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Original Article

# Analysis of the Factors Affecting Energy Drink Consumption Among University Students: The Case of Erzincan Binali Yıldırım University

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## ABSTRACT

The aim of this study is to identify the factors influencing energy drink consumption habits among students at Erzincan Binali Yıldırım University. Within the scope of the research, an online survey was administered to 288 university students. The collected data were analyzed using descriptive statistics, frequency analyses, a 5-point Likert scale, and Binary Logistic Regression methods. The mean level of concern regarding health effects among students who consume energy drinks (M = 2.75) was found to be lower than the overall sample average (M = 2.85), suggesting that these students tend to downplay the associated health risks. High agreement levels with statements such as “consumed more in social environments” (M = 2.88) and “consumption increases when with friends” (M = 2.75) indicate a strong influence of social context on consumption behavior. Psychological assessments revealed low levels of concern, suggesting that students perceive energy drinks primarily as a means of improving physiological performance rather than being emotionally driven. According to the Binary Logistic Regression results, factors such as age and family income negatively affect energy drink consumption, whereas variables such as social media use, academic level, and spending amount positively contribute to increased consumption. Additionally, students who prefer alternative beverages in the morning were significantly less likely to consume energy drinks. In conclusion, it is recommended that awareness be raised among students regarding the potential risks of energy drinks, social media advertising be regulated, and healthy beverage alternatives be promoted more effectively.

**Key words:** Energy drink, University students, Consumption behavior, Social media influence, Logistic regression.

# Üniversite Öğrencilerinde Enerji İçeceği Tüketimini Etkileyen Faktörlerin Analizi: Erzincan Binali Yıldırım Üniversitesi Örneği

## ÖZ

Bu çalışmanın amacı, Erzincan Binali Yıldırım Üniversitesi öğrencilerinin enerji içeceği tüketim alışkanlıklarını etkileyen faktörleri belirlemektir. Araştırma kapsamında 288 üniversite öğrencisine çevrimiçi anket uygulanmıştır. Elde edilen veriler tanımlayıcı istatistikler, frekans analizleri, 5’li Likert ölçeği ve Binary Lojistik Regresyon yöntemleri kullanılarak analiz edilmiştir. Enerji içeceği tüketen öğrencilerin sağlık etkilerine ilişkin ortalama kaygı düzeyinin (Ort. = 2,75), tüm örneklemin ortalamasından (Ort. = 2,85) daha düşük olduğu saptanmıştır. Bu durum, tüketicilerin olası sağlık risklerini görece daha az önemsediklerini göstermektedir. “Sosyal ortamlarda daha fazla tüketildiği” (Ort. = 2,88) ve “arkadaşlarla birlikte olunduğunda tüketimin arttığı” (Ort. = 2,75) ifadelerine verilen yüksek katılım, sosyal çevrenin tüketim davranışları üzerindeki güçlü etkisini ortaya koymaktadır. Psikolojik değerlendirmelerde düşük düzeyler görülmüş, öğrencilerin enerji içeceklerini duygusal nedenlerden ziyade fizyolojik performansı artırıcı bir araç olarak algıladıkları sonucuna varılmıştır. Binary Lojistik Regresyon sonuçlarına göre; yaş ve aile geliri enerji içeceği tüketimini azaltıcı yönde etki yaparken, sosyal medya kullanımı, sınıf düzeyi ve harcama miktarı tüketimi artırıcı yönde etkili bulunmuştur. Ayrıca, sabah

saatlerinde farklı içecekleri tercih eden öğrencilerin enerji içeceği tüketme olasılığı anlamlı biçimde daha düşük çıkmıştır. Sonuç olarak, öğrencilerin enerji içeceklerinin potansiyel riskleri konusunda bilinçlendirilmesi, sosyal medya reklamlarının denetlenmesi ve sağlıklı içecek alternatiflerinin daha etkin şekilde teşvik edilmesi önerilmektedir.

**Anahtar kelimeler:** Enerji içeceği, Üniversite öğrencileri, Tüketim davranışı, Sosyal medya etkisi, Lojistik regresyon.

## INTRODUCTION

Energy drinks are non-alcoholic beverages typically formulated with stimulant components such as caffeine, taurine, and various vitamins, and are promoted for their purported performance-enhancing effects (Zucconi et al., 2013). These beverages often contain between 50 to 550 mg of caffeine per can, making caffeine the primary active ingredient (Ishak et al., 2012). An 8 oz. energy drink contains approximately 80 mg of caffeine—more than twice the amount in a 12 oz. can of cola (33.9 mg), and nearly equivalent to 6 oz. of coffee (70 mg) (Bell et al., 1996; Chou and Bell, 2007). This demonstrates that energy drinks generally deliver a higher stimulant dose compared to other caffeinated beverages (Hardy et al., 2021). Designed to enhance energy, mental alertness, and physical endurance (Harris and MarMunsell, 2015), energy drinks have become particularly popular among athletes, professionals in cognitively demanding jobs, and university students facing intensive study periods (Hardy et al., 2017). While the caffeine in these drinks stimulates the central nervous system, their high sugar content can pose health risks despite their rapid energy-boosting potential (Nadeem et al., 2021).

Energy drinks were first introduced in 1949 by American scientist Dr. Enuf, who marketed them as an alternative to sugar-laden sodas enriched with vitamins. Consumption spread across Asia and Europe by the 1960s (Kayapınar and Özdemir, 2016), and by the 1990s, the Turkish market included 42 different brand names (Dikici et al., 2012).

The energy drink industry has grown into a vast global market. Manufacturers offer a wide variety of formulations tailored to shifting consumer tastes and needs (Hammond and Reid, 2018). Packaging design and marketing strategies—especially those leveraging digital media—have made these products highly attractive, particularly to young consumers (Buchanan et al., 2018). Some brands associate their products with sports and physical activity, employing creative advertising tactics that target youth and promote consumption (Wiggers, 2018; Luo et al., 2021). However, it is crucial that users be accurately informed of the potential health risks associated with high caffeine and sugar content. These drinks are associated with risks such as dependence and cardiovascular effects, requiring a well-balanced understanding by both consumers and health professionals (Breda et al., 2014; Uzundumlu et al., 2016). Public awareness campaigns and effective educational interventions are thus essential to encourage healthier consumption habits.

Among youth and students in particular, energy drinks have gained increasing popularity. Their attractive packaging, stimulating effects, and widespread advertising campaigns all contribute to higher consumption rates. However, a well-informed understanding of their ingredients and physiological effects is essential to promote healthy consumption patterns. Research into the effects and risks of energy drinks can guide individuals in making informed and healthy decisions (Aslam et al., 2013). In this context, analyzing the consumption behaviors of students at Erzincan Binali Yıldırım University will provide valuable insights from a broad perspective.

There are several studies conducted in Türkiye investigating energy drink consumption among university students. Şen et al. (2015), in their study with 750 students at Afyon Kocatepe University, reported that students did not have an adequate level of awareness regarding energy drink consumption. Avcı (2017) indicated that the prevalence of energy drink consumption in Türkiye was 54%. Afacan and Karadut (2024), in a study conducted with medical faculty students at Karabük University, found that age, type of high school graduated from, and the daily study hours had significant effects on energy drink consumption. Moreover, when the responses to questions measuring knowledge about energy drinks were analyzed, it was determined that the medical students did not have sufficient knowledge on this subject.

The student population of Erzincan Binali Yıldırım University serves as a significant sample group for investigating energy drink consumption patterns. These beverages are often consumed to increase alertness, energy, focus, and physical performance. However, despite their increasing popularity, concerns about potential health effects have led to growing scholarly interest. This study aims to examine in detail the energy drink consumption behaviors of university students, evaluating the influence of demographic, social, economic, and health-related factors. In particular, it explores the frequency and context of consumption, as well as how demographic variables affect these habits. Additionally, the role of peer influence and sociocultural dynamics is

considered alongside psychological factors. The study aims to enhance our understanding of energy drink use among young adults and contribute to increased awareness in this area.

The main objective of this study is to investigate energy drink consumption habits among students at Erzincan Binali Yıldırım University. Energy drinks are increasingly popular among young people, and this trend may significantly impact health and social behavior. Our research offers a comprehensive perspective on students' knowledge, motivations, and consumption patterns, as well as the potential health effects of energy drinks.

Ultimately, the study seeks to support young individuals in making informed decisions about their consumption behaviors. The findings are expected to contribute to public awareness and aid in the development of educational programs on the health implications of energy drinks.

## MATERIALS AND METHODS

### Materials

The research material consists of both primary and secondary data. The primary data were obtained through surveys administered to students enrolled at Erzincan Binali Yıldırım University, while the secondary data were derived from relevant national and international studies on energy drink consumption.

### Methods

#### Sampling and Data Collection:

The sample consisted of undergraduate students at Erzincan Binali Yıldırım University. In June 2025, a structured online questionnaire was conducted to assess students' energy drink consumption habits, consumption frequency, preferences, and influencing factors. The study focused on full-time undergraduate students enrolled at the university. Since it was not feasible to reach the entire population, a sample size was calculated using the following standard sampling formula (Miran, 2007; Günden and Miran, 2008; Uzundumlu et al., 2016; Aksoy and Arsalan, 2019; Kumbasaroglu, 2023):

$$n = \frac{N \cdot p(1-p)}{(N-1) \cdot \sigma_x^2 + p(1-p)} \quad \text{(Eq.1)}$$

$$\sigma_p^2 = \left(\frac{r}{Z_{\alpha/2}}\right)^2 = \left(\frac{0.05}{1.64}\right)^2 = 0.00093 \quad \text{(Eq.2)}$$

where:

- $n$ = Sample size;
- $N$ = Population size (number of registered students at the university as of April 2025 = 23,937);
- $p$ = Estimated ratio of energy drink consumers (based on literature = 0.50 for maximum variance);
- $\sigma_x^2$ = Varyans = 0.000093;
- $r$ = deviation from the mean (5%);
- $Z_{\alpha/2}$ = 1.64 for 90% confidence level.

Based on the formula, the required sample size was calculated as 266. Accounting for potential data loss, errors, and incomplete responses, 280 questionnaires were targeted and 288 valid responses were obtained.

#### Group Comparisons:

To examine group differences between energy drink consumers and non-consumers, several inferential statistical tests were applied. Chi-square tests of independence were conducted to explore associations between categorical variables, such as gender (Table 1) and grade point average categories (Table 4). Effect sizes were calculated using Phi and Cramer's V coefficients. For continuous variables, such as daily habits (hours of TV watching, internet use, social media use, sleep duration, and sports activities; Table 2), independent samples t-tests were performed. Where normality assumptions were not met, non-parametric alternatives such as the Mann–Whitney U test were applied. Health-related attitudes and behaviors (Table 3) were analyzed using similar group comparisons, depending on the measurement level of the variables.

#### Measurement Tools and Analytical Methods:

The questionnaire included items on consumer profiles and energy drink consumption characteristics. Responses were measured using descriptive statistical methods (frequency and mean values). The importance attached to energy drink consumption and the influencing factors were measured using a 5-point Likert scale.

To analyze the individual and socio-economic factors affecting energy drink consumption among students, binary logistic regression analysis was applied (Hosmer et al., 2013). The dependent variable was coded as binary (1 = consumer, 0 = non-consumer). Logistic regression was selected as it is a robust method for predicting categorical outcomes and explaining consumption tendencies.

The general form of the binary logistic regression model was as follows (Peng et al., 2002):

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k \quad \text{(Eq.3)}$$

where:

- $p$ = Probability of energy drink consumption;
- $p/(1-p)$= Odds ratio;
- $\beta_0$ = Constant term;
- $\beta_i$ = Coefficient of the independent variable;
- $X_i$ = Independent variables (age, gender, income, media use, etc.).

The applied model was formulated as:

$$\begin{aligned}\log\left(\frac{p}{1-p}\right) = {} & \beta_0 + \beta_1 \cdot \text{Age} + \beta_2 \cdot \text{Social Media Use} + \\ & \beta_3 \cdot \text{Morning Consumption Habit} + \beta_4 \cdot \text{Soft Drink Consumption} + \\ & \beta_5 \cdot \text{Body Mass Index (BMI)} \quad + \beta_6 \cdot \text{Academic Year Level} + \\ & \beta_7 \cdot \text{Monthly Expenditure} + \beta_8 \cdot \text{Regular Breakfast Habit} + \\ & \beta_9 \cdot \text{Grade Point Average (GPA)} + \beta_{10} \cdot \text{Monthly Income} \; + \\ & \beta_{11} \cdot \text{Tea Consumption} + \beta_{12} \cdot \text{Peer Influence on Energy Drink Consumption} + \\ & \beta_{13} \cdot \text{Campaign Awareness} + \beta_{14} \cdot \text{Regular Sports Activity}\end{aligned} \quad \text{(Eq.4)}$$

The statistical analyses were performed using SPSS 22.0, and binary logistic regression was applied for inferential evaluation.

## RESULTS AND DISCUSSION

This section presents and discusses the main findings of the study based on the data collected from Erzincan Binali Yıldırım University students. The results are structured around descriptive statistics, consumption habits, health and physiological outcomes, academic performance, and logistic regression analyses. Each subsection aims to highlight not only the current consumption patterns of university students but also the broader implications in relation to existing literature.

### Descriptive Statistics

Among the 288 students who participated in the survey at Erzincan Binali Yıldırım University, 34.40% reported consuming energy drinks while 65.60% stated that they did not. Table 1 presents the demographic and economic characteristics of both consumers and non-consumers. Of the participants, 50.35% were female and 49.65% were male, with nearly equal representation between genders. The consumption rate was 28.28% among female students and 49.56% among male students. The average age of both groups was between 21 and 23 years, with the majority reporting monthly income and expenditure levels of less than 10,000 TL.

In terms of economic distribution, 58.70% of students reported a monthly income of 10,000 TL or below, while 5.20% reported incomes between 15,001–20,000 TL. Similarly, 59.70% of students spent 10,000 TL or below per month, and only 3.80% reported monthly expenditures between 20,001–25,000 TL.

These findings are consistent with previous studies. For example, Alqassim et al. (2021) reported that 49% of participants were male and 51% female, with an average age range of 17–28 years, of whom 79% consumed energy drinks. Similarly, Arria et al. (2011) found that 46% were male and 54% female, with an average age range of 20–23 years, and 65.60% reported consuming energy drinks. Bulut et al. (2014) emphasized that consumption

is more prevalent among adolescents and young adults, aligning with the present study's focus on university students.

Since age ranges, monthly income, and monthly expenditure categories are grouped, a chi-square ($\chi^2$) test was conducted to assess the relationship between gender and energy drink consumption. The results indicated a statistically significant relationship between gender and consumption status ($\chi^2(1) = 4.82$, $p = 0.028 < 0.05$). Male students were found to consume energy drinks at a higher rate compared to female students. In contrast, no significant differences were observed between the groups in terms of age, income, and monthly expenditure.

**Table 1.** Demographic and economic characteristics of participants.

| Participants | Gender (%) | | Age (Years) | | Monthly Income (TL/Month) | | Monthly Expenditure (TL/Month) | |
|---|---|---|---|---|---|---|---|---|
| | Female Students | Male Students | Female Students | Male Students | Female Students | Male Students | Female Students | Male Students |
| Energy Drink Consumers | 28,28 | 49,56 | 21-23 | 21-23 | ≤10000 | ≤10000 | ≤10000 | ≤10000 |
| Non-Consumers | 71,72 | 59,44 | 21-23 | 21-23 | ≤10000 | ≤10000 | ≤10000 | ≤10000 |
| **Total** | **50,35** | **49,65** | **21-23** | **21-23** | **≤10000** | **≤10000** | **≤10000** | **≤10000** |

Students who participated in the survey were predominantly undergraduate students (70.14%), while 29.86% were vocational school students. By academic level, 46.18% were first-year students, 34.72% were second-year students, 7.29% were third-year students, 8.68% were fourth-year students, and the remaining 3.13% were fifth- or sixth-year students.

Table 2 presents the daily habits of students. On average, participants reported watching TV for 0.81 hours per day, using the internet for 7.70 hours, spending 5.43 hours on social media, sleeping 7.38 hours, and engaging in sports activities for 2.12 hours. These findings indicate significant shifts in lifestyle habits, with increased internet and social media use and decreased television viewing.

Uzundumlu et al. (2016) similarly reported that university students spent an average of 8 hours sleeping, 2.14 hours watching TV, 3.7 hours using the internet, and 3.5 hours on social media per day. The present study therefore confirms that internet and social media use have increased, while television viewing has declined among students.

Independent samples t-tests revealed that energy drink consumers spent significantly less time watching television (M = 0.58 vs. 0.93 hours, p = 0.014), but significantly more time using the internet (M = 8.68 vs. 7.19 hours, p = 0.012) and social media (M = 6.34 vs. 4.95 hours, p = 0.004). No significant differences were observed for sleep duration or sports activity ($p > 0.05$) (Table 2).

**Table 2.** Comparison of Daily Habits by Energy Drink Consumption Status

| | Participants | | | | |
|---|---|---|---|---|---|
| Daily Habits | Energy Drink Consumers | Non-Consumers | Average | t testi | p-value |
| TV Watching (hrs/day) | 0,58 | 0,93 | 0,81 | 2,46 | 0,014** |
| Internet Use (hrs/day) | 8,68 | 7,19 | 7,70 | -2,54 | 0,012** |
| Social Media (hrs/day) | 6,34 | 4,95 | 5,43 | -2,91 | 0,004* |
| Sleep Duration (hrs/day) | 7,23 | 7,46 | 7,38 | 1,31 | 0,193 |
| Sports (hrs/day) | 2,14 | 2,11 | 2,12 | -0,21 | 0,831 |

*Notes: *p < 0.01, **p < 0.05 (statistically significant).

### Consumption Preferences and Habits

Among the energy drink consumers, 64.60% reported consuming them once a week, while 26.30% consumed them two to three times a week. Regarding alternative beverages, 21.60% preferred tea, and 12.60% chose carbonated drinks and Turkish coffee.

Spierer et al. (2014) reported that among participants aged 18–24, 35.87% consumed energy drinks two times or less per week, while 16.22% consumed them two to three times per week. Similarly, Shaikh et al. (2018) found that 28.80% consumed them once a week. Compared with these studies, the present research at Erzincan

Binali Yıldırım University reveals a higher proportion of weekly consumption, indicating that more than half of the participants engage in at least weekly use.

### Health Status and Physiological Effects

Table 3 summarizes selected health-related indicators. Body Mass Index (BMI)—calculated as weight (kg) divided by height ($m^2$)—is commonly associated with various health conditions. According to Ergün and Erten (2004), values between 18.0–24.9 kg/$m^2$ indicate normal weight. In the present study, no significant association was observed between BMI and energy drink consumption, and both consumers and non-consumers fell within the normal range. However, consumers reported higher rates of chronic disease and regular medication use than non-consumers, whereas non-consumers reported higher rates of regular breakfast.

Poulos and Pasch (2015) found that the BMI of energy drink consumers was significantly higher than that of non-consumers at the 5% significance level, a pattern not replicated here. Symptomatically, 35.40% of students reported rapid heartbeat, 24.20% insomnia, 12.10% headaches, and 9.10% anxiety after energy drink consumption, while 33.30% reported no noticeable effects. Consistent with these findings, Reid et al. (2015) reported restlessness (22.00%), palpitations/rapid heartbeat (33.70%), increased urination (11.60%), insomnia (11.20%), trembling (8.50%), headaches (7.80%), irritability (7.80%), and other effects (1.80%).

Taken together, rapid heartbeat emerges as the most salient adverse effect, underscoring potential cardiovascular risks and the need for targeted awareness among university students.

According to the results of the analyses, no statistically significant differences were found between energy drink consumers and non-consumers in terms of BMI, chronic disease, regular medication use, or regular breakfast habits ($p > 0.05$). Although chronic disease and medication use rates were slightly higher, and breakfast frequency lower among consumers, these differences were not statistically significant. These findings indicate that energy drink consumption is not directly related to existing health conditions or basic dietary habits among students. However, from a practical perspective, the lower breakfast frequency may be considered noteworthy, especially when evaluated alongside unhealthy eating behaviors.

**Table 3.** Health-related attitudes and behaviors of participants.

| Participants | Health-Related Attitudes and Behaviors | | | |
|---|---|---|---|---|
| | Body Mass Index (kg/$m^2$) | Chronic Disease (%) | Regular Medication Use (%) | Regular Breakfast (%) |
| Energy Drink Consumers | 23,73 | 9,10 | 15,20 | 38,40 |
| Non-Consumers | 23,39 | 7,40 | 10,10 | 45,50 |
| **Average** | **23,51** | **8,00** | **11,80** | **43,10** |
| **p-value** | **0.472** | **0.617** | **0.203** | **0.247** |

### Relationship with Academic Performance

Table 4 presents the distribution of Grade Point Averages (GPA) among energy drink consumers and non-consumers. The findings indicate that half of the energy drink consumers (50.0%) have a GPA below 2.50, whereas more than 65.0% of non-consumers achieve a GPA above 2.50. This suggests that students who abstain from energy drinks tend to perform academically better than their consuming peers.

The results of the chi-square test showed that there was no significant relationship between energy drink consumption and students' GPA categories ($\chi^2(4) = 1.97$, $p = 0.742$, Cramer's $V = 0.083$). Both consumers and non-consumers were mostly concentrated in the <2.50 GPA range, indicating that academic performance was not significantly influenced by energy drink consumption status.

**Table 4.** Weighted grade point averages of participants.

| Participants | Weighted Grade Point Averages (%) | | | | | Total |
|---|---|---|---|---|---|---|
| | < 2.00 | 2.00-2.49 | 2.50-2.99 | 3.00-3.49 | ≥3.50 | |
| Energy Drink Consumers | 7,60 | 8,70 | 9,70 | 4,60 | 3,80 | 34,40 |
| Non-Consumers | 23,60 | 22,60 | 12,50 | 4,50 | 2,40 | 65,60 |
| **Average** | **31,20** | **31,30** | **22,20** | **9,10** | **6,20** | **100,00** |

The results point to a negative association between energy drink consumption and academic performance. Consumers tend to cluster in the lower GPA ranges, whereas non-consumers are overrepresented in the higher GPA categories. This may be linked to several factors:

- Cognitive and Physiological Effects: Excessive caffeine intake can cause sleep disturbances, anxiety, and concentration difficulties, which in turn impair learning efficiency.
- Lifestyle Patterns: Students consuming energy drinks are more likely to have irregular study and sleep routines, contributing to poorer academic outcomes.
- Motivational Aspects: While energy drinks are often consumed to enhance alertness during exams or assignments, the short-term stimulation may not compensate for long-term adverse effects on attention and memory.

Overall, the evidence suggests that avoiding energy drinks is associated with higher academic success. Future interventions could focus on raising awareness among students about healthier alternatives for maintaining focus and performance, such as balanced nutrition, regular sleep, and structured study habits.

### Students' Attitudes Towards Energy Drinks

#### Step 1: Users' perceptions

The findings from the energy drink consumers reveal a range of perceptions regarding the role of these beverages in their daily and academic lives. As shown in Table 5, students generally expressed moderate agreement with statements linking energy drinks to concentration, social settings, and physical performance.

Specifically, respondents reported that energy drinks provide a sense of alertness and sometimes assist with focus during lectures (Mean=2.45). However, their average scores suggest that such perceptions are not strong enough to consider energy drinks as a consistent academic aid. Similarly, the view that energy drinks help individuals "not to give up" (Mean=2.22) or make them "feel happier" (Mean=2.60) reflects a more psychological rather than physiological evaluation.

Concerns about health risks were evident, as participants moderately agreed with the statement "I am worried about the health effects" (Mean=2.75). This indicates that, even among users, awareness of potential negative outcomes such as increased heart rate, anxiety, and sleep disturbances is present. At the same time, consumption in social contexts (Mean=2.88) and under peer influence was noted as a significant factor, demonstrating the strong social dimension of energy drink use.

Physical and performance-related perceptions showed mixed results. While statements such as "Energy drinks improve sports performance" (Mean=2.43) and "They increase concentration" (Mean=2.55) received moderate support, users also recognized negative consequences, including "Energy drinks disturb sleep" (Mean=2.74) and "They accelerate heartbeat" (Mean=2.84). These findings underline the ambivalence in consumer perceptions—energy drinks are seen both as enhancers of short-term energy and as potential health risks.

Overall, the data suggest that energy drink consumption among students is shaped by a combination of perceived short-term benefits (alertness, performance, social influence) and recognized long-term concerns (health risks, sleep disturbances, cardiovascular strain).

In addition to these descriptive findings, further statistical analyses were conducted to test the differences between consumers and non-consumers, and the results are presented below.

When considering the perceptions of all students, including both consumers and non-consumers, the responses provide a more comprehensive picture of energy drink attitudes. As presented in Table 5, the mean scores predominantly fall between 2.0 and 3.0, reflecting cautious or ambivalent views.

For instance, the statement "I am concerned about the health effects of energy drinks" received one of the highest averages (Mean=2.85). This suggests that, across the student population, there is a shared awareness of potential health risks, even among those who do not consume energy drinks regularly. Similarly, the item "Energy drinks contain high amounts of sugar" yielded a relatively high average (Mean=3.00–3.10), indicating that students possess some degree of nutritional awareness regarding the product content.

On the other hand, beliefs tied to performance enhancement received moderate but lower agreement. For example, "Energy drinks improve concentration" (Mean=2.19) and "They enhance physical performance" (Mean=2.41) scored closer to the lower end, suggesting that students are skeptical about their effectiveness in boosting academic or athletic success.

Social and environmental factors appeared more prominent. The statement "Energy drinks are consumed more in social settings" achieved a relatively high mean (Mean=2.82), pointing to peer influence as a strong determinant of consumption. Additionally, "Consumption increases when with friends" (Mean=2.72) reinforces the role of social context in shaping behavior.

Negative physiological effects were also acknowledged, as reflected in higher mean scores for "Energy drinks disturb sleep" (Mean=2.79) and "They accelerate heartbeat" (Mean=2.93). These results highlight that, despite certain perceived short-term benefits, students remain conscious of adverse health outcomes.

Taken together, the broader student sample presents a more balanced but cautious perspective: while energy drinks are occasionally linked to concentration and social contexts, the overriding perception is shaped by concerns over health risks and physiological drawbacks.

Independent samples t-tests revealed several significant differences between consumers and non-consumers across specific items. Consumers were significantly more likely to agree that energy drinks help them concentrate ($M = 2.45$ vs. 1.84, $p < 0.001$), are indispensable ($M = 2.22$ vs. 1.61, $p < 0.001$), and provide energy ($M = 2.84$ vs. 2.38, $p = 0.002$). They also showed higher agreement with the statements that energy drinks make people happier ($M = 2.60$ vs. 1.96, $p < 0.001$), improve concentration ($M = 2.55$ vs. 2.01, $p < 0.001$), and enhance physical performance ($M = 2.67$ vs. 2.27, $p = 0.016$). Additionally, consumers were more likely to support the idea that energy drinks should be mixed with alcohol ($M = 2.25$ vs. 1.80, $p = 0.009$) (Table 5).

In contrast, no significant differences were observed between consumers and non-consumers regarding perceptions of health risks. For example, the statements "Energy drinks contain high amounts of sugar" ($p > 0.05$), "Energy drinks contain high amounts of caffeine" ($p > 0.05$), "Energy drinks accelerate heartbeat" ($p > 0.05$), and "Energy drinks cause insomnia" ($p > 0.05$) were not significant even at the 10% level. These findings suggest that while consumers are more inclined to perceive energy drinks as beneficial in terms of focus, energy, and social use, both consumers and non-consumers share similar levels of concern regarding potential health risks.

**Table 5.** Students' opinions on energy drinks by consumption status (N = 288)

| Statements | Consumers (N=99) Mean | Non-consumers (N=189) Mean | Total (N=288) Mean | p-value |
|---|---|---|---|---|
| Energy drinks help me focus better in my classes | 2,45 | 1,84 | 2,05 | 0,001* |
| Energy drinks have become an indispensable product for me | 2,22 | 1,61 | 1,82 | 0,001* |
| I am concerned about the health effects of energy drinks | 2,75 | 2,90 | 2,85 | 0,220 |
| Energy drinks are consumed more frequently in social environments | 2,88 | 2,79 | 2,82 | 0,120 |
| Consuming energy drinks during physical activity is a common habit for me | 2,37 | 1,82 | 2,01 | 0,001* |
| Energy drinks have no health effects | 2,29 | 2,02 | 2,10 | 0,085 |
| Energy drinks provide energy | 2,84 | 2,38 | 2,53 | 0,002** |
| Energy drinks make people happier | 2,60 | 1,96 | 2,19 | 0,001* |
| Energy drinks are effective in muscle building | 2,23 | 1,92 | 2,03 | 0,031** |
| Energy drinks are sports beverages | 2,43 | 2,12 | 2,23 | 0,045** |
| Energy drinks improve concentration | 2,55 | 2,01 | 2,19 | 0,001* |
| Energy drinks cause weight gain | 2,65 | 2,60 | 2,61 | 0,410 |
| Energy drinks contain high amounts of sugar | 3,00 | 3,15 | 3,10 | 0,150 |
| Energy drinks contain high amounts of caffeine | 3,00 | 3,12 | 3,08 | 0,210 |
| Energy drinks should be mixed with alcohol | 2,25 | 1,80 | 1,95 | 0,009* |
| Energy drinks increase heart rate | 2,84 | 2,98 | 2,93 | 0,190 |
| Energy drinks increase blood pressure | 2,65 | 2,98 | 2,87 | 0,070 |
| Energy drink consumption increases with friends | 2,75 | 2,70 | 2,72 | 0,330 |
| Energy drinks improve physical performance | 2,67 | 2,27 | 2,41 | 0,016** |
| Energy drinks cause insomnia | 2,74 | 2,82 | 2,79 | 0,410 |

*Notes: *p < 0.01, **p < 0.05 (statistically significant).

**Note:** 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.
(Mean scores closer to 1–2 indicate disagreement, 3 neutral, and 4–5 strong agreement.)

### Step 2: General discussion and literature

The findings of this study align with and expand upon previous national and international research. For instance, Uzundumlu et al. (2016) identified key drivers of energy drink consumption such as increasing energy and enhancing physical performance, which are also observed among our sample. Similarly, Borlu et al. (2019) reported a significant prevalence of energy drink use among university students in Turkey, highlighting limited awareness of health risks. In a broader context, Protano et al. (2023) emphasized the ambivalence in consumer attitudes worldwide, where short-term benefits coexist with awareness of adverse health effects. Our results reinforce this duality, as students simultaneously acknowledged performance enhancement while remaining concerned about cardiovascular strain, sleep disturbance, and high sugar content.

What distinguishes the present study is its focus on the specific context of Erzincan Binali Yıldırım University, offering updated and localized insights into the patterns of energy drink consumption in Türkiye. Unlike earlier works that often relied on descriptive statistics, our analysis incorporated inferential statistical tests (t-tests, chi-square, and non-parametric alternatives), which provided a more rigorous examination of group differences. For example, while male students were significantly more likely to consume energy drinks, no meaningful differences were found across age or income groups. This highlights that gender may serve as a stronger determinant of consumption behaviors than socio-economic factors within this population.

From a public health perspective, these results underscore the urgent need to raise awareness among university students about the potential health consequences of energy drink consumption. The finding that regular consumers spend significantly more time on social media and less on sleep points to behavioral patterns that may exacerbate existing health risks. Furthermore, the absence of strong links between energy drink use and academic performance suggests that perceived cognitive benefits may be overstated. Future research should therefore explore longitudinal effects, potential interventions at the university level, and cross-cultural comparisons to better understand the socio-behavioral determinants of energy drink use.

### Logistic Regression Results

The results of the Binary Logistic Regression model used to identify the factors affecting the energy drink consumption habits of Erzincan Binali Yıldırım University students are presented in Table 6. The findings indicate that age and monthly income significantly reduce the likelihood of energy drink consumption, while social media use, grade level, and monthly expenditure increase it. Notably, students who preferred other beverages in the morning were far less likely to consume energy drinks. These results highlight that, in addition to individual preferences, social environment and economic status play an important role in shaping consumption behaviors.

Protano et al. (2023) reported that university students, particularly males, often consume energy drinks to enhance academic or physical performance; however, such consumption was found to negatively affect sleep, as well as cardiovascular and nervous system health. Similarly, Šljivo et al. (2020) found that coffee consumption significantly increased the likelihood of energy drink use at the 1% level, while other beverage preferences did not have a statistically significant effect. Previous studies have also shown that higher energy drink consumption is positively correlated with smoking and alcohol use, often reaching statistical significance (Alqassim et al., 2021; Borlu et al., 2019; Uzundumlu et al., 2016; Casuccio et al., 2015).

To test the model's fit, several goodness-of-fit statistics were examined. The model summary showed a –2 Log Likelihood value of 322.105, a Cox & Snell $R^2$ of 0.155, and a Nagelkerke $R^2$ of 0.214, indicating that the model explains up to 21% of the variance in energy drink consumption. The Hosmer–Lemeshow test yielded a p-value of 0.849, which is greater than 0.05, confirming that the model exhibits statistically significant consistency with the observed data. Therefore, the regression model can be considered a valid and reliable tool for explaining the key factors influencing energy drink consumption.

**Table 6.** Binary logistic regression results (Estimation model)

| Variable | B Coefficient | Exp(B) | p-Value | Interpretation |
|---|---|---|---|---|
| Constant | -1.413 | 0.243 | 0,207 | — |
| Age | -0.654 | 0.52 | 0.007* | Each unit increase in age decreases the likelihood of energy drink consumption by 48%. Highly significant (p < 0.01). |
| Social Media | 0.081 | 1,084 | 0.032** | Increased social media usage raises the likelihood of consumption by 8%. Significant at p < 0.05. |
| Morning Consumption | -2.613 | 0.073 | 0.019** | Choosing alternative morning beverages decreases energy drink consumption by 92.7%. Strong negative effect (p < 0.05). |
| Soft Drink Consumption | -0,542 | 0,582 | 0,073 | Not statistically significant. |
| Body Mass Index (BMI) | 0,033 | 1,033 | 0,404 | Not statistically significant. |
| Grade Level | 0.329 | 1,390 | 0.031** | Each increase in grade raises consumption by 39%. Significant (p < 0.05). Higher-grade students are more likely to consume. |
| Monthly Expenditure | 0.334 | 1,396 | 0.028** | Each increase in expenditure raises consumption by 40%. Socioeconomic indicator, significant (p < 0.05). |
| Regular Breakfast | 0,177 | 1,193 | 0,556 | Not significant. |
| GPA | -0,004 | 0,996 | 0,996 | No effect. |
| Monthly Income | -0.359 | 0.698 | 0.007* | Higher income decreases consumption likelihood by 30%. Highly significant (p < 0.01). |
| Tea Consumption | 0,354 | 1,424 | 0,225 | Not significant. |
| Friends' Influence | -0,300 | 0,741 | 0,466 | Not significant. |
| Campaign Awareness | 0,056 | 1,058 | 0,849 | Not significant. |
| Regular Sports Participation | -21,806 | 0,000 | 0,998 | Not significant. |

***Notes:** *p < 0.01, **p < 0.05 (statistically significant).

Figure 1 illustrates the odds ratios (Exp(B)) of the significant variables in the logistic regression model. Among the predictors, social media use, class level, and monthly expenditure were found to increase the likelihood of energy drink consumption, with odds ratios above 1. This indicates that students with higher social media engagement, higher grade levels, and greater monthly spending are more prone to consuming energy drinks. Conversely, age, morning beverage preference, and income demonstrated odds ratios below 1, suggesting that older students, those choosing alternative morning beverages, and those with higher income levels are less likely to consume energy drinks.

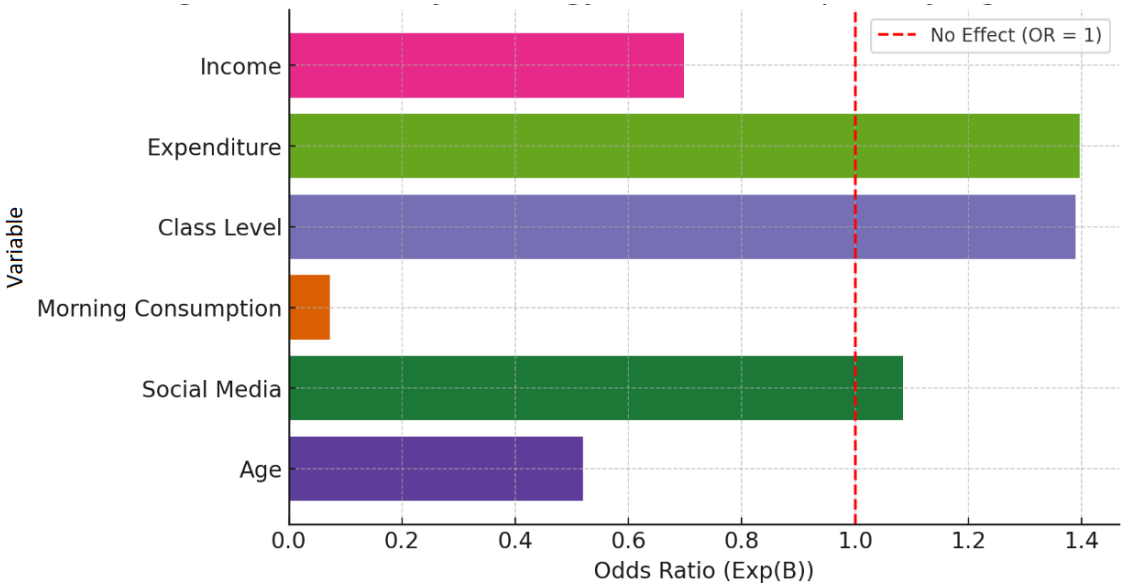


**Figure 1.** Probability of energy drink consumption by significant variables.

The visual representation supports the statistical findings presented in Table 6 and highlights a clear divergence between socioeconomic and behavioral factors (which increase consumption likelihood) and demographic factors (which reduce it). This alignment reinforces the reliability of the regression model and emphasizes the importance of social environment and economic status in shaping consumption patterns.

The results of the regression analysis were found to be largely consistent with the findings obtained from independent tests. For instance, the logistic model confirmed that higher social media usage significantly increases the likelihood of energy drink consumption ($p < 0.05$), aligning with the t-test results showing that consumers spend more time on social media. Similarly, health-related indicators such as BMI, chronic illness, regular medication use, and breakfast habits were not significantly associated with consumption in either regression or chi-square/t-test analyses. Academic performance (GPA) also consistently showed no significant relationship in both methods. Minor differences were observed in television watching and internet use: while independent t-tests revealed significant differences, these effects disappeared in the regression model after controlling for other variables, suggesting that the association may be explained by related behavioral or socioeconomic factors. Overall, the convergence of regression and descriptive analyses reinforces the robustness of the study's key findings.

## CONCLUSION

This study aimed to determine the consumption status of energy drinks among Erzincan Binali Yıldırım University students and to identify the factors influencing their consumption patterns. Based on data collected from 288 students through an online survey, the following conclusions and recommendations were drawn:

### Main Findings

1. Approximately 34.40% of the students reported consuming energy drinks, indicating a noteworthy prevalence within the university population.
2. Internet and social media use were found to be high among participants, while television watching remained relatively low.
3. Consumers of energy drinks exhibited lower levels of concern regarding health risks compared to the overall student sample, suggesting that potential health hazards are not adequately prioritized by this group.
4. The perception that energy drinks "contain high amounts of sugar and caffeine" received the highest mean scores across all participants, reflecting a high level of awareness of product content.
5. Statements such as "consumed more in social environments" and "usage increases under peer influence" were particularly emphasized among consumers, underscoring the social dimension of consumption behavior.
6. Binary Logistic Regression results revealed that age and monthly income significantly decreased the likelihood of consumption, whereas social media usage, grade level, and monthly expenditure increased

it. Students who preferred alternative morning beverages (such as tea or milk) were significantly less likely to consume energy drinks.

7. These findings collectively demonstrate that energy drink consumption is shaped not only by individual habits but also by social and economic factors.

### Recommendations

1. Awareness Campaigns: Information campaigns should be expanded to increase students' knowledge about health risks, caffeine content, and high sugar levels in energy drinks.
2. Regulation of Advertisements: Energy drink advertisements on social media should be monitored and restricted, considering their strong influence on young consumers.
3. Promotion of Healthy Alternatives: Universities should encourage access to healthier beverage options (e.g., water, natural fruit juice, herbal teas) within campus environments.
4. Health-Oriented Educational Programs: Periodic seminars, workshops, and awareness-raising activities targeting university students should be developed to foster healthy consumption habits.
5. Monitoring Consumption Trends: Longitudinal research should be conducted to track consumption patterns and update policy recommendations accordingly.

### Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

### Author Contributions

***Hediye KUMBASAROĞLU*** **:**Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; software; writing— original draft; writing—review and editing.

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