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Analysis of Factors Affecting the Status of Energy Drink Usage Status by University Students

A. Semih Uzundumlu[1], Ayse Sezgin[2] and M. Mehmet Sari[3]

Ataturk University, Agriculture Faculty, Department of Agriculture Economics, 25240 Erzurum, Turkey
E-mail: [1]<asuzsemi@atauni.edu.tr>, [2]<asezgin@atauni.edu.tr>, [3]<mehmet.sari@atauni.edu.tr.>

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ABSTRACT Energy drinks have negative impacts on the health and the economy of individuals. The aim of this study is to determine the factors that could impact energy drink using habits of university students. Surveys were made according to the Unclustered Probability Sampling Method (n = 260) with the students in Bayburt University campuses in 2014. Ages of students were 18-35 years and 55.4 percent of them are women while 44.6 percent are men. Additionally, 10.8 percent of the total students are used to consuming an energy drink. Seventy-five percent of energy drinks users are men, and twenty-five percent are women. Monthly average energy drink consumption is 0.4 cans per student. In the study, 5 of 18 factors that affected energy drinks consumption are significant. These factors comprised of economic, psychological, social and demographic questions. If the government intervenes in the use of energy drinks and implies some restrictions on overuse of energy drinks, as it is implied on smoking, the society will be healthier and more productive.

INTRODUCTION

Energy drinks were first used in Asian and European countries in the 1960s and then they have become familiar firstly in Europe and later, in North America in the 1980s. Today, the energy drink consumption continues to increase every year worldwide (Reissig et al. 2009). The energy drink consumption has grown exponentially in recent years (Attila and Cakir 2011; Emond et al. 2015).

Energy drinks are used quite heavily by university students and sportsmen (Dikici et al. 2012; Pettigrew et al. 2016; Choi et al. 2016). Energy drink consumption has increased, especially among university students in recent years (Iscioglu et al. 2010).

Because of the widespread belief about energy drinks that they improve attention, physical performance and endurance the use of these beverages has been increasing (Howard and Marczinski 2010; Mets et al. 2011; Harris and Munsell 2015). Energy-boosting properties of these drinks are derived from sugar and caffeine (Miller 2008). Firms, saying that energy drinks are increasing physical, emotional resilience and the concentration. Thus they can buy their products easily (Kim 2003). A commonly used slogan that "energy drinks contain caffeine as in a cup coffee" does not reflect the truth (Seifert et al. 2011). However, Dikici et al. (2012) said that caffeine content in energy drinks is above this value. Also, energy drinks are often used as "dietary supplements" in presentations, which is contrary to its meaning, which should be perceived as "parasitic power". This situation is showing similarity to the marketing tactics of tobacco manufacturers. However, when compared to smokers' sensitivity, awareness of energy drink users is relatively less.

Energy drinks contain high quantities of sugar, caffeine, and varying ratios of vitamin B complexes, taurine, guarana, ginseng, yohimbine, inositol, glucuronolactone, a carnitine and various botanical derivatives (Aranda and Morlock 2006; Dikici et al. 2012). Taurine and inositol amino acids in energy drinks cause nervousness in the drinker (Harwood 2005; Sharma 2010; Gorgulu et al. 2014). Energy drinks cause excess emissions of dopamine, serotonin, noradrenaline and adrenaline such as addictive drugs (Dikici et al. 2012). Despite all these findings, an increase of conscious or unconscious consumption of energy drinks, in particular for youths and adolescents is very worrying for future generations.

There are not enough studies about adverse effects of energy drinks in particular on human health, and thus, people lack the knowledge about the effects of energy drinks on health

(Rush et al. 2006; Oteri et al. 2007; O'Brien et al. 2008; Harris and Munsell 2015).

The studies show that youths may easily access and often use energy drinks, whereas they have little information about harmful health effects of these beverages (Attila and Cakir 2011).

As a result, energy drinks are a part of popular culture that is not so innocent as they are readily obtainable in the market shelves (Dikici et al. 2012).

The purpose of the research is to determine consumption of energy drinking habits of undergraduates to evaluate the knowledge level of university students about energy drinks. Thanks to the results of this study, next generations are expected to consume energy drinks less and more consciously.

MATERIAL AND METHODS

Material

The main material of the research was obtained by conducting face-to-face interviews with 260 students in Bayburt University in May 2014. Various local and foreign studies were used as the second data source, and the survey forms were prepared according to objectives of the research.

Methods

Sampling Method

With the information referred from the student affairs, the number of samples is determined. For determining the number of samples, the following equation was used (Newbold 1995).

$$n = \frac{Np(1-p)}{(N-1)\sigma_{px}^2 + p(1-p)} = 257 \quad (1)$$

$$\sigma_p^2 = \left(\frac{r}{z_{\alpha/2}}\right)^2 = \left(\frac{0.05}{1,64}\right)^2 = 0.00093 \quad (2)$$

Where,

n = sample size (257)

N= population (number of students enrolled in universities) (5842)

p = percentage making a choice (50% used for sample size needed)

$Z_{\alpha/2}$ = z value (1.64 for 90% confidence level)

σ^2_p: variance

r: deviation from the average (5%)

Participants and Setting

This study was carried with 260 surveys and participants were randomly selected from four faculties that were engineering, education, economics and administrative, sciences and technology. 44.6 percent of participants were males, and 55.4 percent were females. The researcher delivered the survey themselves to the respondents.

Instrumentation

The numbers of questionnaires were 32, and those were developed from previous studies while the surveys were presented in four sections to the participants. Questions in section one are associated with socioeconomic and demographic factors. Questions in section two are related with daily activities and lesson conditions. Issues of section three are linked with the quantity of used energy drinks and expenditures of students. Points of section four are connected with attitude and behavior of the student towards an energy drink. Sixteen questions in the Likert scale were asked to both user and non-user respondents.

Pilot Study

The survey form was re-shaped after the corrections from the pre-survey form, tried on some students.

Data Collection

When the questionnaires are surveyed, the purpose of the research and estimated duration of filling a questionnaire form were explained to the students. An assistant professor completed re-control of data in five days. After all the survey information was transferred to the computer, the LIMDEP 4.0 program analyzed the data.

Statistical Analyses

The LIMDEP 4.0 statistical package program was used for *Binary Logit Regression Model*. This Model was used to measure effects of socioeconomic, demographic and behavioral factors of young consumers on energy drink consumption. Binary Logit Regression model estimated the coefficients. P-value demonstrated the significance of these factors. Hence, finding

whether an econometric problem exists, the variance-inflating factor (VIF) and Durbin-Watson d statistics was used (Gujarati 2005).

Ethical Consideration and Human Rights

Consent of the student was obtained before beginning to survey. The aim of this study was explained in a simple and clear manner to each student. Confidential of all data providing questions were asked. At the beginning of surveys, students were told that in any case, they could stop responding and could have left at any stage of the study. The studies were carried out without taking the name of the student. Survey has not made with student psychologically affected from this study.

RESULTS

Table 1 shows demographic, social and economic characteristics of energy drink using and non-using students. Among the participants 55.4 percent were women and 44.6 percent were men. Above half of the participants were female, and energy drinks using percentage in the men and women were 18.1 percent and 4.9 percent, respectively. The average ages of the female and male participants were 21.9 and 22.9 years respectively, the median age of female and male users were 22.7 and 24.0 respectively, and the average age of female and male non-users were 21.9 and 22.6, respectively. It is understood that a lot of young people do not use energy drinks. The average monthly expenditure of the female and male participants were 550.2 and 656.0 TRY respectively, the average monthly payments of female and male users were 554.3 and 702.4 TRY respectively, and the average monthly cost of female and male non-users were 550.0 and 625.3 TRY, respectively. It is emerging that energy drinks using students' monthly costs are higher than the non-user student. The monthly average drinking cost of female and male users was 7.8 and 14.1 TRY, respectively. Eventually, the male student makes relatively more expenditure than the female student on energy drinks in this cohort. The more expenditure male student makes, the more they consume energy drinks.

Table 2 shows resident locations of energy drinks users and non-user students. Approximately half of participants and 54.2 percent of energy drinks users reside in rented houses with friends (Table 2). The biggest factor in choosing home rental is due to the desire to live more freely. The percentage of energy drinks users in private and state dormitories were seventeen percent and twenty-five percent, respectively. Also, four percent of the students who live with their families use energy drinks.

Table 3 shows some habits of drinking and non-drinking students. Users and non-users sleep on an average of 8.0 hours per day. Participants' daily watching averages are 2.14 hours TV, using 3.7 hours Internet, 3.5 hours of which is spent on Facebook, Twitter and WhatsApp.

Table1: Socio-demographic and economic characteristics of participants in the study (N=260)

Participants	*Gender (%)*		*Age (Year)*		*Monthly total expenditure (TRY[1]/Month)*		*Energy drinks expenditure (TRY/Month)*	
	Female	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*
Energy drinks users	4.9	18.1	22.7	24.0	554.3	702.4	7.8	14.1
Non-users of energy drink	95.1	81.9	21.9	22.6	550.0	625.3	0	0
Total or Average	55.4	44.6	21.9	22.9	550.2	656.0	0.4	2.5

Table 2: Residence locations of participants in the study (N=260)

Participants	*Resident location (%)*				
	Public dormitories	*Private dormitories*	*Rental apartment*	*Others*	*Total*
Energy drinks users	2.7	1.8	5.8	0.4	10.7
Non-users	20.0	22.4	43.1	3.8	89.3
Total	22.7	24.2	48.9	4.2	100.0

Table 3: Some habits of participants in the study (N=260)

Participants	*Some habits*			
	Watching TV (h/day)	*Using the Internet (h/day)*	*Using Facebook, Twitter and WhatsApp (h/day)*	*Sleep duration (h/day)*
Energy drinks users	2.16	4.4	4.3	8.0
Non-users	2.14	3.6	3.6	7.8
Average	2.14	3.7	3.5	7.8

The daily average of TV watching of the users and non-users is 2.16 and 2.14 hours, respectively. It is understood that energy drink users tend to watch TV a little more. Daily average Internet use of the users and non-users of participants are 4.4 and 3.6 hours, respectively. Also, it is understood from Table 3 that almost ninety-five percent of Internet use consists of Facebook, Twitter and WhatsApp.

Table 4 shows some health-related attitudes and behaviors of user and non-user students. Body Mass Index (BMI) (the weight in kilograms divided by the square of the height in meters) is known to be associated with many diseases. Correlation of BMI and energy drink use was not found significant. Eighty-eight percent of young people's BMI are within the limits of scientists' recommendation. No correlation was found between energy drinks use and chronic diseases though the chronic illness is more prevalent among non-users. 61.2 percent of participants, 46.7 percent of energy drinks users and 62.9 percent of non-energy drinks users have regular breakfast. Over half of the participants, 64.3 percent of energy drinks users and fifty percent of non-energy drinks users do regular exercise.

Table 5 shows weighted grade point average of using and non-using students. Over half of using participants have over 2.5 of 4.0 grade points average. However, the average grade of 46.7 percent of the student's energy drinks using is more than 2.5. It is expressed that a non-using student is more successful than energy drink using student.

Table 6 shows opinions of users about energy drinks. The most acceptable variables for energy drink users to consume are boosting energy, containing high amounts of caffeine, repelling sleep, increasing physical performance, containing large quantities of sugar, gaining weight, increasing heart rhythm and being sport drinkers, respectively.

Table 7 shows opinions of the students about energy drinks. The most acceptable variables for students to consume are being harmful

Table 4: Some health-related attitudes and behaviours of participants in the study (N=260)

Participants	*Some health-related attitudes and behaviours*			
	Body Mass Index	*Chronic disease state (%)*	*Having regular breakfast (%)*	*Doing regular exercise (%)*
Energy drinks users	23.7	0.0	5.0	6.9
Non-users of energy drink	22.6	6.2	56.2	44.6
Total or Average	22.7	6.2	61.2	51.5

Table 5: Weighted grade point average of participants in the study (N=260)

Participants	*Weighted grade point average*					
	< 2.00	*2.00-2.49*	*2.50-2.99*	*3.00-3.49*	*≥3.50*	*Total*
Energy drinks users	1.1	4.6	3.1	1.9	0	10.7
Non-users of energy drink	10.4	33.5	30.8	13.5	1.1	89.3
Total	11.5	38.1	33.9	15.4	1.1	100.0

Table 6: Opinions of energy drink using student about energy drinks (N=28)

Opinions	*Likert Scale of energy drink*					
	1	*2*	*3*	*4*	*5*	*Aver.*
It provides energy	0	1	14	10	3	3.54
It contains high amounts of caffeine	3	3	6	14	2	3.32
It is sleep repellent	3	5	8	4	8	3.32
It increases physical performance	0	7	12	3	6	3.29
It contains high amounts of sugar	0	2	19	6	1	3.21
It gains weight	2	1	20	3	2	3.07
It increases heart rhythm	6	5	5	6	6	3.04
It is sport-drink	0	14	4	6	4	3.00
It is harmful for health	8	4	5	6	5	2.86
It is ecstatic	0	18	6	0	4	2.64
It increases blood pressure	10	4	6	5	3	2.54
It increases concentration	9	7	5	3	4	2.50
Friends of student significantly increase energy drink use	11	4	6	4	3	2.43
It should be used by mixing with alcohols	18	1	2	2	5	2.11
It is effective on growing muscles	14	7	1	4	2	2.04
It has no effect on people	16	12	0	0	0	1.43

Note: 1-2, as unimportant, 3, as medium important and 4-5 as very important has interpreted on the Likert scale.

Table 7: Opinions of student about energy drink (N=260)

Opinions	*The severity of drinking*					
	1	*2*	*3*	*4*	*5*	*Aver.*
It is harmful for health	77	27	37	27	92	3.12
It contains high amounts of caffeine	70	18	65	67	40	2.96
It is sleep repellent	61	56	58	22	63	2.88
It increases heart rhythm	97	24	41	25	73	2.82
It increases blood pressure	97	32	39	16	76	2.78
It contains high amounts of sugar	62	67	67	25	39	2.66
It has no effect on people	25	151	26	22	36	2.59
It increases physical performance	112	35	45	28	40	2.42
It gains weight	127	14	58	22	39	2.35
It is sport-drink	111	49	36	35	29	2.32
Friends of student significantly increase energy drink use	134	25	39	20	42	2.27
It provides energy	50	154	31	22	3	2.13
It should be used by mixing with alcohols	178	14	9	7	52	2.00
It increases concentration	158	40	29	13	20	1.83
It is ecstatic	161	42	39	5	13	1.72
It is effective in making muscles	185	33	19	9	14	1.59

Note: 1-2, as unimportant, 3, as medium important and 4-5 as very important has interpreted on the Likert scale.

to health, containing high amounts of caffeine, repelling sleep, increasing heart rhythm, increasing blood pressure, containing large amounts of sugar and having no positive or negative effect on people, respectively.

Table 8 shows factors impacting energy drink using habits of university students. According to the results of the Binary Logit Regression model, there are positive relations between 4th grade, age and cigarette consumption, and there is a negative relationship between having breakfast.

According to results of Binary Logit Model, only significant variables are explained in the marginal effect. Compared to a graduating student and another student, the graduating student is likely to use 6.7 percent more energy drinks. This value is significant even at ten percent of significance level. When ages of the student are increased a year, in the possibility of

Table 8: Estimations results for the Binary Logit Regression Model

Variables	*Regression model*		*Marginal effects*		*Mean*
	Estimate	*St. err.*	*Estimate*	*St. err.*	
Constant	-7.659**	3.690	-0.421**	0.208	
Faculty of Engineering	-0.262	0.568	-0.014	0.030	0.392
4th Grader	1.116*	0.613	0.067*	0.040	0.438
Gender	-0.864	0.570	-0.047	0.030	1.554
Age	0.235*	0.135	0.013*	0.008	22.346
Education	-0.104	0.112	-0.006	0.006	14.777
Tea Consumption	-0.019	0.045	-0.001	0.002	5.258
Alcohol Consumption	0.029	0.052	0.002	0.003	0.442
Cigarette Consumption	0.056***	0.020	0.003***	0.001	5.073
Expenditure	0.0001	0.001	0.000	0.515	589.923
BMI (Body Mass Ind.)	0.047	0.078	0.003	0.004	22.728
State of Residence	-0.123	0.514	-0.007	0.028	0.488
Watching TV	-0.068	0.106	-0.004	0.006	2.142
Using Internet	0.167**	0.084	0.009**	0.005	3.695
Doing Sports	0.342	0.495	0.019	0.027	0.515
Having Breakfast	-0.848*	0.511	-0.052*	0.034	0.612
Early Riser	0.569	0.514	0.032	0.029	0.492
Less Sleeping	-0.504	0.728	-0.024	0.030	0.169
Grade Point Average	0.292	0.531	0.016	0.029	2.441
Restricted log likelihood	-88.83243				
Log-likelihood	-68.41869				

using energy drinks with is 1.3 percent increasing. This value is even at ten percent. When the possibility of daily cigarette consumption of student increases a unit, their energy drink use is increasing 0.3 percent. This value is even at one percent. If student' regular Internet use increases one hour, the possibility of energy drinks use may increase 0.9 percent. This value is even five percent. A student who regularly uses breakfast energy drinks is 5.2 percent less than the ones who do not have breakfast. This value is even at ten percent.

DISCUSSION

Bekir et al. (2014) and Woolsey et al. (2015) expressed that energy drink consumption is more prevalent in adolescents and young age group. Also, according to a study conducted on young age groups in the USA, the consumption of energy drink was determined higher than the adult age groups (Park et al. 2013; Azagba et al. 2014). In another study including adults, energy drink consumption among 18-29 age groups was found to be 8.8 times more massive than adult age groups (Berger et al. 2011).

This study was conducted in the period that consumes energy drink mostly. Consequently, students in the last year of university, and in particular, older students consume more energy drinks. Only senior students should be informed about energy drink consumption. As a result of the study, senior student consumes energy drinks more and as student age increases, their energy drink consumption increase. It can be stated that raising awareness in particular towards energy drink consumption in student from the first classes will be significant.

It was determined in this study that cigarette-using students tend to consume energy drinks more than the non-smoking student. As Bekir et al. (2014) and Mann et al. (2016) pointed out, a smoking habit has a positive impact on energy drink consumption.

Additionally in this study, the result has emerged that a student who does not usually have regular breakfast is more inclined to energy drink consumption. A student who cannot regularly have breakfast feels exhausted on some days of the week. Thus, they need energy drinks on these days.

Another important result of the study is that frequency of Internet use increases the energy drink consumption. Conventional energy drinks advertising on the Internet is very essential on emerging of this result.

CONCLUSION

The increase of energy drink consumption among university students is a remarkable result of this paper. Furthermore, it is viewed that

cigarette use has a positive effect on energy drink consumption. Spending time on the Internet among students also increase energy drink use. Another meaningful outcome of the paper is that breakfast, that is, one of the essential components of balanced nutrition decreases energy drink consumption.

RECOMMENDATIONS

As a result of the paper, the university students must be informed about the possible health effects of energy drinks. Moreover, governments must impose legal restrictions on pictures and advertisements that encourage energy drink consumption on the Internet. The young people, especially university students, should be educated about the importance of having regular breakfast in the balanced nutrition. In this context, breakfast facilities should be presented in an easier and more economical way to a student in canteens and dormitories of universities or some restaurants.

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