

Factors associated with problematic alcohol consumption in adolescents

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Objectives: The purpose of this study was to investigate factors that influence problematic drinking among adolescents in South Korea. The first aim of this study was to examine the problematic drinking status according to socio-demographics characteristics, mental-health, and health behavior factors. The second aim was to identify factors affecting problematic drinking. **Methods:** Using statistics from the 11th(2015) Korea Youth Risk Behavior Web-based Survey, any variations among the subjects were presented by percentages and analyzed by χ^2 -tests, and then logistic regression analysis was conducted. **Results:** In the final model, gender, economic status, weekly allowance, father's education level, experience of sadness, smoking, and consumption of high-caffeine drinks were all significantly associated with problematic drinking. **Conclusions:** Awareness of teenagers regarding the potential health effects of problematic drinking, in particular in regards to mixing smoking and high-caffeine drinks with consumption of alcoholic beverages, should be increased through health education. Teenagers need to be taught the physical and mental dangers of drinking. A program that can teach proper drinking habits and prevent excessive drinking is needed. It should be a national matter just like the smoking policy.

Key words: problematic drinking, alcohol, adolescents, KYRBS

I. Introduction

Drinking alcohol sometimes works positively to relieve tension and promote social interpersonal relationships(Kim, 2012), but underage drinking is considered a deviant behavior in our society. Especially in western cultures, teenage binge drinking is often thought of as an initiation ceremony (Schulenberg et al., 1996). Teenagers go through major biological, psychological, and societal changes, and many teenagers experience difficulties while going through puberty(Jin & Bae, 2012). Teenage drinking is not only bad for their mental health, but also it affects their physical health (Cho & Yoon, 2010). Teenage binge drinking is a problem for society, it affects the health of teenagers, and the study habits of students. Symptoms of alcohol addiction that may progress into a serious condition are called Problematic Alcohol

Consumption(WHO, 1994). This can cause problems in physical, mental, and social health. Among men over 19 years of age in Korea, 42.6% have a score higher than 8 on the Alcohol Use Disorders Identification Test(AUDIT), indicating a drinking alcohol problem(Centers for Disease Control, 2013). It seems that Korean drinking alcohol customs are causing this proportion to continuously increase over time. If teenagers are neither taught properly nor prevented from drinking alcohol at young ages, this can lead to not only a serious drinking alcohol addiction, but also a huge financial loss for society(Kang, 2016) because of the costs of mental, physical, and societal treatments for teenage alcohol addicts (Stevens, 1991). But, even though it is widely known about various health-related social burdens caused by problematic drinking, the drinking alcohol rate is continuously increasing (Kang et al, 2000). Adolescents are vulnerable to alcohol,

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tobacco, and illegal drugs and can easily buy alcohol than others. Therefore, interventions to reduce teenage drinking are urgently needed. And repeated studies of influencing factors are needed.

Drinking alcohol is determined by the personal and environmental characteristics of the drinker and Individual characteristics include demographic and psychosocial characteristics and environmental characteristics include Socio-economic and cultural characteristics(Ansoleaga, 2013). Therefore, in order to adequately explain the problematic problem of the individual, an analysis that can take into consideration the characteristics of the individual and the environmental characteristics should be performed.

The majority of the previous research involving teenage drinking is about drinking alcohol behavior and the factors involved in drinking alcohol behavior, and only a few are about drinking alcohol problems. Previous studies have reported that depression is the main factor increasing the risk of binge drinking(Chung, 2012). In addition, those who are self-conscious about their health are more likely to be involved in drinking alcohol(Ryu, Kang & Lee, 2011). Other factors include stress, smoking, family drinking behavior, and drinking alcohol partners(Jeon & Lee, 2010; Chung, 2012; Ariza, 2000). In addition, cognitive factors such as drinking knowledge(Shin & Sohn, 2008; Je, 2011), normative behavior(Ryu, Lee & Shin, 2010), alcohol expectancy(Kang & Kim, 2014), and drinking refusal self-efficacy(Kim, 2007) are all significant predictors of problematic drinking. However, because most of the previous research only included specific groups it is difficult to generalize the factors involving problematic drinking to all teenagers.

Thus, we investigated factors affecting problematic drinking with the ultimate goal of preventing underage drinking, based on the data from The 11th Korea Youth Risk Behavior Web-based Survey. The first aim of this study was to examine the problematic drinking status according to socio-demographics characteristics, mental-health, and health behavior factors. The second aim was to identify factors affecting problematic drinking.

II. Methods

1. Data and study design

This is a secondary data analysis study. The data were taken from the 11th(2016) Korea Youth Risk Behavior Web-Based Survey (KYRBS) conducted by the Korean Centers for Disease Control and Prevention. The KYRBS, an online self-administered questionnaire survey, was conducted annually to monitor the prevalence of health risk behaviors in Korean adolescents. To select a nationally representative sample of middle and high school students, this survey used a stratified, cluster sampling design. The survey of middle and high school students was conducted in two stages in April of 2016. The first stage identified the location of each school and the 2nd stage involved randomly selecting students from different grades and classes. A total of 70,362 students from 800 schools (400 middle, 400 high) took an online survey anonymously. The respondents' data were assigned weights to assure equal probability of being sampled and to cover missing data. Of the 70,362 students selected, 68,043 students completed the survey with a response rate of 96.7%. The sample for this study selected 7,391 subjects who checked at least one answer on the Alcohol CRF questionnaire among the 68,043 students.

2. Ethical considerations

The Korean Centers for Disease Control and Prevention provided the raw KYRBS data after reviewing our study's purpose and data analysis plans. The KYRBS was officially approved by the Statistics Korea. All study participants completed the survey under the condition of anonymity. This study was approved by the Institutional Review Board of Kyungsoong University in Korea (KSU-16-10-002).

3. Variable measurements

1) Problematic drinking

Problematic drinking is a drinking behavior that leads to

physical, psychological, social, academic, professional, legal, economical, or spiritual dysfunction, and family or personal relationship problems(Daley, 1997). To classify problematic drinking, we used the problem Alcohol CRF questionnaire from the results of the KYRBS. In cases where two or more of the six items were selected, the subject's behavior was classified as problematic drinking.

2) Socio-demographics characteristics

Socio-demographics characteristics were identified from the results of the KYRBS. They included gender, school, economic status, cohabitation with family, weekly allowance, and father's education. Economic status was categorized into three groups by low, middle, and high. Living with family was categorized into two groups by 'with family' and 'without family.' Weekly allowance was categorized into three groups by 'less than 50k won,' 'between 50k but less than 100k won,' and over 100k won.

3) Mental health and health behaviors

Mental health and health behaviors factors were identified from the results of the KYRBS. Mental health factors were subjective health status, perceived happiness, perceived stress, and perceived sadness. All mental health factors except perceived sadness could be answered in three ways but perceived sadness had only two answers(yes or no). Health behavior factors included smoking and high-caffeine drink consumption. High-caffeine drink consumption had two possible answers(yes or no) by assessing whether the adolescents had ever used one in the last 7 days.

3. Data analysis

Based on the complex survey design, all data were weighted by the proportion of gender, school type, and grade in each geographic area. For the statistical data analysis, the complex sampling method was used and stratified variables(Strat), cluster variables(Cluster), weights(W), and FPC(finite population correction) factors were used according

to the guidelines for the analysis of complex sampling method.

Descriptive statistics and chi-square tests were used to compare socio-demographics characteristics and mental health and health behavior factors according to problematic drinking. Logistic regression was conducted to identify factors associated with problematic drinking. Model 1 included socio-demographic characteristics such as gender, school type, GPA, economic status, cohabitation status, weekly allowance, and the father's education. Model 2 was added mental health characteristics such as subjective health status, perceived happiness, perceived stress, and perceived sadness. Model 3, the final model, included socio-demographic, mental health and health behavioral characteristics. The reason for dividing the model is that by assigning each category stepwise, it is possible to compare the levels that affect the outcome variables when the other categories are adjusted and when they are unadjusted. All statistical analyses were performed using IBM SPSS version 23. Statistical significance was accepted for $p < .05$.

III. Result

1. Socio-demographic characteristics

Table 1 summarizes the socio-demographic characteristics of the sample. In total, 62% of the respondents were male and 38% were female, and 86.2% of the respondents were in high school while 13.8% were in middle school. The GPA distribution was 56.2% average, 32% low, and 11.8% high. Family economic status(income) was 48.0% low, 43.2% average, and 8.9% high. In total, 92.9% of the respondents were living with their family and 71.6% had a weekly allowance of less than 50k won, 18.1% received between 50 and 100k won, and 10.3% received more than 100k won. Around half(51.6%) of the respondents' fathers were college graduates and the rest were high school graduates or had less schooling. Slightly more than half(53.9%) of respondents had problematic drinking.

<Table 1> Socio-demographic characteristics

(n=7,391)

	Items	n	(%)
Gender	Male	4,534	(62.0)
	Female	2,857	(38.0)
School Type	Middle school	1,097	(13.8)
	High school	6,294	(86.2)
GPA	High	699	(11.8)
	Middle	3,367	(56.2)
	Low	1,898	(32.0)
Economic Status	High	585	(8.9)
	Middle	2,985	(43.2)
	Low	3,348	(48.0)
Cohabitation with family	Yes	6,849	(92.9)
	No	542	(7.1)
Weekly allowance	< 50k won	5,300	(71.6)
	≥ 100k won	1,332	(18.1)
	between 50k ≤ and >100k won	759	(10.3)
Father's education	≤ High school	3,004	(48.4)
	≥ College	2,984	(51.6)
Problem Drinking	Yes	3,981	(53.9)
	No	3,410	(46.1)

2. Socio-demographic characteristics of participants with problematic drinking

Table 2 summarizes the socio-demographic characteristics of participants with problematic drinking. In total, 54.4% of the participant reported drinking alcohol in high school and 49.5% did so in middle school. Those with high family economic status were more likely to have experienced drinking alcohol(61.8%) followed by 53% for middle and 51.3% for low status. Respondents who were not living with family had

a drinking alcohol experience rate of 61.7% compared with 53.1% among those living with family. Those with an allowance of more than 100k won were more likely to have experienced drinking alcohol(68.8%) compared with 58.6% for those receiving 50k to 100k and 50.3% for those receiving less than 50k. Participants with parents having a lower education level were more likely to have experienced drinking (54.1%) compared with those whose parents were college graduates (50.4%).

<Table 2> Socio-demographic characteristics and Problematic drinking

(n=7,391)

Characteristics	Categories	Total	Problematic drinking		$\chi^2(p)$	
			No	Yes		
			n(%)	n(%)		
Gender	Male	Middle school	641(13.0)	341(53.0)	300(47.0)	2.32(<165)
		High school	3,893(87.0)	1,705(44.4)	2,188(55.6)	
	Female	Middle school	456(15.1)	216(47.0)	240(53.0)	
		High school	2,401(84.9)	1,148(47.4)	1,253(52.6)	
School type	Middle school	1,097(13.8)	557(50.5)	540(49.5)	8.71(<.005)	
	High school	6,294(86.2)	2,853(45.6)	3,441(54.4)		
Economic status	Affluent	585(8.9)	225(38.2)	360(61.8)	22.91(<.000)	
	Average	2,985(43.1)	1,388(47.0)	1,597(53.0)		
	Poor	3,348(48.0)	1,633(48.7)	1,715(51.3)		
Cohabitation with family	Yes	6,849(92.9)	3,199(46.9)	3,650(53.1)	14.33(<.005)	
	No	542(7.1)	211(38.3)	331(61.7)		
Weekly allowance	< 50k won	5,300(71.6)	2,638(49.7)	2,662(50.3)	107.29(<.000)	
	between 50k ≤ and >100k won	1,322(18.1)	538(41.4)	794(58.6)		
	≥100k won	759(10.3)	234(31.2)	523(68.8)		
Father's education	≤ High school	3,004(48.4)	1,353(45.9)	1,651(54.1)	8.09(<.010)	
	≥ College	2,984(51.6)	1,497(49.6)	1,487(50.4)		

3. Mental health and health behavior factors involved in problematic drinking

Table 3 summarizes the mental health and health behavior factors involved in problematic drinking. All negative factors of mental health and health behaviors were significantly associated with problematic drinking. Those who reported they were 'unhealthy' drank more(65.9%) than those who reported they were 'healthy'(51.3%). Those who perceived

their happiness as poor drank more(63.1%) than those who felt 'affluent'(50.1%). Subjects with a higher stress level drank more(58.6%) compared with those who had a lower stress level(49.8%) and subjects reporting sadness versus those that did not had problematic drinking percentages of 62.1% versus 48.4%. Smokers drank more(63.9%) than nonsmokers(38.6%) and users of high-caffeine drinks drank more alcohol than non-users, 61.9% versus 52%.

<Table 3> Mental health and Health behaviors factors and Problematic drinking

(n=7,391)

Characteristics	Categories	Total n(%)	Problematic drinking		$\chi^2(p)$
			No n(%)	Yes n(%)	
Subjective health status	Unhealthy	620(8.4)	218(34.1)	402(65.9)	54.35(<.000)
	Moderate	1,718(23.3)	744(43.5)	974(56.5)	
	Healthy	5,053(68.3)	2,448(48.7)	2,605(51.3)	
Perceived Happiness	Affluent	3,990(53.7)	1,992(49.9)	1,998(50.1)	61.04(<.000)
	Average	2,398(32.7)	1,046(44.1)	1,352(55.9)	
	Poor	1,003(13.6)	372(36.9)	631(63.1)	
Perceived Stress	Severe	3,462(46.6)	1,435(41.4)	2,027(58.6)	61.75(<.000)
	Little	2,876(39.0)	1,442(50.6)	1,434(49.4)	
	Never	1,053(14.4)	533(50.2)	520(49.8)	
Perceived sadness	Yes	2,864(39.1)	1,092(37.9)	1,772(62.1)	133.25(<.000)
	No	4,527(60.9)	2,318(51.6)	2,209(48.4)	
Ever Smoking	Yes	4,441(59.9)	1,592(36.0)	2,849(63.9)	458.01(<.000)
	No	2,950(40.1)	1,818(61.4)	1,132(38.6)	
High-caffeine drinks	Yes	1,373(18.4)	523(38.1)	850(61.9)	51.50(<.000)
	No	6,018(81.6)	2,887(48.0)	3,131(52.0)	

4. Factors affecting problematic drinking

Logistic regression analysis was used to identify the factors affecting teenage problematic drinking; the results are shown in Table 4. In socio-demographic model 1, gender, economic status, weekly allowance, and the father's education level were significantly associated with problematic drinking. In model 2, mental health characteristics, gender, economic status, weekly allowance, father's education level, perceived happiness level, and experience of sadness were significantly associated with problematic drinking. In model 3, gender, economic status, weekly allowance, father's education level, experience of sadness, smoking, and consumption of high caffeine drinks were significantly associated with problematic drinking. School type, GPA, cohabitation situations, subjective health status, perceived happiness, and stress level were not significant factors. Hosmer-Lemeshow was used for the fit of

Model 3, and the null hypothesis was adopted with a p value of 0.545. In the final model 3, girls had more experience with problematic drinking than boys(OR = 0.83 in boys, 95% CI: 0.72-0.96). Those of higher economic status had more experience with problematic drinking than those of lower status(OR = 1.38, 95% CI: 1.09-1.76); moreover, those of middle class had more experience than those of lower status (OR = 1.08, 95% CI: 0.92-1.20). There was also a correlation with weekly allowance; those who received an allowance of more than 100k won drank more alcohol than those who received less than 50k won(OR = 1.81, 95% CI: 1.42-2.31) and those who received an allowance between 50k and 100k won drank more than those who received less than 50k won (OR = 1.28, 95% CI: 1.10-1.50). Those with fathers who had received less education (high school or less) drank more compared with those with fathers who had graduated from college(OR = 1.16, 95% CI: 0.94-1.49). In regards to mental

health issues, those who had experienced intense depression in the last 12 months drank more than those who had not (OR = 1.47, 95% CI: 1.27-1.69). For smokers, as each smoking unit increased by 1, alcohol consumption increased by 1.15

times (95% CI: 1.11-1.18) and those who used high-caffeine drinks drank more than non-users (OR = 1.20, 95% CI: 1.10-1.31).

<Table 4> Logistic regression analysis results on problematic drinking

(n=7,391)

Level	Characteristics (baseline)	Categories	Model 1	Model 2	Model 3
			OR (95% CI)	OR (95% CI)	OR (95% CI)
Socio-demographic	Gender(female)	Male	1.15(1.02-1.30)	1.31(1.15-1.49)	.83(.72-.96)
	School Type(middle)	High school	1.14(.97-1.34)	1.16(.99-1.37)	1.15(.97-1.37)
	GPA(low)	High	.95(.78-1.16)	1.00(.82-1.23)	1.10(.88-1.36)
		Moderate	1.10(.95-1.25)	1.09(.95-1.25)	1.09(.95-1.26)
	Economic status (poor)	Affluent	1.43(1.14-1.80)	1.43(1.13-1.81)	1.38(1.09-1.76)
		Average	1.11(.98-1.26)	1.08(.96-1.23)	1.08(.92-1.20)
	Cohabitation with family (no)	Yes	1.09(.83-1.42)	1.09(.83-1.43)	1.23(.63-1.06)
	Weekly allowance (< 50k won)	≥100k won	2.13(1.71-2.67)	2.12(1.68-2.67)	1.81(1.42-2.31)
		between 50k≤ and>100k won	1.39(1.20-1.61)	1.38(1.19-1.60)	1.28(1.10-1.50)
	Father's education (≥college)	≥High school	1.18(1.05-1.34)	1.20(1.06-1.36)	1.16(.94-1.59)
Mental health	Subjective health status(healthy)	Unhealthy		1.31(1.03-1.66)	1.27(.99-1.63)
		Moderate		1.09(.95-1.25)	1.04(.90-1.20)
	Perceived Happiness (affluent)	Poor		1.28(1.03-1.60)	1.19(.94-1.49)
		Average		1.24(1.08-1.42)	1.17(1.01-1.35)
	Perceived Stress (never)	Severe		1.15(.94-1.41)	1.10(.89-1.36)
		Little		1.00(.83-1.21)	.97(.80-1.18)
Perceived sadness(no)	Yes		1.54(1.34-1.76)	1.47(1.27-1.69)	
Health behavior	smoking days				1.15(1.11-1.18)
	High-caffeine drinks(no)	Yes			1.20(1.10-1.31)

Logistic regression was done on the complex sample.

IV. Discussion

This study was conducted to investigate predictors significantly associated with problematic drinking among adolescents in order to provide data to support basic educational materials

and health interventions for teenage problematic drinking. In this study, logistic regression analysis was used to develop three models using data on socio-demographics, mental health, and health behaviors. In socio-demographic model 1, gender, economic status, weekly allowance, and father's education

level were significant risk factors. Additionally, in model 2, mental health characteristics, gender, economic status, weekly allowance, father's education level, perceived happiness level, and experience of sadness were significant risk factors. However, in model 3, which included the additional variable 'cohabitation with family,' happiness was not one of the significant risk factors.

In model 3, boys had 0.83 times experience than girls with problematic drinking(95% CI: 0.72-0.96), and another nationwide Korean youth study reported that girls had more experience with problematic drinking than boys (Park & Lee, 2013). Further, Shin et al.'s(2008) study, which was based on middle school students in Korea, showed girls(25.9%) drank more alcohol than boys(23.4%). Traditionally, men tend to be more likely to drink alcohol in Korean culture and boys tend to adjust to peer norms. However, in other studies of teenage drinking, boys consumed more alcohol compared to girls(Kim & Kim, 2013; Ariza & Nebot, 2000). We also found that those with higher family economic status had higher problematic drinking consumption, consistent with the Park's(2013) study. There was also a direct correlation between drinking alcohol and the weekly allowance. Since all teenagers are dependent on their parents, they experience fewer financial difficulties when they are given a higher weekly allowance.

In this study, participants with a lower father's education level drank 1.16 times more. In Kim & Kim's(2013) research, the fathers' education level was the only significant variable for problematic drinking and in another study, those with fathers with high and middle school degrees drank 1.14 and 1.2 times more than those whose fathers had college degrees(Park & Lee, 2013). Also, there was a positive correlation between duration of education and drinking alcohol(Chung, 2012). Most teenagers learn about drinking from their parents, especially from their fathers. In Jeon & Lee's(2010) study, those with a lower education level drank more, which supports the assumption that teenagers who grow up watching their fathers binge drink are more likely to drink more.

In regards to mental health issues, those who experienced

intense sadness in the last 12 months drank 1.47 times more compared with those who did not. In previous studies, there was a strong direct correlation between drinking and depression(Park & Lee, 2013; Kim, 2014; Kim & Cho, 2012). In Jeon & Lee's(2010) study, women who experienced stress and depression also showed higher risk of problem drinking than women who did not. Students are vulnerable to academic stress and depression. Drinking alcohol seems to be one of the defense mechanisms to cope with a difficult reality. However, in the current study, the stress level was not a factor correlated with drinking, which contradicts the results of previous studies. Many studies on stress level and drinking have shown that the higher the stress level, the higher the alcohol consumption(Kang et al., 2000). However, a few other studies have shown that there is no correlation between stress and drinking(Cole, Tucker, & Friendman, 1991). Therefore, additional research is necessary to clarify the relationship between stress and drinking.

In regards to health behavior factors, we found that those who smoke drink more alcohol, which is consistent with previous studies. In Jeon & Lee's(2010) research, which involves 2005 national nutrition data, those who smoke drink 4 times more than those who do not, and smoking was also a factor in problematic drinking among teenagers in Carles(2000). In the studies of Perkin(1997) and Walton(1984), they stated that drinking promotes smoking, and there is a direct correlation between drinking and smoking, with smoking being one of the side effects of drinking. Thus, the relationship between drinking and smoking can be thought of as the use of one drug increasing the risk of using the other drug(Kim, 2008). Currently, there is a national free smoking cessation policy in place, but there is no policy involving drinking and smoking. High caffeine consumption was also one of the risk factors in the current study. In Miller's(2008) study, there was a high correlation between the use of caffeine drinks and alcohol consumption, and other research results have shown that those who consume caffeine drinks drink 3 times more alcohol than who do not (Yun, Kim, & Lee, 2013). In the study of Attila & Cakir(2011), those who

simultaneously consume both high caffeine drinks and alcohol drink more than those who do not. As a result, it is necessary to develop a policy regarding the mixing of high caffeine drinks and alcohol.

The primary limitation of this study is that we used secondary data acquired from a web-based self-reported survey, so the number of available variables is limited. And the original data used in the study were self-report questionnaires and there is a possibility that the respondents did not answer honestly to sensitive questions such as drinking alcohol and smoking. Further research on factors affecting drinking is necessary. However, the data from the national survey of teenagers are reliable and the strength of this study is that nationally representative data have been used.

V. Conclusion

This study shows that gender, economic status, weekly allowance, father's education level, experience of sadness, smoking, and consumption of high-caffeine drinks were all significantly associated with problematic drinking.

Our suggestions are as follows.

Frist, teenagers need to be taught about the physical and mental dangers of drinking alcohol. A program that can teach proper drinking habits and prevent excessive drinking alcohol is needed. Problematic drinking in are not only the teenager's responsibility, but also are the responsibility of their parents and their role models. Teenage drinking alcohol should not be a problem handled by just the family and the school; it should be a national issue, similar to policies about smoking.

Second, the use of high-caffeine energy drinks and smoking were both found to have excessive drinking as a major side effect and were both often consumed along with alcohol. Therefore, proper advertisement of high-caffeine drinks and cigarettes and strict policies are needed to prevent physical damage to teenagers.

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