

A Scoping Review on Energy Drink Consumption Among Adolescents and Young Adults

Filipe Reis Teodoro Andrade^{1,2}, Gabriel Thalheimer^{1,2}, Santiago David Vásquez Hidalgo^{2,3},
& Rosa Maria Martins de Almeida^{1,2,3}

¹Department of Developmental and Personality Psychology, Universidade Federal of Rio Grande do Sul,

²Psychology Institute, Universidade Federal of Rio Grande do Sul,

³Basic Health Sciences Institute, Universidade Federal of Rio Grande do Sul

This scoping review aimed to identify empirical studies that have explored the use of energy drink consumption among adolescents and young adults. **Method:** A scoping review search was conducted in the following five databases: PubMed, Embase, Lilacs, Scopus, and Psycnet. Some inclusion criteria, such as being published in the last 10 years, and exclusion criteria, such as article type, animal-model usage, and age, were used to select the studies, and 11 were analyzed independently. **Results:** The results showed that adolescents use energy drinks for many factors, such as connection with peers and family, propaganda, and taste. Some studies have been developed in Australia and the United States of America, and some have explored other variables associated with energy drinks and alcohol use. **Conclusion:** It is essential to understand how energy drink consumption and behaviors are related to health or risky behavior and its associations with other drugs. More research is needed to explore the long-term health impacts of energy drink consumption during the critical developmental periods of childhood and adolescence, as well as its association with alcohol and other substances. The findings underline the importance of stringent regulations, public health policies, and educational initiatives to mitigate the risks associated with energy drink consumption among adolescents. Future research is essential to understand the long-term implications and develop effective preventive strategies to safeguard adolescent health and well-being.

Keywords: energy drinks, adolescents, health, consumption

Adolescence, defined by the World Health Organization (WHO) as individuals aged between 10 and 19 years, is a pivotal stage characterized by rapid physical, cognitive, and psychosocial development, laying the crucial foundations for good health (World Health Organization, 2019). Recently, there has been a discernible global increase in energy drink consumption among adolescents, which has become a subject of significant health concern and professional debate (Miller et al., 2018).

Energy drinks (ED) are beverages that typically contain varying amounts of caffeine, taurine, glucuronolactone, vitamins, herbal extracts, proprietary blends, and amino acids. They are marketed as products capable of enhancing mental alertness and physical endurance (Ahuja et al., 2021; Higgins et al., 2018). These drinks, available in carbonated or non-carbonated forms and with or without sugar, are distinct from traditional beverages like coffee, tea, sodas, and sports drinks, even though they may seem similar. A notable difference is in their caffeine content, with energy drinks potentially containing between 40 to 250 milligrams per 8 fluid ounces, as per the U.S. Food and Drugs Administration (FDA, 2018). This range is significantly higher compared to the caffeine content in an 8-ounce cup of coffee, which usually contains 80 to 100 milligrams. Studies also indicate that energy drinks have an average taurine concentration of approximately 750 milligrams per 8-ounce

serving (Ahuja et al., 2021; Caine & Geraciotti, 2016).

The rise in the consumption of energy drinks among adolescents can be attributed to a myriad of factors. Targeted advertising, the promise of increased alertness, combating fatigue, aspirations for improved academic and athletic performance, and the trend of mixing these drinks with alcohol are some of the driving forces behind their popularity (Quigley et al., 2019; Reissig et al., 2009). However, this increasing consumption has been linked with several adverse health effects, including elevated blood pressure and psychological issues such as anxiety (Lisko et al., 2017). Furthermore, due to the addictive properties of caffeine and other similar components in energy drinks, there have been increased reports of anxiety, stress, and depression among consumers (Linden-Carmichael & Lau-Barraco, 2017; Richard & Smith, 2016). Given these associated risks, some countries have instituted restrictions on the sale of energy drinks, with others contemplating similar regulatory measures (Winston et al., 2005).

Therefore, this scoping review aimed to examine the use of energy drinks in adolescents and young adults to provide a synthesized summary of the evidence and identify gaps in our knowledge. The research question is: Have there been observable trends in the consumption of energy drinks among adolescents and young adults (aged 12-25) in the past decade, with particular emphasis on identifying influencing factors and associated health and behavioral risks?

ENERGY DRINK CONSUMPTION AMONG ADOLESCENTS AND YOUNG ADULTS

With energy drinks gaining popularity due to aggressive marketing strategies, it is imperative to scrutinize the associated risks, thereby laying the groundwork for the development and implementation of prevention programs targeting both the youth and their guardians (Ahuja et al., 2021; Brache & Stockwell, 2011; Zandvliet et al., 2005).

Methods

A literature review followed the premises proposed by PRISMA (Page et al., 2021a; Page et al., 2021b). The scoping review was carried out according to the following steps: (1) formulation of the research question; (2) production and registration of the investigation protocol; (3) definition of inclusion and exclusion criteria; (4) developing of the research strategy and conducting the reference search; (5) screening of studies based on inclusion and exclusion criteria; (6) evaluation of the quality of studies; (7) data extraction (8) data synthesis and evaluation of the quality of the studies (Donato & Donato, 2019).

The approach for conducting systematic scoping reviews by Levac et al. (2010) guided the review based on the five-stage methodological framework that Arksey and O'Malley (2005) developed.

Stage 1: Identifying the Research Question.

The central question guiding this scoping review was:

"Have there been observable trends in the consumption of energy drinks among adolescents and young adults (aged 12-25) in the past decade, with particular emphasis on identifying influencing factors and associated health and/or behavioral risks?"

Stage 2: Identifying Relevant Studies

After the initial search in EMBASE and PubMed, five electronic databases were searched: EMBASE, PubMed, PsycNet, Scopus, and Web of Science, with the last searches performed on August 03, 2022. Date limits were set for 10 years, and the search strategy included using descriptors: Energy Drinks AND (Teenagers) AND (Addiction), with necessary adaptations to the specifications of each database (Table 1). In searches between June 07, 2022, and August 03, 2022, 143 materials were identified.

Stage 3: Study Selection

Quantitative and qualitative peer-reviewed, original, full-length research papers were included. The reviewers were previously trained for the task

according to the following exclusion criteria: (a) reviews and meta-analyses; (b) Theses, dissertations, abstracts, and publications in congresses; (c) studies that are not in English; (d) animal model research; (e) sample with subjects under 12 or over 25 years old.

Participants

This Review focused on adolescents and young adults aged between 12 and 25 years. The population may have been studied in schools, universities, or through surveys.

Concept

During the review, the focus was on energy drink consumption by adolescents, specifically on health and relational factors. Studies that solely focused on addiction to sugar were not considered. The PICO strategy was used based on eligibility criteria, with P (population) being adolescents, I (intervention) lower levels of use, C (comparison) being patterns of use in adolescents, and O (outcome) being energy drink consumption during adolescence.

Search Strategy

When performing the search strategy in the five different databases, a total of 143 records were identified. These records were exported to Rayyan Software (Ouzzani et al., 2016). Duplicate records were then removed, resulting in 139 records for screening the title and abstract. The screening was performed by two authors (FRTA and GT), who independently compared the titles and abstracts of each record with the inclusion criteria. FRTA and GT finally agreed to include 11 records as relevant studies for full-text screening. The records considered eligible for full-text screening were then distributed among one other author, RMMA, in addition to FRTA and GT. They independently screened the full-text studies to assess eligibility for inclusion in the review.

The research tool Rayyan Software was used to combine all materials, remove duplicates (n=143), and for the independent reviewers (FRTA and GT) to screen the 139 unique titles and abstracts simultaneously (Ouzzani et al., 2016). FRTA and GT had a concordance rate of 96.8%, and a third reviewer (RMMA) assessed divergences. With those steps complete, 13 articles were selected for the second round of assessments, this time analyzing full text according to the same criteria previously stated.

Based on the analysis of the complete texts, 13 articles were selected for the data extraction phase. After this second exclusion phase, data extraction began, con-

sidering as inclusion criteria in the study: (a) articles that had energy drinks in their title; (b) studies that evaluated the effect of energy drinks on adolescents; (c) research that made comparisons between groups or intragroup; At this stage, two articles were excluded (see Figure 1).

Stage 4: Charting the Data

Three authors (FRTA, GT, and RMMA) analyzed energy drink use in adolescence, including three main phases: preparation, organizing, and writing. One author (FRTA) extracted study characteristics, which were also reviewed by GT and included in an agreement between RMMA. As this was a review, study quality (e.g., risks of bias, study strength) was considered, but not for a meta-analysis. Tables 1 and 2 show the systematization and categorization of relevant topics from the results of the studies included in this review, reflecting the review questions.

Stage 5: Collating, Summarizing, and Reporting the Results

The main characteristics of the eleven included studies are presented in Table 2. The studies were grouped by year of publication. Studies published in the same year were grouped alphabetically by first authors' surnames. The extracted data were: (1) citation; (2) country; (3) Study design; (4) outcome measures; (5) sample; (6) main findings.

Findings

The findings of the review are presented according to the review questions. Table 2 reports the general information and significant findings of the reviewed publications.

Results

Concerning the overall number of articles, there were 119,796 participants from different countries, most of them from China, the United States of America, and Italy, aged 12 to 19 years, who completed various surveys. The average is 11,979,6 adolescents. The most predominant type of test was the socio-demographic questionnaire, covering 50% of the total articles.

Several studies indicated that boys were more likely to report consumption than girls and in a more significant amount (Choi et al., 2016; Koivusilta et al., 2016; Magnezi et al., 2015). In this scoping review, cross-sectional survey data suggested that the use of energy drinks is patterned by gender. Larson et al. (2014) found a significant connection between regular consumption and lower breakfast frequency for

girls. In contrast, Ludden & Wolfson (2010) found that girls were likelier than boys to report expectations around appetite suppression. Patterns of use according to age were less clear-cut, with some studies showing that consumption levels increased with age and others demonstrating that the converse was true.

Martz et al. (2015) showed that cross-racial and ethnic patterns were also identified; black students were less likely to consume energy drinks than their white counterparts or Latins. Other studies have suggested that consumption levels are highest among Aboriginal, Hispanic, and/or Black students (Martz et al., 2015; Visram et al., 2016; Xu et al., 2020). Higher consumption levels were positively associated with being underweight or obese, being from a single-parent family, receiving complimentary school meals, having special educational needs, and having higher spending (Reid et al., 2015; Scalese et al., 2017).

Young people with higher scholastic averages, a higher sense of coherence, higher levels of parental monitoring, and more educated parents were less likely to consume and consistently associated with energy drink consumption was the use of alcohol and/or binge drinking, smoking, or susceptibility to smoking and other substance energy drinks (Miller, 2008).

One survey of Australian college students observed that premixed alcohol-mixed energy drinks (AMEDs) included the ability to drink more, sensations of being more awake or in control, the symbolic attractiveness of AMEDs, and the ease of obtaining and concealing the beverages for underage drinkers. The survey also identified several negative aspects of AMEDs, including difficulty speaking, hangovers, and increased aggression (Jones et al., 2012).

A study on the appropriateness of caffeinated drinks for children found that high caffeine intakes (>5 mg/kg body weight per day) were associated with an increased risk of apprehension (anxiety) and withdrawal symptoms. Nevertheless, evidence from young adult studies and expert discussions was used to suggest that relatively small quantities of caffeine may benefit cognitive function and sports performance, as well as contribute to daily liquid intake (Jones et al., 2012; Kempes et al., 2019; Sanchis-Gomar et al., 2015).

Views Regarding the Consumption of Energy Drinks

Our analysis of mixed method studies and relevant survey results revealed two significant themes:

ENERGY DRINK CONSUMPTION AMONG ADOLESCENTS AND YOUNG ADULTS

motivations for usage and convincing on usage.

Motivations for Use

Many individuals, particularly boys involved in sports, consume energy drinks to enhance their athletic performance. Others may opt for energy drinks as an occasional substitute for soft drinks, but only when they have extra funds available, as they tend to be pricier (Abian-Vicen et al., 2014; Costa et al., 2014; Gallo-Salazar et al., 2015). Participants in studies have commonly reported that energy drinks "wake you up, make you feel alert, and taste good," "make me hyper," and "keep me energized for soccer matches" (Abian-Vicen et al., 2014; O'Dea, 2003). A research study conducted by Jones explored the perceptions of alcohol-energy drinks (AEDs) among 12-17-year-olds and found that young people enjoyed them because they increased the fun at parties and acted as a pick-me-up (Jones, 2011).

Convincing on Use

The use of energy drinks among young people is influenced by advertising and brand loyalty, according to a study that involved participants from three different age groups (16-21, 22-28, and 29-35 years). The study found that energy drinks were advertised on various platforms such as TV, the internet, games promotions, sports sponsorship, and shops. Industry marketing targeted specific drinks to men or women using sexualized imagery, humor, and social media (Bunting et al., 2013). The younger age group seemed more aware of their projected social image and more influenced by their peers when making purchasing decisions. Social situations, particularly spending time with friends, were identified as familiar contexts for energy drink consumption. Parents also played a significant role in influencing their children's use of energy drinks. They either discouraged or prohibited the consumption of energy drinks or encouraged and endorsed their use. The study found that energy drinks were easily accessible from convenience stores or supermarkets, provided by parents, shared by siblings or friends, or obtained free at sponsored events. (Bunting et al., 2013; Costa et al., 2014).

Discussion

This review set out to examine evidence of any associations between adolescents and young adults' health and consumption of energy drinks. It also sought to explore consumer experiences and attitudes toward these drinks. The evidence demonstrates that the use of en-

ergy drinks by children and young people is associated with several adverse outcomes and health-damaging behaviors. 139 studies were located, with 11 meeting our inclusion criteria. A total of 99,740 participants were included in the 11 articles. In which we have obtained the gender data of 28,326 participants (28.4%), amongst 47.2% were males and 52.7% were females.

Three randomized controlled trials demonstrated that pre-exercise ingestion of an energy drink positively impacted some aspects of sports performance (O'Dea, 2003; Pennay & Lubman, 2012; Sanchis-Gomar et al., 2015). Nevertheless, the referred studies involved small numbers of athletes, and the results should thus be treated with some vigilance. Several cross-sectional studies indicated that energy drink consumption by adolescents was strongly and positively associated with higher rates of impulsivity, risk behavior, smoking, alcohol, and other substance use, as well as being linked to physical health manifestations such as headaches, loss of vigor, stomach aches, insomnia, fatigue, and hyperactivity (Azagba et al., 2014; O'Dea, 2003).

Two studies provided evidence of a dose-response effect, although none of the investigations could define the reason (Jones et al., 2012; Pennay & Lubman, 2012). Typically, boys consume more energy drinks than girls. Usage was found to be patterned by gender and age, although there was some variance between studies on the direction of the association. The highest consumption levels have been observed in sedentary and physically active people, suggesting a link between sports and screen-based relaxation activities.

An exciting finding among the analyzed studies is in a Hungarian study by Toth et al. (2020) where he examined 631 high school students and their relationships with energy drinks that corroborate the hypothesis of this review. The social environment of respondents and the amount of time they spend with friends were also factors influencing ED use. Parents supporting or forbidding education use have a significant influence on their children. Those with a weaker sense of coherence and a tendency toward depression were much more likely to become addicted, those who were active in sports were significantly less likely to report symptoms of depression, and their sense of coherence was also more potent than young people who did not engage in sporting activities at the same time, ED consumption was widespread among young people who were active in sports (Tóth et al., 2020).

The studies mentioned above have reported perceived beneficial effects on young people's bodies and sports performance, with slight mention of any adverse effects and limited knowledge of energy drink ingredients among participants (Franklin et al., 2013; Pennay & Lubman, 2012; Sampasa-Kunyinga et al., 2020; Visram et al., 2016).

Other literature findings show that energy drinks can significantly increase the likelihood of negative mental health conditions, such as stress, anxiety, and depression. These adverse outcomes are particularly prevalent in adolescents and young consumers (Richards et al., 2016). Although energy drinks may positively impact mood in the short term, long-term consumption is more likely to harm mental health (Trapp et al., 2014). However, there is a lack of comprehensive data regarding the potential link between energy drink consumption and mental health issues in young people (Kaur et al., 2020). Consequently, it is plausible that the components of energy drinks could contribute to the development or aggravation of mental health problems (Babu et al., 2008).

As for the appeal of energy drinks among the young, taste and energy-seeking were identified as critical drivers for consumption. Advertising and brand loyalty have been highlighted as significant influences on young people's attitudes toward energy drinks, and peers, family, and friends also played an important role. A few studies found that more than half of young energy drink consumers (53%) reported using energy drinks to continue partying and drinking alcohol over a more extended period and may experience adverse effects ranging from difficulty sleeping to addiction to alcohol (Franklin et al., 2013; Park et al., 2012; Wiggers et al., 2020).

A study by Leal and Jackson (2019) used samples for monitoring students between 2010 and 2016 and found that energy drink consumers are significantly more likely to intend to initiate marijuana use. Youth who heavily use energy drinks have substantially higher odds of having the intention to use marijuana (Snipes & Benotsch, 2013). Other studies in Table 2 show that adolescents may have associations with depressive symptoms when they ingest energy drinks with alcoholic beverages (Cotter et al., 2013; Tóth et al., 2020; Xu et al., 2020).

Aggressive marketing campaigns by manufacturers toward adolescents and young adults put this

group at risk. That said, an experimental study developed in Canada provided evidence that current warnings in caffeinated energy drinks (CEDs) could be enhanced to increase the salience of messages, with a more significant impact from clear, descriptive, front-of-package 'high source of caffeine' labels, eliciting lower product appeal and perceived safety ratings in young adults aged 12–24 years (Reid et al., 2015). As caffeine is the primary psychoactive ingredient in energy drinks and is responsible for the vast majority of toxicity, energy drink labels that present high levels of caffeine associated with 'danger' could reduce the number of poisonings through indiscriminate use (Zandvliet et al., 2005).

Advertisements for energy drinks are often targeted towards adolescents through popular TV shows and websites, which could potentially encourage them to consume such drinks (Harris et al., 2015). It is important to note that while the average amount of caffeine consumed by teenagers has decreased over the past 20 years, there has been a significant increase in energy drink consumption among adolescents over the past decade (Tran et al., 2016). This is a cause for concern due to the numerous reported adverse effects of excessive caffeine, ranging from minor sleep disturbances to mortality. High consumption of energy drinks among young people in recent years is a worrying trend (Mesirov et al., 2015).

The need to understand adolescents' consumption of energy drinks is justified primarily by a range of immediate risk behaviors that are associated. Regarding future health, recent reviews have pointed out that standards adopted during this period have a potentially lasting influence and can extend into adulthood, with repercussions on physical and psychological health (Rice & Klein, 2019). Different behaviors of children and adolescents can negatively affect health and well-being, with short or long-term impacts. Regarding energy drinks, there is evidence that the age at first use predicts future risks. A longitudinal study with young American military officers pointed to the age range between 13 and 16 years as critical, suggesting that adolescents who begin consumption during this period become more likely to consume larger quantities of the product in isolated episodes than those who started consumption after the 20 years (Sather et al., 2016). Furthermore, new associations have been found between frequent ED consumption with alcohol by adolescents and a greater risk of developing alcohol dependence in adulthood (Arria et al., 2011).

ED does not present therapeutic benefits, contains

ENERGY DRINK CONSUMPTION AMONG ADOLESCENTS AND YOUNG ADULTS

understudied ingredients, is not fully regulated, and has no safe consumption levels yet established for children and adolescents (Curran & Marczynski, 2017; Howland & Rohsenow, 2013; Seifert et al., 2011). The context is one of uncertainty regarding the acute and chronic safety of these products. Thus, it is necessary to understand the patterns of ED consumption by adolescents in our reality, the motivations that have led them to consume, and the factors that may be associated, both protective factors against consumption and risk factors, due to eventual or regular use. Special attention to this stage of development, characterized by lower assessment and self-protection capabilities, can prevent global health and well-being issues, with consequences in different areas of adult life.

Conclusion

The data collected covered several significant biases to be considered; however, regarding the use of energy drinks for adolescents, it is essential to have more studies to understand that energy drink consumption might increase risk behaviors associated with alcohol, which can be seen through competition, or impulsive risk, and depression (Table 2). Adolescence is a phase of significant biological and social changes. It is crucial to be aware of these aspects, primarily regarding social support, for a greater possibility of dealing with new situations.

This review contributes to the growing body of evidence regarding the health effects of consuming energy drinks. For young people, the negative implications may outweigh the positive ones. Despite this, factors like the brand, relationships with energy drink users, taste, and perceived benefits increase their popularity among young consumers. The advertising for these products worldwide often features ideas of power, strength, energy, and explosion, using images and product names that allude to these concepts. It is crucial to explore the effects of high levels of ingredients like caffeine, taurine, and sugar in energy drinks on young people's bodies. More education is needed about energy drink patterns for this demographic. However, addressing this issue through policies and interventions is complex due to the choices adolescents and young people make. While individual health education is unlikely to have a significant impact, healthcare and other professionals can play a role in promoting safe consumption habits.

Young men were identified as an essential fac-

tor, in combination with the gendered marketing and perceived links to sports performance. More research is required to explore the longer-term health impacts, given that childhood and adolescence are critical yet understudied periods in developing health-related behaviors and use of energy drinks associated with alcohol or types of consumption. The potential effects of heavy and long-term energy drink consumption on child development, behavior, and educational outcomes also warrant further study.

Furthermore, the findings have important practical implications for public health policies and laws governing the sale of energy drinks to minors on a prevention level. The results highlight the significance of imposing more stringent regulations and education efforts to block adolescents' access to these drinks, promoting healthy habits.

Dealing with the problem of children and teens consuming energy drinks requires acknowledging the complexity of their choices. While educating them about health may have little impact, healthcare professionals and others should provide clear information about the safety of consuming energy drinks. They may need guidance from organizations like the Food and Drug Administration (FDA- U.S.A), the Brazilian Health Regulatory Agency (Anvisa), and the European Medicines Agency (EMA).

It's essential to conduct further research to explore the long-term health impacts, particularly during childhood and adolescence, which are critical yet understudied periods in developing health-related behaviors.

Strengths and Limitations

Three authors thoroughly and systematically screened titles and abstracts, followed by full-text studies and reference lists. Discussions were held to ensure that no appropriate studies were lost. We attempted to use various search terms such as "stimulant drink," "energy strip," "energy shot," and "energy mint," as well as "youth," "young adults," and "teen" for the population. However, these terms yielded little results in the research bases. This was a limitation of our study. Additionally, we only included studies in the English language, which may have caused us to miss some relevant papers. We searched five databases, but this is a partial number. However, we followed the recommendations of experienced academics to cast as wide a net as possible regarding the context, concept, and population.

Recommendations for Further Research

The findings have considerable and varied implications in the context of this research. This study reveals the increasing concern over adolescent energy drink intake and its potential connection to other drugs, especially alcohol. Theoretically, our findings add to the field by verifying and deepening our knowledge of the dangers that alcoholic drinks pose to adolescents.

Our research indicates that further long-term studies are required to track adolescents and better understand how their behavior may be affected as they approach adulthood through energy drinks. Additionally, this study highlights the need for more investigation into the development and effectiveness of preventive and educational programs targeting adolescents. This includes researching school-based interventions, public awareness campaigns, and collaborating with mental health professionals to combat the psychological risks of consuming energy drinks and other substances. Ultimately, this study establishes a strong foundation for future research to safeguard adolescent health and well-being while identifying key areas where significant contributions can be made to address the dangers of energy drink consumption in this age group.

References

- Abian-Vicen, J., Puente, C., Salinero, J. J., González-Millán, C., Areces, F., Muñoz, G., ... & Del Coso, J. (2014). A caffeinated energy drink improves jump performance in adolescent basketball players. *Amino Acids*, 46, 1333-1341. <https://doi.org/10.1007/s00726-014-1702-6>
- Ahuja, M., Awasthi, M., Records, K., & Lamichhane, R. R. (2021). Early age of alcohol initiation and its association with suicidal behaviors. *Substance Use & Misuse*, 56(9), 1332-1338. <https://doi.org/10.1080/10826084.2021.1922452>
- Arksey, H., & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology*, 8(1), 19-32. <https://doi.org/10.1080/1364557032000119616>
- Arria, A. M., Caldeira, K. M., Kasperski, S. J., Vincent, K. B., Griffiths, R. R., & O'Grady, K. E. (2011). Energy drink consumption and increased risk for alcohol dependence. *Alcoholism: Clinical and Experimental Research*, 35(2), 365-375. <https://doi.org/10.1111/j.1530-0277.2010.01352.x>
- Azagba, S., Langille, D., & Asbridge, M. (2014). An emerging adolescent health risk: Caffeinated energy drink consumption patterns among high school students. *Preventive Medicine*, 62, 54-59. <https://doi.org/10.1016/j.ypmed.2014.01.019>
- Babu, K. M., Church, R. J., & Lewander, W. (2008). Energy drinks: The new eye-opener for adolescents. *Clinical Pediatric Emergency Medicine*, 9(1), 35-42. <https://doi.org/10.1016/j.cpem.2007.12.002>
- Bonar, E. E., Cunningham, R. M., Polshkova, S., Chermack, S. T., Blow, F. C., & Walton, M. A. (2015). Alcohol and energy drink use among adolescents seeking emergency department care. *Addictive Behaviors*, 43, 11-17. <https://doi.org/10.1016/j.addbeh.2014.11.023>
- Brache, K., & Stockwell, T. (2011). Drinking patterns and risk behaviors associated with combined alcohol and energy drink consumption in college drinkers. *Addictive Behaviors*, 36(12), 1133-1140. <https://doi.org/10.1016/j.addbeh.2011.07.003>
- Bryant Ludden, A., & Wolfson, A. R. (2010). Understanding adolescent caffeine use: connecting use patterns with expectancies, reasons, and sleep. *Health Education & Behavior*, 37(3), 330-342. <https://doi.org/10.1177/1090198109341783>
- Bunting, H., Baggett, A., & Grigor, J. (2013). Adolescent and young adult perceptions of caffeinated energy drinks. A qualitative approach. *Appetite*, 65, 132-138. <https://doi.org/10.1016/j.appet.2013.02.011>
- Caine, J. J., & Geraciotti, T. D. (2016). Taurine, energy drinks, and neuroendocrine effects. *Cleveland Clinic Journal of Medicine*, 83(12), 895-904. <https://doi.org/10.3949/ccjm.83a.15050>
- Costa, B. M., Hayley, A., & Miller, P. (2014). Young adolescents' perceptions, patterns, and contexts of energy drink use. A focus group study. *Appetite*, 80, 183-189. <https://doi.org/10.1016/j.appet.2014.05.013>
- Choi, H. J., Wolford-Clevenger, C., Brem, M. J., Elmquist, J., Stuart, G. L., Pasch, K. E., & Temple, J. R. (2016). The temporal association between energy drink and alcohol use among adolescents: a short communication. *Drug and Alcohol Dependence*, 158, 164-166. <https://doi.org/10.1016/j.drugalcdep.2015.11.009>
- Cotter, B. V., Jackson, D. A., Merchant, R. C., Babu, K. M., Baird, J. R., Nirenberg, T., & Linakis, J.

ENERGY DRINK CONSUMPTION AMONG ADOLESCENTS AND YOUNG ADULTS

- G. (2013). Energy drink and other substance use among adolescent and young adult emergency department patients. *Pediatric Emergency Care, 29*(10), 1091–1097. <https://doi.org/10.1097/PEC.0b013e3182a6403d>
- Curran, C. P., & Marczynski, C. A. (2017). Taurine, caffeine, and energy drinks: Reviewing the risks to the adolescent brain. *Birth Defects Research, 109*(20), 1640-1648. <https://doi.org/10.1002/bdr2.1177>
- Dawodu, A., & Cleaver, K. (2017). Behavioural correlates of energy drink consumption among adolescents: a review of the literature. *Journal of Child Health Care, 21*(4), 446-462. <https://doi.org/10.1177/1367493517731948>
- Donato, H., & Donato, M. (2019). Etapas na condução de uma revisão sistemática. *Acta Médica Portuguesa, 32*(3), 227-235. <https://doi.org/10.20344/amp.11923>
- Franklin, K. M., Hauser, S. R., Bell, R. L., & Engleman, E. A. (2013). Caffeinated Alcoholic Beverages - An Emerging Trend in Alcohol Abuse. *Journal of Addiction Research & Therapy, (Suppl. 4)*, S4-012. <https://doi.org/10.4172/2155-6105.S4-012>
- Gallo-Salazar, C., Areces, F., Abián-Vicén, J., Lara, B., Salinero, J. J., Gonzalez-Millán, C., ... & Del Coso, J. (2015). Enhancing physical performance in elite junior tennis players with a caffeinated energy drink. *International Journal of Sports Physiology and Performance, 10*(3), 305-310. <https://doi.org/10.1123/ijsp.2014-0103>
- Gallimberti, L., Buja, A., Chindamo, S., Vinelli, A., Lazzarin, G., Terraneo, A., Scafato, E., & Baldo, V. (2013). Energy drink consumption in children and early adolescents. *European Journal of Pediatrics, 172*, 1335-1340. <https://doi.org/10.1007/s00431-013-2036-1>
- Harris, J. L., & Munsell, C. R. (2015). Energy drinks and adolescents: what's the harm?. *Nutrition reviews, 73*(4), 247–257. <https://doi.org/10.1093/nutrit/nuu061>
- Higgins, J. P., Babu, K., Deuster, P. A., & Shearer, J. (2018). Energy drinks: A contemporary issues paper. *Current Sports Medicine Reports, 17*(2), 65-72. <https://doi.org/10.1249/JSR.0000000000000454>
- Howland, J., & Rohsenow, D. J. (2013). Risks of energy drinks mixed with alcohol. *JAMA - Journal of the American Medical Association, 309*(12), E1-E2. <https://doi.org/10.1001/jama.2012.187978>
- Ilie, G., Boak, A., Mann, R. E., Adlaf, E. M., Hamilton, H., Asbridge, M., Rehm, J., & Cusimano, M. D. (2015). Energy drinks, alcohol, sports and traumatic brain injuries among adolescents. *PLoS One, 10*(9), e0135860. <https://doi.org/10.1371/journal.pone.0135860>
- Jones, S. C. (2011). “You wouldn't know it had alcohol in it until you read the can”: Adolescents and alcohol-energy drinks. *Australasian Marketing Journal, 19*(3), 189-195. <https://doi.org/10.1016/j.ausmj.2011.05.005>
- Jones, S. C., Barrie, L., & Berry, N. (2012). Why (not) alcohol energy drinks? A qualitative study with Australian university students. *Drug and Alcohol Review, 31*(3), 281-287. <https://doi.org/10.1111/j.1465-3362.2011.00319.x>
- Kaur, S., Christian, H., Cooper, M. N., Francis, J., Allen, K., & Trapp, G. (2020). Consumption of energy drinks is associated with depression, anxiety, and stress in young adult males: Evidence from a longitudinal cohort study. *Depression and anxiety, 37*(11), 1089–1098. <https://doi.org/10.1002/da.23090>
- Kemps, E., Tiggemann, M., Cibich, M., & Cabala, A. (2019). Cognitive bias modification for energy drink cues. *PloS one, 14*(12), e0226387. <https://doi.org/10.1371/journal.pone.0226387>
- Koivusilta, L., Kuoppamäki, H., & Rimpelä, A. (2016). Energy drink consumption, health complaints and late bedtime among young adolescents. *International Journal of Public Health, 61*, 299-306. <https://doi.org/10.1007/s00038-016-0797-9>
- Larson, N., DeWolfe, J., Story, M., & Neumark-Sztainer, D. (2014). Adolescent consumption of sports and energy drinks: linkages to higher physical activity, unhealthy beverage patterns, cigarette smoking, and screen media use. *Journal of Nutrition Education and Behavior, 46*(3), 181-187. <https://doi.org/10.1016/j.jneb.2014.02.008>
- Leal, W. E., & Jackson, D. B. (2019). The role of energy drink consumption in the intention to initiate marijuana use among adolescents. *Addictive Behaviors, 93*, 240-245. <https://doi.org/10.1016/j.addbeh.2019.02.008>

- Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: advancing the methodology. *Implementation Science, 5*, 1-9. <https://doi.org/10.1186/1748-5908-5-69>
- Linden-Carmichael, A. N., & Lau-Barraco, C. (2017). A daily diary examination of caffeine mixed with alcohol among college students. *Health Psychology, 36*(9), 881-889. <https://doi.org/10.1037/hea0000506>
- Lisko, J. G., Lee, G. E., Kimbrell, J. B., Rybak, M. E., Valentin-Blasini, L., & Watson, C. H. (2017). Caffeine concentrations in coffee, tea, chocolate, and energy drink flavored e-liquids. *Nicotine & Tobacco Research, 19*(4), 484-492. <https://doi.org/10.1093/ntr/ntw192>
- Magnezi, R., Bergman, L. C., Grinvald-Fogel, H., & Cohen, H. A. (2015). A survey of energy drink and alcohol mixed with energy drink consumption. *Israel Journal of Health Policy Research, 4*, 1-8. <https://doi.org/10.1186/s13584-015-0052-5>
- Mai-Lippold, S. A., Dettlinger, C. M., Khalsa, S. S., & Pollatos, O. (2021). A pilot study on the effect of an energy drink on interoception in high vs. low anxiety sensitivity individuals. *European Journal of Health Psychology*. <https://doi.org/10.1027/2512-8442/a000061>
- Martz, M. E., Patrick, M. E., & Schulenberg, J. E. (2015). Alcohol mixed with energy drink use among US 12th-grade students: Prevalence, correlates, and associations with unsafe driving. *Journal of Adolescent Health, 56*(5), 557-563. <https://doi.org/10.1016/j.jadohealth.2015.01.019>
- Mesirow, M. S., & Welsh, J. A. (2015). Changing beverage consumption patterns have resulted in fewer liquid calories in the diets of US children: National Health and Nutrition Examination Survey 2001-2010. *Journal of the Academy of Nutrition and Dietetics, 115*(4), 559-66.e4. <https://doi.org/10.1016/j.jand.2014.09.004>
- Miller, K. E. (2008). Energy drinks, race, and problem behaviors among college students. *Journal of Adolescent Health, 43*(5), 490-497. <https://doi.org/10.1016/j.jadohealth.2008.03.003>
- Miller, K. E., Dermen, K. H., & Lucke, J. F. (2018). Caffeinated energy drink use by U.S. adolescents aged 13-17: A national profile. *Psychology of Addictive Behaviors, 32*(6), 647-659. <https://doi.org/10.1037/adb0000389>
- Norberg, M. M., Newins, A. R., Crone, C., Ham, L. S., Henry, A., Mills, L., & Dennis, P. A. (2019). Why are caffeinated alcoholic beverages especially risky? *Addictive Behaviors, 98*, 106062. <https://doi.org/10.1016/j.addbeh.2019.106062>
- O'dea, J. A. (2003). Consumption of nutritional supplements among adolescents: usage and perceived benefits. *Health Education Research, 18*(1), 98-107. <https://doi.org/10.1093/her/18.1.98>
- Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan—a web and mobile app for systematic reviews. *Systematic Reviews, 5*, 1-10. <https://doi.org/10.1186/s13643-016-0384-4>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *International Journal of Surgery, 88*, 105906. <https://doi.org/10.1016/j.ijsu.2021.105906>
- Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... McKenzie, J. E. (2021). PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *BMJ, 372*. <https://doi.org/10.1136/bmj.n160>
- Park, S., Blanck, H. M., Sherry, B., Brener, N., & O'Toole, T. (2012). Factors associated with sugar-sweetened beverage intake among United States high school students. *The Journal of Nutrition, 142*(2), 306-312. <https://doi.org/10.3945/jn.111.148536>
- Pennay, A., & Lubman, D. I. (2012). Alcohol and energy drinks: a pilot study exploring patterns of consumption, social contexts, benefits and harms. *BMC Research Notes, 5*(1), 1-10. <https://doi.org/10.1186/1756-0500-5-369>
- Quigley, B. M., Miller, K. E., Eliseo-Arras, R. K., & Ball, N. J. (2019). Alcohol mixed energy drink use as a risk factor for experiencing and perpetrating

ENERGY DRINK CONSUMPTION AMONG ADOLESCENTS AND YOUNG ADULTS

- bar aggression. *Psychology of Addictive Behaviors*, 33(3), 304–309. <https://doi.org/10.1037/adb0000456>
- Reid, J. L., Hammond, D., McCrory, C., Dubin, J. A., & Leatherdale, S. T. (2015). Use of caffeinated energy drinks among secondary school students in Ontario: Prevalence and correlates of using energy drinks and mixing with alcohol. *Canadian Journal of Public Health*, 106, e101-e108. <https://doi.org/10.17269/CJPH.106.4684>
- Reissig, C. J., Strain, E. C., & Griffiths, R. R. (2009). Caffeinated energy drinks—a growing problem. *Drug and Alcohol Dependence*, 99(1-3), 1-10. <https://doi.org/10.1016/j.drugalcdep.2008.08.001>
- Rice, E. L., & Klein, W. M. P. (2019). Interactions among perceived norms and attitudes about health-related behaviors in U.S. adolescents. *Health Psychology*, 38(3), 268-275. <https://doi.org/10.1037/hea0000722>
- Richards, G., & Smith, A. P. (2016). A review of energy drinks and mental health, with a focus on stress, anxiety, and depression. *Journal of Caffeine Research*, 6(2), 49-63. <https://doi.org/10.1089/jcr.2015.0033>
- Sampasa-Kanyinga, H., Masengo, L., Hamilton, H. A., & Chaput, J. P. (2020). Energy drink consumption and substance use among middle and high school students. *International Journal of Environmental Research and Public Health*, 17(9), 3110. <https://doi.org/10.3390/ijerph17093110>
- Sanchis-Gomar, F., Pareja-Galeano, H., Cervellin, G., Lippi, G., & Earnest, C. P. (2015). Energy drink overconsumption in adolescents: implications for arrhythmias and other cardiovascular events. *Canadian Journal of Cardiology*, 31(5), 572-575. <https://doi.org/10.1016/j.cjca.2014.12.019>
- Sather, T. E., Woolsey, C. L., Williams, R. D., Evans, M. W., & Cromartie, F. (2016). Age of first use of energy beverages predicts future maximal consumption among naval pilot and flight officer candidates. *Addictive Behaviors Reports*, 3(2016), 9-13. <https://doi.org/10.1016/j.abrep.2015.12.001>
- Scalèse, M., Denoth, F., Siciliano, V., Bastiani, L., Cotichini, R., Cutilli, A., & Molinaro, S. (2017). Energy drink and alcohol mixed energy drink use among high school adolescents: association with risk taking behavior, social characteristics. *Addictive Behaviors*, 72, 93-99. <https://doi.org/10.1016/j.addbeh.2017.03.016>
- Seifert, S. M., Schaechter, J. L., Hershoin, E. R., & Lipshultz, S. E. (2011). Health effects of energy drinks on children, adolescents, and young adults. *Pediatrics*, 127(3), 511-528. <https://doi.org/10.1542/peds.2009-3592>
- Snipes, D.J., Benotsch, E.G. (2013). High-risk cocktails and high-risk sex: examining the relation between alcohol mixed with energy drink consumption, sexual behavior, and drug use in college students. *Addictive Behaviors*, 2013;38:1418-1423. <https://doi.org/10.1016/j.addbeh.2012.07.011>
- Temple, J. L. (2009). Caffeine use in children: what we know, what we have left to learn, and why we should worry. *Neuroscience & Biobehavioral Reviews*, 33(6), 793-806. <https://doi.org/10.1016/j.neubiorev.2009.01.001>
- Tóth, Á., Soós, R., Szovák, E., M. Najbauer, N., Tényi, D., Csábi, G., & Wilhelm, M. (2020). Energy drink consumption, depression, and salutogenic sense of coherence among adolescents and young adults. *International Journal of Environmental Research and Public Health*, 17(4), 1290. <https://doi.org/10.3390/ijerph17041290>
- Townshend, J., & Duka, T. (2001). Attentional bias associated with alcohol cues: differences between heavy and occasional social drinkers. *Psychopharmacology*, 157, 67-74. <https://doi.org/10.1007/s002130100764>
- Trapp, G. S., Allen, K., O'Sullivan, T. A., Robinson, M., Jacoby, P., & Oddy, W. H. (2014). Energy drink consumption is associated with anxiety in Australian young adult males. *Depression and Anxiety*, 31(5), 420–428. <https://doi.org/10.1002/da.22175>
- Tran, N. L., Barraji, L. M., Bi, X., & Jack, M. M. (2016). Trends and patterns of caffeine consumption among US teenagers and young adults, NHANES 2003-2012. *Food and chemical toxicology : an international journal published for the British Industrial Biological Research Association*, 94, 227–242. <https://doi.org/10.1016/j.fct.2016.06.007>
- Treloar, H. R., Piasecki, T. M., McCarthy, D. E., & Baker, T. B. (2014). Relations among caffeine

- consumption, smoking, smoking urge, and subjective smoking reinforcement in daily life. *Journal of Caffeine Research*, 4(3), 93-99. <https://doi.org/10.1089/jcr.2014.0007>
- U. S. Food and Drug Administration. Consumer Updates (2018). Spilling the Beans: How Much Caffeine is Too Much?. Washington, DC. Retrieved from: <https://www.fda.gov/consumers/consumer-updates/spilling-beans-how-much-caffeine-too-much>.
- Visram, S., Cheetham, M., Riby, D. M., Crossley, S. J., & Lake, A. A. (2016). Consumption of energy drinks by children and young people: a rapid review examining evidence of physical effects and consumer attitudes. *BMJ Open*, 6(10), e010380. <http://dx.doi.org/10.1136/bmjopen-2015-010380>
- World Health Organization. (2019). *Adolescent Health*. https://www.who.int/health-topics/adolescent-health#tab=tab_1
- Wiggers, D., Reid, J. L., & Hammond, D. (2020). Efficacy of Canadian health warning statements on caffeinated energy drinks: an experimental study among young Canadians. *Health Education Research*, 35(6), 618–626. <https://doi.org/10.1093/her/cyaa040>
- Winston, A., Hardwick, E., & Jaber, N. (2005). Neuropsychiatric effects of caffeine. *Advances in Psychiatric Treatment*, 11(6), 432-439. <https://doi.org/10.1192/apt.11.6.432>
- Xu, H., Guo, J., Wan, Y., Zhang, S., Yang, R., Xu, H., Ding, P., & Tao, F. (2020). Association Between Screen Time, Fast Foods, Sugar-Sweetened Beverages and Depressive Symptoms in Chinese Adolescents. *Frontiers in Psychiatry*, 11, 458. <https://doi.org/10.3389/fpsy.2020.00458>
- Zandvliet, A. S., Huitema, A. D., De Jonge, M. E., Den Hoed, R., Sparidans, R. W., Hendriks, V. M., Van Den Brink, W., Van Ree, J. M., & Beijnen, J. H. (2005). Population pharmacokinetics of caffeine and its metabolites theobromine, paraxanthine and theophylline after inhalation in combination with diacetylmorphine. *Basic & Clinical Pharmacology & Toxicology*, 96(1), 71-79. <https://doi.org/10.1111/j.1742-7843.2005.pto960111.x>

ENERGY DRINK CONSUMPTION AMONG ADOLESCENTS AND YOUNG ADULTS

Table 1

Search Strategies Used for EMBASE, PsychNet, PubMed, Scopus, and Web of Science

| <i>Database</i> | <i>Search Strategy</i> |
|-----------------|---|
| EMBASE | ‘Energy Drinks’ AND (‘Teenagers’) AND (‘Addiction’) |
| PsychNet | (Any Field: “Energy Drinks”) AND (Any Field: “Teenagers”) AND (Any Field: “Addiction*”) |
| | #1 Mesh Terms ‘Energy Drinks’ |
| PubMed | #2 Mesh Terms ‘Teenagers’ |
| | #3 Mesh Terms ‘Addiction’ |
| Scopus | (‘Energy ‘Drinks’) AND (‘Teenagers’) AND (Addiction’) |
| Web of Science | ‘Energy Drinks’ AND (‘Teenagers’) AND (Addiction’) |

Table 2

Summary of the Information and Characteristics of Each Study (n = 11)

| <i>Citation</i> | <i>Country</i> | <i>Study Design</i> | <i>Outcome measures</i> | <i>Sample</i> | <i>Main Findings</i> |
|--|----------------|---------------------|---|---|---|
| Xu et al. (2020) | China | Cross-Sectional | The Children's Depression Inventory; Self-reported questionnaire for measuring ST, FFs, and SSBs consumption; The Bayesian multiple mediations. | 14.500 students in four provinces of China. | Consumption of FFs and SSBs during ST may enhance the association with depressive symptoms in adolescents. FFs and SSBs consumption may play a mediating variable in the association between ST and depressive symptoms. |
| Sammpasa-Kanyinga et al. (2020) | Canada | Cross-sectional | Ontario Student Drug Use and Health Survey (OSDUHS) | 10.662 students in 7th to 12th grade who self-reported information on energy drink consumption and substance use. | Results provide supporting evidence that middle school students who consume energy drinks are at higher risk of other substance use than their high school counterparts. |
| Toth et al. (2020) | Hungary | Cross-sectional | Depression Scale (BDS-13) and Sense of Coherence Scale (SOC-13). Logistic regression models were used. | 631 high school and college students. | The social environment of respondents and the amount of time they spent with friends were also factors influencing ED use. Parents supporting or forbidding ED use have a significant influence on their children Those with a weaker sense of coherence and a tendency toward depression were much more likely to become addicted. Those who were active in sports were significantly less likely to report symptoms of depression, and their sense of coherence was also stronger than that of young people who did not engage in sporting activities. At the same time, ED consumption was prevalent among young people who were active in sports. |

ENERGY DRINK CONSUMPTION AMONG ADOLESCENTS AND YOUNG ADULTS

| | | | | | |
|------------------------------|-----------------------------|-----------------|--|--|---|
| Leal et al. (2019) | United States Of America | Cross-sectional | Logistic regression models were used. | 40,525 Undergraduate students | Energy drink consumers are significantly more likely to intend to initiate marijuana use. Youth who heavily use energy drinks have significantly higher odds of having the intention to use marijuana. Youth who heavily use energy drinks have significantly higher odds of having the intention to use marijuana. |
| Norberg et al. (2019) | Australia | Cross-Sectional | Modified Timeline Followback approach; Analytic plan. | 148 Undergraduate students. | Caffeine consumption was positively associated with the number of standard drinks consumed. Caffeine was an independent risk factor for heavier and more harmful alcohol use. Students radically misperceive their intoxication levels and subjective intoxication best predicts ARCs. |
| Miller et al. (2019) | United States of America | Cross-Sectional | Sociodemographic characteristics, personality traits, lifestyles, and patterns of alcohol and caffeine use. | 1,032 U.S. early (aged 13–15; n=602) and middle adolescents (aged 16–17; n=430). | Findings show that adolescent energy drink use is widespread and varies due to demographic, psychosocial, lifestyle, and substance use characteristics. Common situational contexts for use were: compensating for lack of sleep and/or playing sports differed by gender and age cohort. |

| | | | | | |
|----------------------------|-----------|-----------------|--|--|--|
| | | | <p>Experiment 1: Dot probe task; Cognitive Bias modification protocol (Direct attention away from energy drink pictures); post-training assessment of attentional bias. Ostensible taste test.</p> | <p>Experiment 1: 116 regular energy drink consumers.</p> | <p>Experiment 1: The observed reduction in attentional bias in the group of participants that were trained to direct attention away from energy drink pictures was not accompanied by a lower intake of energy drinks in the taste test.</p> |
| Kemps et al. (2019) | Australia | Cross-sectional | <p>Experiment 2: Approach-avoidance task. Cognitive Bias modification protocol (Push joystick away in response to energy drink pictures); post-training assessment of approach bias. Ostensible taste test.</p> | <p>Experiment 2: 226 regular energy drink consumers.</p> | <p>Experiment 2: In line with Experiment 1, approach bias modification did not significantly affect energy drink consumption in the taste test. However, results were in the expected direction in that energy drink intake in the avoid group was lower than in the approach group.</p> |

ENERGY DRINK CONSUMPTION AMONG ADOLESCENTS AND YOUNG ADULTS

| | | | | | |
|------------------------------|--------------------------|---------------------|---|--|--|
| Scalèse et al. (2017) | Italy | Observational Study | ESPAD@Italia 2015 (European School Survey Project on Alcohol and Other Drugs) | 30,588 Italian high school students aged 15–19 years. Both genders. | <p>Respectively, 41.4% and 23.2% of respondents reported drinking energy drinks and Alcohol mixed with energy drinks in the last year associated with daily smoking, binge drinking, use of cannabis, and other psychotropic drugs.</p> <p>Among life habits and risky behaviors, the following were positively associated: going out with friends for fun, participating in sports, experiencing physical fights/accidents or injury, engaging in sexual intercourse without protection, and being involved in accidents while driving.</p> |
| Bonar et al. (2015) | United States of America | Cross-sectional | AUDITC (Alcohol Use Disorders Identification Test), Energy drink use, reasons and consequences, Risk behaviors, and Demographics. | 439 youth ($M_{age}=18.6$ years, $SD=1.4$; 41% male; 73% Caucasian). | <p>The main findings are common reasons for combining energy drinks and alcohol were hiding the flavor of alcohol (39%) and liking the taste (36%).</p> <p>Common consequences were feeling jittery (71%) and trouble sleeping (46%). Combined users had the highest rates of risk behaviors (e.g., drug use, sexual risk behaviors, driving after drinking) and alcohol use severity.</p> |

| | | | | | |
|--------------------------------------|--------------------------|-----------------|---|---|---|
| Snipes & Benotsch. (2013) | United States Of America | Cross-sectional | Self-report Questionnaires assessing drug use, alcohol and AmED consumption, and sexual behavior. | 704 undergraduate students from a university in the southeastern United States. | AmED consumers appear more likely to use cocaine, marijuana, and methamphetamine, as well as engage in unprotected sex, sex after drug use, and sex after too much drinking. |
| Cotter et al. (2013) | United States of America | Cross-sectional | HYPED study questionnaire (Hearing Young Perspectives on Energy Drink Use) | N=169; Adolescents= 43; Young adults= 126. Both genders. | Adolescents typically consumed a mean of 1.5 and young adults a mean of 2.6 energy drinks per day when using energy drinks and drank at most a mean of 2.4 and 2.6 drinks per day, respectively. Among adolescents, energy drink usage was more common than alcohol, “street” or illicit drugs, and tobacco usage but less common than caffeine product usage. For young adults, energy drink usage was more common than “street” or illicit drugs but less common than caffeine use and similar to tobacco and alcohol usage. Young adult energy drink users were more likely than young adult non-energy drink users to use tobacco and caffeine. |

Note. Some of the studies utilized abbreviation words. ST: Screen time, FFs; Fast foods; SSBs: Sugar-sweetened beverages; ED: Energy drink; EDs: Energy drinks; MTF: Monitoring the Future; ARCs: Alcohol-related consequences; AmED: Alcohol mixed with energy drink.

ENERGY DRINK CONSUMPTION AMONG ADOLESCENTS AND YOUNG ADULTS

Figure 1

Flow Chart of Steps Performed During a Scoping Review

