

THE IMPACT OF ENERGY DRINKS ON SLEEP AND PSYCHOEMOTIONAL STATE OF ADOLESCENTS

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ABSTRACT	KEYWORDS
<p>The consumption of energy drinks among adolescents has become a significant public health concern in recent years, as the high content of caffeine and other stimulants may negatively affect sleep, psychoemotional state, and academic performance. This article examines the impact of energy drink consumption on sleep and the psychoemotional state of adolescents. Particular attention is paid to the composition of energy drinks, including caffeine, taurine, and sugar, as well as their effects on the central nervous system. Changes in sleep duration and quality, levels of anxiety, irritability, and emotional instability in adolescents who regularly consume energy drinks are analyzed. The paper summarizes data from contemporary scientific studies and emphasizes the risk of developing sleep disturbances and psychoemotional disorders associated with the systematic consumption of these beverages. The study concludes that it is necessary to inform adolescents, parents, and educators about the potential negative consequences of energy drink consumption and the importance of preventive measures. Social-analytical and hygienic-statistical observational methods were used to study consumption habits, sleep indicators, psychoemotional status, and the level of adolescents' awareness of health risks. The obtained data make it possible to develop scientifically grounded hygienic recommendations aimed at reducing energy drink consumption and preventing sleep disorders, thereby contributing to improved health and academic performance among adolescents.</p>	<p>Energy drinks, adolescents, sleep, psychoemotional state, sleep disturbances, mental health, health effects, mood, fatigue</p>

Introduction

Energy drinks are becoming increasingly popular among adolescents. They contain tonic substances, most commonly caffeine (in some cases, caffeine is declared in the form of extracts of guarana, tea, or mate, which contain caffeine, or under other names such as mateine or theine), as well as other stimulants, including theobromine and theophylline (cocoa alkaloids). In addition, energy drinks often contain vitamins, easily digestible carbohydrates (glucose, sucrose) as sources of energy, adaptogens, and other components. [3]

Excessive consumption of energy drinks containing caffeine and taurine, which are potent psychoactive substances, affects the functioning of the central nervous system. Disorders of the emotional sphere have been reported, including the emergence of unmotivated fear, the development of depression, sleep and appetite disturbances, and an increased frequency of antisocial behavior. The presented data may serve as evidence of the negative impact of non-alcoholic tonic beverages on adolescent health. [2]

The main purposes of consuming energy drinks are to improve performance during drowsiness and to enhance mood. With single-use consumption, energy drinks improve mood—this was reported by 48% of 150 respondents; 28% experienced a surge of energy, 14% felt no effects, 7% experienced weakness and drowsiness, and 5% reported nausea and dizziness. Those who consumed energy drinks repeatedly experienced headaches, suppressed self-awareness, weakness, and drowsiness over time, accompanied by an increased need for energy drinks. [4]

The Importance of Sleep for Adolescents

Sleep is a vital, periodically occurring special physiological state of the body that occupies approximately one-third of a person's daily time. It is characterized by the absence of voluntary activity, almost complete disconnection from external sensory stimuli, the presence of dreams, as well as specific electrophysiological and humoral manifestations. Sleep disorders in children represent a pressing issue in modern pediatrics and neurology: they are observed in 84% of children under the age of 2.5 years, in 25% of children aged 3–5 years, and in 13.6% of children aged 6 years [2–4]. Among sleep disorders in childhood, the most prevalent are sleep talking (84%), nighttime awakenings (60%), bruxism (45%), night terrors (39%), nocturnal enuresis (25%), difficulty falling asleep (16%), snoring (14%), rhythmic movements (9%), and obstructive sleep apnea (3%) [6].

Adequate sleep, as a crucial component of a healthy lifestyle, affects all aspects of human life. The role of high-quality sleep is fully reflected in maintaining physical and psychoemotional well-being. Accordingly, sleep disorders in children and adolescents and the associated problems justifiably raise concern among healthcare professionals and the general public, and these issues receive considerable attention due to their widespread and increasing prevalence. The bodies of school-aged children are in a stage of active growth and development and have an acute need for effective nighttime rest provided by sleep. Sleep deprivation in children and adolescents is one of the most urgent problems of modern society, as it leads to serious somatic and mental health consequences. As a result of chronic sleep deprivation, the risk of cardiovascular diseases and hypertension increases, along with the development of obesity and diabetes mellitus, while immune function is impaired.

Sleep deficiency negatively affects attention and memory and leads to faster fatigue during intensive educational activities, which undoubtedly affects the quality of learning and reduces the effectiveness of school education and extracurricular programs. Unhealthy sleep among minors is considered a serious problem not only for public health but also for society as a whole: 20–40% of children experience sleep problems such as nighttime awakenings and difficulty falling asleep; 75% of high school students sleep less than the recommended eight hours per night and report impaired sleep quality. Healthy sleep and circadian rhythms are essential for the physical, cognitive, and psychosocial development of children and adolescents. Sleep deprivation and poor sleep quality have been associated with cardiometabolic risk factors that increase the likelihood of cardiometabolic diseases and mortality later in life. Persistent sleep problems in childhood precede the development of clinical

psychological and emotional symptoms in adolescence, including aggression, attention deficit, social anxiety, and depression. Insufficient nighttime sleep and daytime sleepiness are associated with poor academic performance. Thus, identifying the health consequences of unhealthy sleep and determining evidence-based interventions for the prevention of sleep disorders will contribute to improving the health and well-being of children and adolescents [1].

The harmful effects of energy drinks (EDs) among Korean youth have been assessed as including sleep loss, severe stress, and depression leading to suicide attempts. Among medical students, energy drink consumption has been associated with insomnia and irritability. In addition, it has been shown that intake of 3 mg/kg of caffeine as part of energy drinks exacerbates insomnia and nervousness regardless of gender. Chronic sleep deprivation and circadian rhythm disruption caused by high-caffeine energy drinks may provoke inappropriate behavior and substance abuse [5].

To determine the prevalence of sleep disorders and their impact on academic performance among schoolchildren in the city of Norilsk, Krasnoyarsk Krai, a study was conducted involving 350 adolescents. To identify sleep problems in children and for further analysis, parents were surveyed using the adapted Children's Sleep Habits Questionnaire (CSHQ) to obtain data on target and classification variables, and a detailed medical examination of the schoolchildren was performed. The CSHQ is a parent-completed questionnaire consisting of 33 items that assesses eight domains of sleep: parasomnias, bedtime resistance, sleep duration, sleep onset delay, nighttime awakenings, sleep anxiety, daytime sleepiness, and sleep-disordered breathing. It was developed and clinically validated by researchers at Brown University for children aged 4 to 12 years to identify the most common sleep problems in this age group. Responses were evaluated using a 3-point Likert scale.

According to the obtained data, among the examined children aged 6 to 12 years, 54.9% were boys and 45.1% were girls, with a mean age of 9.16 years and no significant deviations. Low academic performance was observed in 16.8% of the participants, average performance in 55.8%, and high performance in 27.4%. The mean bedtime and wake-up time for all children on weekdays were 9:30 p.m. and 6:45 a.m., respectively, with an average sleep duration of 8.4 hours across all age groups. The study found that sleep duration in all age groups was below the recommended level, and approximately half of the children (46%) woke up more than once per night. The bivariate regression coefficient confirmed that an increase in the frequency of nighttime awakenings by one unit leads to a decrease in academic performance by 0.044 points, which is statistically significant ($p < 0.05$) [8].

The Impact of Energy Drinks on the Psychoemotional State of Adolescents

At present, modern life is characterized by high levels of tension and strain on the human body, including a fast-paced rhythm, academic and work-related stress, and social instability. Often, individuals experience a lack of strength, energy, and time to meet personal needs and achieve set goals. In an attempt to improve their physical condition, many turn to energy drinks. However, most consumers rarely consider the composition of these fast-acting beverages and their effects on the human body. All energy drinks contain sucrose and glucose, which serve as primary nutritional substrates for the body. When food enters the body, glucose is formed through the breakdown of starch and disaccharides. Energy drinks also contain caffeine. A sharp release of adrenaline and increased psychological activity are followed, after a short period, by a decline in energy. After consuming an energy drink, the body requires time to recover and eliminate caffeine. Caffeine overdose leads to nervousness, irritability, sleep disturbances, and loss of appetite. [9]

With prolonged and regular caffeine consumption, seizures, stomach pain, and deterioration of nervous system function may occur. Energy drinks also contain theobromine and taurine. Taurine is an amino acid synthesized in the gallbladder that participates in various metabolic processes and improves cellular nutrition. It accumulates in muscle tissue, enhances metabolic processes, has anticonvulsant properties, and regulates heart rate. Taurine, as one of the main components of energy drinks, is considered harmless in small amounts but not at the levels used in energy drinks—600–1080 mg compared to the recommended intake of 400 mg. In large quantities, taurine causes overstimulation and exhaustion of the nervous system, and when combined with alcohol, it enhances its effects, leading to serious disruptions in cardiovascular and nervous system function. Therefore, taurine is contraindicated for individuals with increased nervous excitability and those consuming alcoholic beverages. Thus, a single can of an energy drink contains more than sufficient taurine—an amount recommended for professional athletes and entirely unnecessary for the general population. [7]

In addition, aggressive marketing of energy drinks targeted at young people has created an environment in which these beverages pose a significant threat to the health of the younger generation. Energy drinks are widely perceived as substances that overcome drowsiness and increase physical and mental activity. Recently, consumers have begun using the stimulating effects of energy drinks to counteract the sedative effects of alcohol. Advertising that promotes the beneficial effects of energy drinks increases the risk of their negative impact on the physical and mental health of young people. The need for further clinical trials assessing the efficacy and safety of energy drinks is unquestionable. Such studies should be conducted alongside improvements in marketing and advertising policies and the refinement of regulations governing their consumption.

A link between energy drink consumption and mental health has been established, including manifestations of stress, anxiety, the development of depressive symptoms, and suicidal ideation accompanied by suicide attempts. It has been reported that Canadian adolescents who consumed energy drinks more than once a month were nearly three times more likely to report depressive thoughts than those who did not consume these beverages. A review of energy drink consumption and mental health among adolescents and adults confirmed a positive association between chronic energy drink use and adverse mental health outcomes, including stress, anxiety, and depression. The authors suggest that the consumption of high-caffeine energy drinks may lead to sleep deprivation, which in turn contributes to the deterioration of mental health.

Furthermore, energy drink consumption at the age of 14 is considered a predictor of future drug use. [5]

Excessive consumption of energy drinks containing caffeine and taurine, which are potent psychoactive substances, affects the functioning of the central nervous system. Disorders of the emotional sphere have been reported, including the emergence of unmotivated fear, the development of depression, sleep and appetite disturbances, and an increased frequency of antisocial behavior. [2]

Conclusion

The analysis of scientific literature indicates that energy drink consumption among adolescents is a widespread phenomenon accompanied by a range of adverse health effects. The primary active components of energy drinks are caffeine, taurine, and other stimulants that exert a pronounced impact on the central nervous system.

It has been established that regular consumption of energy drinks is associated with sleep disturbances, including reduced sleep duration, impaired sleep quality, and disruption of sleep patterns. In addition, numerous studies demonstrate a negative impact of energy drinks on the psychoemotional state of adolescents.

Thus, the obtained data confirm the existence of a relationship between energy drink consumption, sleep disturbances, and deterioration of the psychoemotional state in adolescents. This underscores the necessity of limiting energy drink consumption during adolescence, increasing awareness among adolescents and their parents about potential risks, and developing and implementing hygienic and preventive measures aimed at preserving health and improving the quality of life of adolescents.

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