrophic to adolescents, contrastingly, minor to adults. Parents often felt as though they were "walking on eggshells" around their adolescent. As adolescents grow, their ability to process information at a more mature level can hinder their decision making since they have a less experienced knowledge base. However, with parental involvement, adolescents had more hope in making decisions that did not affect them negatively for the remainder of their lives. Due to the inadequate world, experiences with heightened cognitive functioning, adolescents often operated out of an egocentric view. Elkind (1970) argued that this self-centered view of adolescents was described as an "imaginary audience" (as cited in Eckstein et al., 1999, p. 37). This self-centered view birthed from the certainty that adults were the judicious audience (Eckstein et al., 1999).
The egocentric, inexperienced, improved cognitive functioning view on adolescence resulted in the belief that unpleasant consequences happened to others, not themselves (Eckstein et al., 1999). “Personal Fable,” as Eckstein et al., labeled this sense of invincibility that most adolescents concurred, caused them to think that others get pregnant from having sex, become addicted to drugs after experimental use, or get in a car accident when driving drunk. This “personal fable” may be what contributes to the heightened alert by parents, as the adolescent’s desire to belong encourages them to behave in risk-taking activities (Eckstein et al., 1999).

Eckstein et al., (1999) suggested that parents and counselors of adolescents remember to offer an environment that includes encouragement and respect where the adolescent remains accepted regardless of the risk-taking, egocentric, and emotionally deregulated characteristics that exist. Dinkmeyer and McKay (1990), as cited in Eckstein et al., 1999, p. 43, suggested family meetings that include an environment in which the adolescent and other family members are heard, can express feelings about one another, offers conflict resolution, and allows a setting to plan fun family activities.

Eckstein et al., (1999), suggested four recommendations to understanding and dealing with adolescents. First, fostering responsibility entails adults encouraging adolescents to get involved in chores around the house or a job at a local business. This approach helps adolescents to appreciate the relationship between envisioning an aspiration and making it a reality. Next, rather than testing the adolescent's naive stance, adults can encourage social interest and offer ways adolescents can give back to the community. Subsequently, adults could encourage adolescents to become involved with mentoring programs. As a final point, adults should prevent transference of their own experiences to affect what types of involvement the parent encourages of the adolescent. For example, if a parent perceived himself or herself as a failure in a certain
sport he/she would be deterred from pushing their adolescent into this same sport to feel the sense of success that he/she was unable to feel as an adolescent (Eckstein et al., 1999).

**Future Research Direction**

Future research is necessary given the complexity of adolescent development and the interaction of new technological advances, increased access to media involvement, and new stimulant products on the market. It will be helpful to answer additional questions in relation to adolescent development and stimulant drink/nutritional supplement consumption. More information about the long-term effects of stimulant drink and nutritional supplements will help public decision makers and parents determine if regulations on the sale of these products are warranted. Perhaps MRI brain scan research on adolescents can be done related to the consumption of these products; and, additional tools for parents to prevent consumption and educate their children on the effects of popular stimulant drinks and nutritional supplements on their development, education, and future health.

**Conclusion Summary**

This literature review has reported on the research and literature that supports the conclusion that adolescents who consume popular stimulant drinks and nutritional supplements, remain at risk of physical and mental health related consequences due to the developmental sensitivity to mood-altering chemicals during adolescence. The literature provided offers education and approaches to parents, caregivers, teachers, and counselor of adolescents. Using the information provided in this review, adults can guide adolescents to fruitfully meet the tasks of life and infuse a sense of courage to meet the challenges and adversity that life can bring.
References


http://drinkarizona.com/index_national.html#carousel_green_tea

http://drinkarizona.com/index_national.html#product_fastshots_pm

http://drinkarizona.com/index_national.html#product_fastshots_am

http://drinkarizona.com/index_national.html#product_fastshots_rx


Bawls Acquisition. (2011b, August). The Low Down. Retrieved from
http://www.bawls.com/the-low-down/


Calamaro, C. J., Mason, T. A., & Ratcliffe, S. J. (2009). Adolescents living the 24/7 lifestyle:
ADOLESCENTS AND STIMULANT DRINKS

Effects of caffeine and technology on sleep duration and daytime functioning. *Pediatrics*, 123(6), e1005-e1010. doi:10.1542/peds.2008-3641


lifespan on the brain, behaviour and cognition. *Nature Reviews Neuroscience, 10*(6), 434-445. doi:10.1038/nrn2639


Substance Abuse Mental Health Services Administration: National Survey on Drug Use and


Steinberg, L. (2009). Should the science of adolescent brain development inform public policy?
*American Psychologist, 64*(8), 739-750. doi:10.1037/0003-066X.64.8.739


The Coca-Cola Company. (2011, August). *Powerade [What is Ion4].* Retrieved from


doi:10.1037/a0021651

Therapeutic Research Faculty, publishers of Natural Medicines Comprehensive Database,
Therapeutic Research Faculty, publishers of Natural Medicines Comprehensive Database, 

Therapeutic Research Faculty, publishers of Natural Medicines Comprehensive Database, 

Walker, L. R., Abraham, A. A., & Tercyak, K. P. (2010). Adolescent caffeine use, ADHD, and  
Cigarette smoking. Children’s Health Care, 39(1), 73-90. 
doi:10.1080/02739610903455186


http://www.thenationalcampaign.org/resources/pdf/BRAIN.pdf


Detrimental effects of energy drink consumption on platelet and endothelial function. 