

Influence of Psychosocial Factors on Energy Drink Consumption in Korean Nursing Students: Never-consumers versus Ever-consumers

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Purpose: This study aimed to investigate the status of caffeine-containing energy drink consumption among Korean nursing students and to identify associated psychological factors. **Methods:** In total, 187 Korean nursing students participated in this cross-sectional study. A self-administered questionnaire was used to identify participants' general characteristics and psychosocial factors (self-esteem, academic stress, depression, and college adjustment) associated with energy drink consumption. Data were analyzed with SPSS using descriptive statistics, the χ^2 test, the t-test, and logistic regression. **Results:** More than two-thirds (73.3%) of the participants had consumed energy drinks. Among the investigated psychological factors, depression appeared to most strongly influence energy drink consumption behaviors in this population. **Conclusion:** The consumption of caffeine-containing energy drinks was found to be common among nursing students preparing to become health care professionals; depressed nursing students were more likely to have consumed energy drinks than non-depressed students. Nursing educators should emphasize the early detection of unhealthy beverage consumption habits and provide appropriate education to enhance healthy behaviors in future health care professionals.

Key words: Energy drinks; Nursing student; Depression

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INTRODUCTION

The energy drink known as Red Bull™ was introduced to the public in Austria in 1987, North America in 1997, and South Korea in 2011. The popularity of energy drinks has increased among young individuals through aggressive slogans in marketing campaigns. These drinks are advertised as being able to enhance energy, alertness, concentration, and athletic performance [1,2]. This marketing strategy has also been successful in Korea. According to a Korean news report, the Korean energy drink market tripled between 2012 and 2013 [3] and has steadily increased up to the present [4]. One reason for the high level of energy drink consumption among Korean adults is the need for additional energy during long academic or working hours [5]. For many college students, academic stress related to future employment triggers a feeling of pressure to achieve a high grade point average, causing psychological stress that leads college students to stay awake for long periods of time [5,6]. In the 1980s and 1990s, a stimulant called "Timing" (with 50 mg of caffeine per tablet; standard dose: 2 tablets) became popular among teenagers and young people in Korea who needed more energy to stay alert over long study and work hours [5]. However, energy drinks are now widespread as a stronger next-generation stimulant in Korea.

Energy drinks contain large doses of caffeine and other legal stimulant and non-stimulant ingredients, including taurine, guarana, sucrose, glucose, glucuronolactone, inositol, niacin, panthenol, and vitamins [1]. However, the ingredient that causes the most concern is caffeine, which can be present at a level as high as 505 mg/serving; this is much higher than levels found in soda (35~50 mg caffeine/serving) and coffee (77~150 mg caffeine/serving) [7]. Consumption of large amounts of caffeine, a central nervous system stimulant, can lead to acute caffeine intoxication [8]. Symptoms of caffeine intoxication may include adverse cardiovascular (e.g., arrhythmias, tachycardia, hypertension, and coronary vasospasms) and neurological effects (e.g., seizures, agitation, aggressive behavior, and suicidal ideation) [1]. In spite of its potential dangers, energy drink consumption among young Korean adults and teenagers is a remarkable social phenomenon [3-5]. Therefore, it is important to identify patterns of energy drink consumption in young Korean people, as well as factors that affect consumption, to prevent the adverse effects associated with long-term consumption of highly-caffeinated energy drinks.

There is growing interest in associations between caffeine and psychological conditions, such as stress, anxiety, depression, and suicidal ideation, among young people [9,10]. Many studies have found positive associations between energy drink consumption and stress, anxiety, and depression, confirming that these behaviors are closely linked [9]. Well-being is a particularly important parameter to assess, because it serves as an indicator of how well students have adjusted to college life. Furthermore, self-esteem reflects an individual's overall emotional appraisal of his or her self-worth, and is a major factor associated with substance or stimulant use-including energy drinks combined with alcohol-among young people. Self-esteem affects an individual's assessments of his or her competence, importance, and health-related behaviors. However, many people who rely on substances have low self-esteem and are more likely to become reliant on such substances in adolescence or young adulthood [11]. Those psychological characteristics affect students' adjustment to college, specifically the ease with which students achieve a harmonious state, without encountering conflicts or perceiving imbalances [12]. Given the widespread use of caffeine-containing energy drinks, their potential harmful effects on academic performance and personal adjustment are similarly broad in scope [13]. Therefore, there is a need to confirm the associations of self-esteem, academic stress, depression, and college adjustment with energy drink consumption.

Many Korean studies have examined energy drink consumption among young Korean people, especially college students [14,15]. Most studies have focused on identifying the

demographic factors that affect energy drink consumption, and only a few have identified psychosocial factors affecting energy drink consumption [16]. Young adulthood is an important time when lifestyle habits are established and fixed across a lifetime. In addition, college is a unique environment where students can develop health-related behaviors [17]. Nursing schools train students with the knowledge and skills necessary to attain, maintain, or recover optimal health and quality of life for individuals, families, and communities. Moreover, nursing students become health professionals after graduation, and it is therefore imperative that they cultivate behaviors that will positively impact their own health, in addition to the health of the patients they will serve [17]. Health care professionals seek to influence or improve health status by preventing or ameliorating risky health behaviors through health education or role modeling [18]. These expectations are particularly applicable to nurses, who care for patients directly at the bedside [17]. Therefore, investigating the risky health behaviors of nursing students, including energy drink consumption, which has recently increased among young people despite the high caffeine content of these drinks, is imperative.

The author investigated energy drink consumption among Korean nursing students and attempted to identify psychological factors that influenced consumption. The specific study purposes were as follows: (1) to investigate the status of energy drink consumption and associated psychosocial variables (self-esteem, academic stress, depression, and college adjustment) among Korean nursing students; and (2) to identify how the associated psychosocial factors influenced energy drink consumption among Korean nursing students. Such information would be helpful for formulating early intervention programs that promote the development of health habits among nursing students. In addition, the results of this study may be used to establish health behavior interventions for 3-shift health care workers, specifically nurses.

METHODS

1. Research Design

The author used an exploratory cross-sectional descriptive study design to identify psychosocial factors associated with energy drink consumption among Korean nursing students.

2. Participants and Data Collection

The target population included all nursing students, from freshman to seniors, attending a nursing university in an urban Korean city. From May to July 2014, 200 survey ques-

tionnaires were distributed (50 students per year-level), corresponding to the total number of nursing students enrolled at the participating nursing university. Only participants who signed a consent form participated in this study. Sufficient time (15~20 minutes) was provided to complete the questionnaire, which was then returned in an unmarked envelope to preserve respondents' anonymity. Ultimately, 187 nursing students participated in this study.

3. Instruments

A self-administered questionnaire was used to identify participants' energy drink consumption, general characteristics (sex, school year, residence, cigarette smoking, alcohol consumption, self-health interest, and self-health management), and psychosocial factors (self-esteem, academic stress, depression, and college adjustment). Items on the general characteristics questionnaire that were deemed likely to be answered with a median score were constructed with answers on a dichotomous scale (e.g. yes or no).

1) Energy drink consumption

The author defined energy drinks as beverages containing high concentrations of caffeine, including Red Bull™, Bacchus™, Hot 6™, Monster™, Burn Intense™, and Rock Star™. As a measure of the status of energy drink consumption, the author determined whether participants had ever consumed energy drinks. Those who had never consumed energy drinks were classified as never-consumers, and those who had consumed energy drinks at least once in their life were classified as ever-consumers.

2) Self-esteem

Self-esteem reflects an individual's overall emotional evaluation of worth. It was assessed using Rosenberg's Self-Esteem Scale [19], which was translated to Korean and used in Ryu's study [20]. The instrument consists of 10 questions that use a 4-point Likert scale ranging from "strongly disagree (1)" to "strongly agree (4)". Individual scores were summed to form a total score, which was then converted to a 100-point scale; potential total scores ranged from 25 to 100. The author then converted the total mean score to an item mean to facilitate comparisons with other study variables. High scores correspond to high levels of self-esteem. In terms of reliability, the questionnaire had a Cronbach's α of .85.

3) Academic stress

Academic stress refers to the perceived overall stress level during college life. It was measured using one question: "What is your stress level, related to your academic experi-

ence, while attending nursing college?" The answers to the question were evaluated on a 4-point Likert scale ranging from "very low (1)" to "very high (4)".

4) Depression

Depression is a state of low mood and aversion to activity that can affect an individual's thoughts, behaviors, feelings, and sense of well-being. The author measured depression using the Beck Depression Inventory (BDI) [21], which has been translated into Korean [22]. The instrument consists of 21 questions, assessed along a 4-point Likert scale ranging from "not present (0)" to "severe (3)". The total score ranges from 0 to 63, with higher scores indicating more severe depressive symptoms. A BDI cutoff score of 17 is used to determine the presence of depression [21]; those scoring ≤ 16 points were considered not to have depression and those scoring ≥ 17 points were considered to have depression. To facilitate a comparison of the mean score with other study variables, the author converted the sum mean score into item mean scores. In terms of reliability, the questionnaire had a Cronbach's α of .83 in this study.

5) College adjustment

College adjustment refers to the ability of university students to maintain a harmonious state, without encountering conflicts and imbalances, by coping with academic, interpersonal, and emotional college life needs. It was measured using Baker and Siryk's Student Adaptation to College Questionnaire [23], which was used in a previous Korean study [24]. The instrument consists of 67 questions that use a 5-point Likert scale ranging from "strongly disagree (1)" to "strongly agree (5)". The total score ranges from 67 to 335. The author converted the sum mean score to item mean scores, with higher scores indicating appropriate adjustment to college life. In terms of reliability, the questionnaire had a Cronbach's α of .84 in this study.

4. Data Analysis

Statistical tests were used to evaluate all collected data using SPSS for Windows version 20.0 (IBM Corp., Armonk, NY, USA), at a significance level of .05 ($p < .050$). Descriptive statistics were used to characterize the study population. Differences in general characteristics and study variables related to energy drink consumption were analyzed using the χ^2 test and the t-test. Lastly, logistic regression was used to identify the psychosocial factors influencing energy drink consumption behavior among Korean nursing students.

5. Ethical Considerations

This study was approved by the Research Ethics Committee of the authors' affiliated university (Institutional Review Board number: YWNR-14-2-027). Participants were informed about the study's purpose and intent, data confidentiality and anonymity, and their right to withdraw from study participation at any time. Written informed consent was obtained from all participants prior to study initiation.

RESULTS

1. General Characteristics of Participants

There were 187 nursing students who completed and returned the survey (93.5% response rate). Among the participants, 82.4% were females and 17.6% were males. The distributions of the participants by year in school ranged from 19.8%-27.3% from freshmen to seniors. Only 10.2% of participants lived with their families, 86.1% were non-smokers, and 74.9% were alcohol consumers. And, 79.1% of participants reported not being interested in their own health, yet 49.2% felt that they were managing their health well. The only statistically significant difference between energy drink never-consumers and ever-consumers was alcohol consumption, with consumers exhibiting significantly higher alcohol consumption ($\chi^2=6.00, p < .021$) (Table 1).

2. Status of Energy Drink Consumption

Among 187 nursing college students, 50 (26.7%) were never-consumers, while 137 (73.3%) were ever-consumers. More than two-thirds of nursing college students had consumed energy drinks in their life.

3. Psychosocial Variables Influencing Energy Drink Consumption

The item mean score of variables that influenced energy drink consumption are shown in Table 2. The item mean score of self-esteem was 1.92 of 4, that for academic stress was 2.64 of 4, that for depression was 0.41 of 3, and that for college adjustment was 3.17 of 5. Among psychological variables, academic stress ($t=2.51, p=.013$), depression ($t=2.91, p=.004$), and college adjustment ($t=3.84, p < .001$) were significantly different between never-consumers and ever-consumers.

4. Psychosocial Factors Influencing Energy Drink Consumption

Table 3 presents the final logistic regression model for energy drink consumption based on psychological factors in Korean nursing students (never-consumers and ever-consumers). Model 1 shows the association between alcohol and

Table 1. General Characteristics of Study Participants

(N=187)

Variables	Categories	Total	Never-consumers	Ever-consumers	$\chi^2 (p)$
		(n=187)	(n=50)	(n=137)	
		n (%)	n (%)	n (%)	
Sex	Female	154 (82.4)	44 (88.0)	110 (80.3)	1.50 (.281)
	Male	33 (17.6)	6 (12.0)	27 (19.7)	
School year	Freshman	49 (26.2)	15 (30.0)	34 (24.8)	3.22 (.359)
	Sophomore	50 (26.7)	12 (24.0)	38 (27.8)	
	Junior	37 (19.8)	13 (26.0)	24 (17.5)	
	Senior	51 (27.3)	10 (20.0)	41 (29.9)	
Residence	With family	19 (10.2)	6 (12.0)	13 (9.5)	0.25 (.593)
	Without family	168 (89.8)	44 (88.0)	124 (90.5)	
Cigarette smoking	Nonsmoker	161 (86.1)	43 (86.0)	118 (86.1)	0.01 (.575)
	Smoker	26 (13.9)	7 (14.0)	19 (13.9)	
Alcohol consumption	Nondrinker	47 (25.1)	19 (38.0)	28 (20.4)	6.00 (.021)
	Drinker	140 (74.9)	31 (62.0)	109 (79.6)	
Interest in one's own health	Interested	39 (20.9)	9 (18.0)	30 (21.9)	0.34 (.685)
	Not interested	148 (79.1)	41 (82.0)	107 (78.1)	
Management of one's own health	Good	92 (49.2)	30 (60.0)	62 (45.3)	3.19 (.098)
	Poor	95 (50.8)	20 (40.0)	75 (54.7)	

Table 2. Psychosocial Variables of Study Participants

(N=187)

Variables (item range)	Total (n=187)	Never-consumers (n=50)	Ever-consumers (n=137)	t (p)
	M±SD	M±SD	M±SD	
Self-esteem (1~4)	1.92±0.32	1.99±0.34	1.89±0.31	1.89 (.061)
Academic stress (1~4)	2.64±0.63	2.46±0.68	2.72±0.59	2.51 (.013)
Depression (0~3)	0.41±0.32	0.31±0.27	0.45±0.33	2.91 (.004)
College adjustment (1~5)	3.17±0.29	3.29±0.21	3.13±0.30	3.84 (< .001)

Table 3. Psychosocial Factors Influencing Energy Drink Consumption

(N=187)

Characteristics	Model 1					Model 2				
	β	SE	p	OR	95% CI	β	SE	p	OR	95% CI
(Constant)	0.39	.30	.192			2.44	2.71	.374		
Alcohol consumption (nondrinker=0, drinker=1)	0.87	.36	.016	2.39	1.18~4.83	0.80	0.39	.041	2.22	1.03~4.79
Self-esteem						0.32	0.69	.641	1.38	0.36~5.36
Academic stress						0.35	0.31	.261	1.42	0.77~2.61
Depression (no*=0, yes [†] =1)						1.60	0.62	.010	4.94	1.46~16.70
College adjustment						-1.19	0.69	.085	0.30	0.08~1.18
	Nagelkerke R ² =.044 (p=.017)					Nagelkerke R ² =.190 (p< .001)				

*No= ≤ 16 Points; † Yes= ≥ 17 points; OR=Odds ratio; CI=Confidence interval; SE=Standard error.

energy drink consumption among nursing students (Nagelkerke R²=.044, p=.017). Model 2 shows the associations between various psychological factors and energy drink consumption among college students who consumed alcohol (Nagelkerke R²=.190, p<.001). Of the psychosocial variables we assessed (self-esteem, academic stress, depression, and college adjustment), only depression significantly influenced energy drink consumption. Depressed nursing students were 4.9 times more likely to have consumed energy drinks than non-depressed nursing students (odds ratio=4.94, p=.010). The Hosmer-Lemeshow test revealed a p value of .914, indicating good model fit because the p value was >.05. Moreover, the classification results were moderate, with 74.3% correct model classification.

DISCUSSION

For many young people, college marks the transition from adolescence to adulthood. Therefore, college is a very important time during which healthy dietary habits are established. Prior studies have indicated that college students have poor-quality diets that fail to meet recommended national dietary standards [8,25]. A similar pattern has been observed among Korean college students, although college students who express awareness of the potential side effects of energy drink

consumption still demonstrate high levels of consumption [15]. Of the nursing college students who participated in this study, more than two-thirds (73.3%) had consumed energy drinks. These results are similar to other findings on the level of energy drink consumption among Korean nursing college students (78.1%), an age group with high levels of energy drink consumption [14]. A Canadian study found that 73.6% of young individuals had reportedly consumed energy drinks [26] and 77.3% of college students consumed energy drinks at least once per week [8]. Thus, attention to health issues related to high levels of energy drink consumption is important.

There are known positive associations between mental health problems, such as stress and depression, and energy drink consumption [9]. Similarly, among the psychological factors in this study, depression significantly influenced energy drink consumption in this population. Depressed nursing students were 4.94 times more likely to have consumed energy drinks than those who were not depressed. This result provides evidence that nursing students who are heavy energy drink consumers may need to evaluate their own psychological condition, considering possibilities such as a depressed mood. This finding also suggests that energy drink consumption is not simply an unhealthy eating habit related to beverage preferences. Nursing students are expected to be role models for the general population, promoting healthy

lifestyles and mental health [17]. Therefore, nursing educators should be aware of the seriousness of mental health problems associated with energy drink consumption in this population. Moreover, nursing educators should emphasize the early detection of unhealthy beverage consumption habits in individuals with depression and provide interventions to rebuild healthy habits and promote mental health. These efforts may help nursing students to grow into nurses who promote healthy beverage consumption behavior in the patients they serve and in the community at large in the near future.

Prior research has identified sociodemographic factors that influence energy drink consumption among college students. These include sex, alcohol consumption, smoking, monthly income, and residing in urban areas [1,25,27]. In this study, alcohol consumption was the only sociodemographic factor that significantly differed between nursing students who never consumed energy drinks and those who had; furthermore, the alcohol consumption rate among ever-consumers was relatively high. This finding reinforces the close association between alcohol and energy drink consumption. Moreover, consuming alcohol in combination with energy drinks is a popular trend among young people [28,29], especially in light of the finding that drinking alcohol combined with energy drinks makes the drinker feel like he or she is drinking more slowly [28]. Thus, this combination promotes overconsumption of alcohol and is a risky health behavior [29], and future research should therefore investigate the practice of mixing energy drinks and alcohol.

The author intensively explored self-esteem, academic stress, depression, and college adjustment as psychological factors that could affect energy drink consumption in college students, based on previous studies [1,10,13]. Even though depression was the only variable significantly related to energy drink consumption in the final regression model, other psychological factors (academic stress and college adjustment, including depression) significantly differed between never-consumers and ever-consumers in a difference comparison analysis. Ever-consumers showed higher academic stress and depression and lower college adjustment scores than never-consumers. Based on a previous study, caffeine is the most commonly-used psychoactive substance [13]; moreover, it influences undesirable mental health problems [9]. Similarly, Hofmeister et al. [30] and Trapp et al. [10] identified relationships between energy drink consumption behaviors and stress. Richards and Smith [9] and Trapp et al. [10] have also identified correlations between total energy drink consumption and depression scores among young people. This may confirm that depression was the most important psychological factor influencing nursing students' consumption of energy drinks. Therefore, nursing educators need to preferentially identify

nursing students who are depressed, and such students should receive education about the importance of healthy beverage consumption habits to prevent repetitive energy drink consumption, in order to reduce the dependence of nursing college students on energy drinks.

The author hypothesized that self-esteem would affect the consumption of energy drinks in nursing students, based on existing literature on the close association between self-esteem and health behaviors in substance abusers [11]; however, in this study, we found no correlation between self-esteem and the stimulant beverage consumption habits of nursing college students. This may suggest that nursing students may not perceive energy drink consumption as an unhealthy beverage consumption habit, or that self-esteem may have little influence on the formation of healthy beverage consumption habits of healthy subjects without current health problems. Therefore, it may be necessary first to identify how nursing students perceive the effects of energy drink consumption on their health. Future research should investigate this issue by using qualitative research methods to analyze various factors that affect energy drink consumption among college nursing students.

More importantly, overconsumption of energy drinks, despite awareness of their adverse effects, is a major problem [2,15]. The existing literature suggests that it is necessary to regularly check levels of energy drink consumption among nursing students, to assess students for related mental health problems (especially focusing on depression), and to repeatedly educate students on proper energy drink consumption guidelines, while students are still learning about healthy behaviors in their nursing curriculum. These efforts may enable early detection and appropriate interventions for unhealthy dietary habits, so that the students can acquire knowledge about nursing while establishing healthy behaviors that can help improve both their own and others' health.

The limitations and suggestions of this study are as follows. The first limitation of this study was that the data were collected from students at a single nursing college in Korea. Thus, the interpretability of these results is limited to nursing students at that institution. For this reason, an expanded study should be conducted to investigate more nursing college students. The second limitation is that the consumption of energy drinks was analyzed categorically by dividing students into never-consumers and ever-consumers. It was therefore not possible to identify the psychological factors that affect the frequency and quantity of energy drink consumption among ever-consumers. For this reason, the author proposes further studies to characterize psychological influences on the frequency and quantity of energy drink consumption among ever-consumers. The third limitation is that the study focused

only on psychosocial factors related to energy drink consumption and could not confirm potential associations with other factors. The author therefore suggests that further studies should seek to identify other associated socio-demographic factors or physical factors, such as sleep, that can affect or be affected by energy drink consumption.

CONCLUSION

Korean nursing students exhibited a high level of energy drink consumption. Those who were depressed were more likely to have consumed energy drinks over their lifetime than their non-depressed counterparts. Nursing educators should be aware of the psychological factors associated with energy drink consumption and should attempt to detect nursing students who experience psychological problems (e.g. depression) as early as possible. Furthermore, nursing educators should also strive to provide adequate, and early, education to correct unhealthy dietary habits among nursing students. These efforts will help establish healthy behaviors, thereby encouraging students to improve their own health, as well as the health of others. Furthermore, these results may be used to establish health behavior interventions for 3-shift health care workers.

Conflict of interest

No existing or potential conflicts of interest relevant to this article are reported.

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