



## RESEARCH ARTICLE

# Alcohol- and cigarette-use-related behaviors across gender, dysfunctional COVID-19 anxiety, and the presence of probable ADHD during the pandemic: A cross-sectional study in a sample of Turkish young adults

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### ABSTRACT

**Objective:** The objective of the study is to evaluate the alcohol- and cigarette-use-related behaviors among young adults during the COVID-19 pandemic restrictions in Turkey. The second objective was to evaluate whether the gender, dysfunctional COVID-19 anxiety, and presence of probable attention-deficit/hyperactivity disorder (ADHD) are associated with the increase in alcohol consumption and cigarette smoking while controlling the effects of current age and diagnosis of anxiety disorder before the COVID-19 pandemic.

**Method:** The study was conducted with an online survey among volunteer participants of young adults. The Adult ADHD Self-Report Scale (ASRS-v1.1) and the Coronavirus Anxiety Scale (CAS) were used to evaluate a group of university students.

**Results:** A total of 1,042 respondents (mean age 26.9±10.9 years; 61.6% female) filled out the survey. Of these, 17.6% reported an increase and 7.7% reported reduced cigarette smoking, whereas 10.8% reported an increase and 8.5% reported reduced alcohol consumption during the pandemic. Both rates of increased cigarette smoking and alcohol consumption were higher among males and those with probable ADHD. In the logistic regression analyses, male gender, COVID-19 related dysfunctional anxiety, and presence of probable ADHD were related to the increase in alcohol consumption and cigarette smoking, while the current age and diagnosis of anxiety disorder before the COVID-19 pandemic were not.

**Conclusion:** Findings of the current study may suggest that the pandemic period is related to both an increase and a reduction of alcohol consumption and cigarette smoking. Males with probable ADHD and higher levels of COVID-19 related dysfunctional anxiety have a higher risk of increasing both alcohol consumption and cigarette smoking.

**Keywords:** ADHD, alcohol consumption, anxiety, cigarette smoking, COVID-19; gender

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## INTRODUCTION

The coronavirus (COVID-19) pandemic has become a global public health concern across the globe since March 11, 2020 (1). Mask use, social distance, and hand hygiene (1) were not enough, and stay-at-home restrictions were implemented (2). Unfortunately, the pandemic caused deaths, job losses, social isolation (3), symptoms of psychological problems (4,5), and widespread fear and anxiety (3,6). Individuals used both adaptive and maladaptive coping strategies to deal with this fear and anxiety. Consumption of both legal substances, alcohol (7,8) and cigarette smoking (9) can result from maladaptive coping. Thus, fear, anxiety, and isolation related to the COVID-19 pandemic may trigger alcohol consumption (10-12) and cigarette smoking (10,12,13), which in turn, could lead to an increased prevalence of alcohol (14) and/or tobacco (15) use disorders and harms due to these substances (11,15). Also, the current findings suggest that both cigarette smoking (15) and alcohol consumption (16) appears to increase the risk of COVID-19 infection and complicate its course. Thus, it can be said that the causal relationship between COVID-19 infection and alcohol consumption and/or cigarette smoking is reciprocal. Nevertheless, increases in pandemic-related fear and anxiety, along with heavy alcohol use, may increase the risk of mortality from overdoses, including methanol poisoning (11), suicide, and alcohol-related liver disease (7), whereas active cigarette smoking may increase the severity and death of COVID-19 in hospitalized COVID-19 patients (15).

As an alternative scenario, fear and anxiety related to the pandemic, health concerns, alcohol sales bans, or economic problems may also have led to a reduction in alcohol consumption and cigarette smoking. In this direction, studies conducted in various countries have found both increased and reduced alcohol consumption, although the rates are different; i.e. 14% and 16% in Poland (17), 10.7% and 24.4% in France (13), 35.5% and 21.3% in Germany (10) 30.3% and 13.7% in Belgium (18), 26.6% and 18.1% in Australia (12), and 25.7% and 29.8% in Indonesia (19) respectively, and finally 17% reported increased alcohol consumption in the UK (20), and 17.6% in Brazilia (21). Similarly, reported rates of increased and reduced cigarette smoking were 26.7% and 18.6% in France (13), 7.4% and 2.5% in Belgium (18), 6.9% and 3.4% in Australia (12), and 20.1% and 32.3% in Indonesia (19), 30.3% and 28.3% in the USA (22), 34.0% and 12.1% in Brazilia (21) respectively, and finally 45.8% of the

participants reported that they increased their smoking in Germany (10). A study conducted on patients who applied for smoking cessation treatment in Turkey showed that the rate of smoking cessation after the pandemic was higher than before (23). These different rates of alcohol consumption and cigarette smoking may be related to the use of different methods in the sampling and data collecting strategy, and the period of the pandemic in which the study was conducted, which could lead to various participant profiles (13). Nevertheless, it may be also related to the cultural and religious differences, and to the certain political measures taken in that country (13).

Nevertheless, alcohol use (16) and cigarette smoking (24) have increased the burden of the problem, particularly among vulnerable groups such as young adults experiencing school closures and online learning as a result of spatial-distancing policies and practices (25,26). In Turkey, university students left campuses by March 2020, and are still off-campus. Also, pandemic restrictions may particularly have adverse effects on individuals with attention-deficit/hyperactivity disorder (ADHD). The diagnosis of ADHD is the main risk factor for alcohol and tobacco-related disorders (27-29). Restrictions could trigger psychological distress, particularly in people with ADHD who adapted well at work/school but struggled at home before the pandemic (30). Thus, the well-known association between ADHD and alcohol and tobacco-related disorders (31) might even be stronger during the COVID-19 pandemic, since "staying at home" may cause fear and anxiety in these individuals with ADHD, and they may use alcohol and/or cigarettes, which have positive reinforcing effects, as a self-treatment attempt to cope with these feelings (32). Furthermore, the findings of a previous study conducted in China suggest differences between the genders, with males consuming more alcohol early in the pandemic, while females being twice as likely to have stress and anxiety-related problems (33). Thus, there may be gender differences in alcohol and/or substance use rates during the pandemic; i.e. a study conducted in the French sample showed that males were more frequent regular alcohol users, and they smoked slightly more cigarettes per day than female smokers (13). Thus, the impacts of gender differences, dysfunctional anxiety related to the COVID-19 pandemic, and the presence of probable ADHD on alcohol- and cigarette-use-related behaviors are important issues to be evaluated among young adults during the COVID-19 pandemic restrictions.

The first aim of the present study is to determine the rates of increase and reduction in alcohol consumption and cigarette smoking among young adults during the pandemic restrictions period in Turkey. We also aimed to evaluate whether gender, the presence of dysfunctional anxiety related to COVID-19, and the presence of probable ADHD are related to the increase in alcohol consumption and cigarette smoking while controlling the effects of current age and diagnosis of anxiety disorder before the COVID-19 pandemic. As to our knowledge, this is the first study to evaluate the alcohol- and cigarette-use-related behaviors among young adults during the COVID-19 pandemic restrictions in Turkey.

## METHOD

### Participants and Procedure

A cross-sectional online study was designed and conducted among young adults. The data of this study were collected mainly from Turkish-speaking university students. Also, an online survey link on the Qualtrics program was exported and the survey link was distributed across gaming forums in Turkish. We used the voluntary response sampling method in the present study.

Cankaya University Ethics Committee (Ankara, Turkey) approved the protocol of the study. Involvement in the study was anonymous and confidential. The Plain Language Information Statement was given to the participants, and informed consent was registered online. The data was collected via Qualtrics. No penalty was given for non-participants, attrition, or withdrawals. Cankaya University students were rewarded with bonus credit added to their total points for participation.

The data collection took place from 6 June to 1 November 2020. A total of 1042 students initiated the online survey.

### Measures

**Adult ADHD Self-Report Scale (ASRS-v1.1) Screening Version:** The Six-item Screening Version of ASRS-V1.1 was developed for community-based studies to measure ADHD symptoms (34-37). The ASRS-v1.1 is a five-point Likert-type scale ranging from “never” (0) to “very often” (4). For items 1-3, scoring 2 (“sometimes”) or greater is equal to 1 point, whereas for items 4-6, scoring 3 (“often”) or greater resulted in a point. If the total score is 4 or higher, ADHD cases with a high probability of having ADHD

**Table 1: Sociodemographic and clinical variables according to the presence of probable ADHD**

	n	%
Age (Mean±SD)	26.92	10.90
Gender		
Male	400	38.4
Female	642	61.6
Romantic relationship	485	46.5
Employment		
Working	272	26.1
Part-time worker	23	2.2
Unemployed	92	8.8
Student	576	55.3
Other	79	7.6
Probable ADHD	185	17.8
Diagnosis of anxiety disorder before the COVID-19 pandemic	121	11.6

ADHD: Attention deficit hyperactivity disorder.

are considered probable ADHD. The Turkish version was validated in university students (38).

**The Coronavirus Anxiety Scale (CAS):** The CAS is a 5-item self-report measure aimed at assessing dysfunctional anxiety specific to the COVID-19 pandemic (3). The CAS has strong reliability ( $\alpha=0.93$ ) and validity (3). The scale was also validated for Turkish (39).

### Statistical Analysis

The IBM SPSS Statistics Version 20 was used for the statistical analyses. The data were cleaned before the analyses. The data with significantly missing values across measures were excluded. When comparing categorical variables, the  $\chi^2$  statistics were used. The One -Way ANOVA was used to compare CAS scores according to the changes in smoking and alcohol use. Two logistic regression analyzes were performed with increases in alcohol consumption and cigarette smoking as the dependent variables, and age, history of anxiety disorder, gender, probable ADHD, and COVID-19 related dysfunctional anxiety as independent variables. In this study, p values were accepted as two-tailed, and the relationships were considered significant at  $p<0.05$  for all the statistical analyses.

## RESULTS

A total of 1042 students initiated the online survey. The sample's mean age was 26.92 years (SD=10.90). The sample consisted of 400 males (38.4%) and 642 females

**Table 2: Changes in the cigarette smoking behavior during the COVID-19 pandemic**

	Gender*		ADHD**		CAS***	
	Female	Male	No	Yes	Total	Mean (SD)
Do you think there was an increase in the number of cigarettes you smoked during the pandemic (for the last 5 months)?						
<b>No, it has not increased. I use it as much as before</b>						
n	56	69	107	18	125	1.06
%	8.7	17.3	12.5	9.7	12.0	(1.96)
<b>Yes, it has increased during the pandemic</b>						
n	96	87	135	48	183	2.16
%	15.0	21.8	15.8	25.9	17.6	(2.98)
<b>I do not smoke</b>						
n	440	214	553	101	654	1.57
%	68.5	53.5	64.5	54.6	62.8	(2.64)
<b>Yes, it has decreased during the pandemic</b>						
n	50	30	62	18	80	1.75
%	7.8	7.5	7.2	9.7	7.7	(2.42)

\*:  $\chi^2=30.325$   $p<0.001$ ; \*\*:  $\chi^2=13.591$   $p=0.004$ ; \*\*\*:  $F=4.643$ ,  $df: 3,1038$ ,  $p=0.003$ ; CAS: Increased > No change, Do not smoke. No difference with decreased.

(61.6%), of which 185 (17.8%) were considered with probable ADHD and 857 (82.2%) were without probable ADHD. Sociodemographic variables are shown in Table 1.

Of the total sample, 183 (17.6%) reported that they increased smoking during the pandemic period, whereas 80 (7.7%) reported that they decreased smoking. The rate of increase in smoking was higher among males than females and higher in those with probable ADHD than in those without ( $\chi^2=30.325$   $p<0.001$ ;  $\chi^2=13.591$   $p=0.004$  respectively). Those who reported increased smoking had a higher CAS score than those smoking as before and those who reported not smoking ( $F=4.643$ ,  $df: 3,1038$ ,  $p=0.003$ ) (Table 2).

Of the total sample, 113 (10.8%) reported increased alcohol consumption during the pandemic, whereas 89 (8.5%) reported decreased alcohol consumption. The rate of increase in alcohol intake was higher in males than in females and was higher in those with probable ADHD than in those without ( $\chi^2=12.642$   $p=0.005$ ;  $\chi^2=12.690$ ,  $p=0.005$  respectively). The CAS score did not show significant differences according to the change in alcohol consumption ( $F=2.162$ ,  $df: 3,1038$ ,  $p=0.091$ ) (Table 3).

Male gender, probable ADHD, and COVID-19 related dysfunctional anxiety were predictors of both the increase in alcohol consumption and cigarette smoking in logistic regression analyses, whereas age and history of anxiety disorder were not (Table 4).

## DISCUSSION

The main findings of the present study were that the increase both in alcohol consumption and cigarette smoking were associated with the male gender, the presence of dysfunctional anxiety related to COVID-19, and the presence of probable ADHD. Studies conducted during the pandemic period have shown us that there is an anxiety about COVID-19 independent of pre-existing anxiety and that the functionality of the individual experiencing this anxiety may be impaired (3,39). Consistent with this, in the present study, the finding of dysfunctional anxiety related to COVID-19 was associated with an increase in alcohol consumption and cigarette smoking, independent of being diagnosed with an anxiety disorder before the COVID-19 pandemic. Due to health concerns, fear of COVID-19 infection, obedience to limiting physical contact, or other reasons, such as economic problems, some individuals may have seen this period as an opportunity to reduce or quit cigarette smoking or alcohol consumption (19,23). According to the other scenario, it could be the other way around. Due to the well-known effects on the reward pathway, alcohol and tobacco are used by many people seeking relief from unpleasant emotions, stress, anxiety, or depression (17,40). People suffering from this dysfunctional anxiety may have

**Table 3: Changes in the alcohol consumption during the COVID-19 pandemic**

	Gender*		ADHD**		CAS***	
	Female	Male	No	Yes	Total	Mean (SD)
Do you think there was an increase in the amount of alcohol you drink during the pandemic period (in the last 5 months)?						
<b>No, it has not increased. I use it as much as before</b>						
n	184	125	247	62	309	1.61
%	28.7	31.3	28.8	33.5	29.7	(2.61)
<b>Yes, it has increased during the pandemic</b>						
n	60	53	82	31	113	2.20
%	9.3	13.3	9.6	16.8	10.8	(3.03)
<b>I do not use alcohol</b>						
n	352	179	455	76	531	1.51
%	54.8	44.8	53.1	41.1	51.0	(2.58)
<b>Yes, it has decreased during the pandemic</b>						
n	46	43	73	16	89	1.66
%	7.2	10.8	8.5	8.6	8.5	(2.44)

\*:  $\chi^2=12.642$   $p=0.005$ ; \*\*:  $\chi^2=12.690$ ,  $p=0.005$ ; \*\*\*:  $F=2.162$ ,  $df: 3,1038$ ,  $p=0.091$ .

**Table 4: Predictors of increase in cigarette smoking and alcohol consumption during the pandemic**

	B	SE	Wald	df	p	OR	95% CI	
							Lower	Upper
<b>Cigarette smoking*</b>								
Age	0.005	0.008	0.452	1	0.501	1.005	0.990	1.020
History of anxiety disorder	0.109	0.254	0.184	1	0.668	1.115	0.678	1.834
CAS	0.099	0.030	11.100	1	0.001	1.104	1.042	1.171
Probable ADHD	0.588	0.199	8.700	1	0.003	1.800	1.218	2.626
Male gender	0.623	0.174	12.762	1	<0.001	1.865	1.218	2.660
<b>Alcohol using**</b>								
Age	0.010	0.009	1.356	1	0.244	1.010	0.993	1.028
History of anxiety disorder	0.065	0.307	0.045	1	0.833	1.067	0.585	1.947
CAS	0.093	0.035	7.137	1	0.008	1.098	1.025	1.175
Probable ADHD	0.622	0.237	6.904	1	0.009	1.863	1.171	2.963
Male gender	0.536	0.212	6.410	1	0.011	1.710	1.129	2.590

CAS: Coronavirus Anxiety Scale; ADHD: Attention deficit hyperactivity disorder; CI: Confidence interval; SE: Standart error; df: Degrees of freedom; OR: Odds ratio. Nagelkerke  $R^2=0.047$  and  $**0.038$ .

tried to find various ways to cope with this anxiety. Some of these methods may be adaptive such as exercise (12), whereas some may be maladaptive, such as using alcohol and/or smoking cigarette, thus complicating the situation (41,42). In a population-based study conducted in Spain, 13.5% of the participants reported that they used alcohol, 12% tobacco, and 6.5% both substances as a coping strategy with the pandemic (42).

Consistent with both scenarios, previous studies in various countries found both increases and decreases in alcohol and cigarette use. These studies reported that the increase in cigarette smoking was associated with a high level of anxiety (12,13), subjective stress due to the COVID-19 pandemic (10), and work status related to COVID-19 (18). Similarly, the increase in alcohol consumption was associated with a depressive mood (12,13,20), poor overall mental health and mental



wellbeing (20), higher levels of anxiety (12), and higher subjective stress due to the COVID-19 pandemic (10) in the previous studies. In the Brazilian adult sample, no gender differences were found for increased alcohol consumption during the period of social restriction with an increase of 10 cigarettes per day (but not an increase of 5 or 20 cigarettes per day) in women than in men (21). Similarly, Vanderbruggen et al. (18) found no gender effect on changes in alcohol use and smoking cigarettes in the Belgian sample, whereas consistent with the present study, a study conducted in Indonesia reported that males were approximately three times more likely than females to report an increase in smoking (19) and in the French sample, males were more frequent regular alcohol users, and they smoked slightly more cigarettes per day than female smokers (13). Interestingly, other studies on the subject did not provide data on gender. Both rates of increased cigarette smoking and alcohol consumption were higher among those with probable ADHD and the presence of probable ADHD predicted increased alcohol consumption and cigarette smoking in the present study. To our knowledge, no study evaluated the relationship between ADHD and alcohol and smoking-related behaviors during the COVID-19 pandemic. However, it is a known fact that individuals with ADHD have a high risk for substance use and substance use disorder (31,43), and this risk may be even higher during the COVID-19 pandemic as they may use these substances as a way of self-treatment (32). Thus, the studies conducted during the pandemic period on alcohol consumption and smoking cigarette show that the increase in the use of these substances is related to the male gender, presence of probable ADHD, and dysfunctional anxiety experienced during this period.

Among the participants in the present study, 17.6% reported an increase and 7.7% reported a reduction in cigarette smoking. These rates ranged between 6.9%-45.8% and 2.5%-32.3%, respectively in previous studies conducted in different countries (10,12,13,18,19,22). It seems that these rates found in the present study are within the range of those found in the previous studies. In support of this, the fact that cigarettes and tobacco are not prohibited by Islamic teachings leads to wider consumption by the public (19). The increase in cigarette smoking was associated with younger age in previous studies (13,18). Although age did not predict the increase in cigarette smoking in the present study, the sample size of young adults might have caused the results to be inconsistent with previous studies. In previous studies evaluating alcohol use-related behaviors, increased alcohol consumption rates ranged

between 10.7%-35.5%, whereas reduced alcohol consumption rates ranged between 13.7%-29.8% (10,12,13,17-20). These rates were 10.8% and 8.5% respectively in the present study, which was lower than the other countries. The changes in alcohol consumption observed in this study are similar to the data of Germany, Belgium, and Australia. In these countries, it was reported that constant alcohol drinking was the most frequent, followed by increased drinking, and the least frequent was reduced drinking, among the changes in alcohol consumption patterns (10,12,18). In the cases of Poland, France, and Indonesia, reducing alcohol consumption was reported more than increasing consumption (13,17,19). Nevertheless, the findings of studies considering alcohol and cigarette use-related behaviors, including the present study, may suggest that the pandemic period is related to both an increase and a decrease in the consumption of these substances.

The increase in alcohol consumption was associated with both middle age (10,13) and young age (18,20) in the previous studies, whereas age did not predict the increase in alcohol consumption in the present study. A previous study conducted on Canadian youth suggested a decline in substance use in both clinical and community samples (44). Thus sampling of young adults may have resulted in lower rates than previous studies. Nevertheless, there may be cultural differences in different countries, as well as differences in the political measures taken and the resulting economic problems. Indeed, the risk of consuming more alcohol during the pandemic was associated with being technically unemployed related to COVID-19 in Belgium (18). The majority of the Turkish population practices Islam as a religion and considers alcohol consumption as immoral. Although this could explain lower rates found in the present study, the rates were even lower than those found in Indonesia, another country that practices Islam as a religion (19). Therefore, there is no explanation for this difference, except that the mean age of the sample in the present study was lower than those reported in the previous studies. Nevertheless, in addition to other reasons, the reduced alcohol consumption rates in these two countries might be, at least partially, attributed to low rates of alcohol dependence (19). Finally, reinforcing and potentially addictive behaviors such as gambling, video gaming, and online shopping may have been used to reduce stress and dysfunctional anxiety related to COVID-19 (14,45). Thus, this may also affect the rates of increase and reduction of cigarette smoking and/or alcohol consumption in present and previous studies.

There are limitations to this study. First of all, it was a non-clinical sample evaluated with self-rating scales. Unfortunately, self-rating scales may only show elevated risk of ADHD or disordered gaming, rather than making the clinical diagnosis of these disorders. This may limit the generalizability of these findings. Also, severe symptoms of ADHD may be related to weaker cognitive functions, reducing the reliability of these results as self-rating scales were used in this study. The subjective nature of the self-rating measurement used to determine the change in the amount of alcohol and cigarette is another limitation of the present study. Secondly, symptoms of depression and having economic problems, and being unemployed due to COVID-19 were not evaluated, which can be considered as a limitation. Finally, it is impossible to comment on the casual relationships between the primary constructs of interest, since our study was cross-sectionally designed. As a result, the findings of the present study should be validated in future prospective studies during the second period of the pandemic using structured interviews.

In conclusion, these findings suggest that certain groups of individuals, especially male young adults with probable ADHD and dysfunctional anxiety related to COVID-19, have a higher risk of increasing their alcohol and/or cigarette use during pandemic times in Turkey. Thus, the present study may suggest that these potential risk factors must be carefully evaluated to prevent the increase in alcohol and cigarette use among young adults.

Contribution Categories		Author Initials
Category 1	Concept/Design	C.E., B.E., E.D.
	Data acquisition	M.T., N.K.
	Data analysis/Interpretation	C.E.
Category 2	Drafting manuscript	C.E., B.E., E.D.
	Critical revision of manuscript	C.E.
Category 3	Final approval and accountability	C.E., B.E., E.D., M.T., N.K.

**Ethical Approval:** The study was approved by the Ethical Committee of Cankaya University, Ankara, Turkey (IRB: 25.11.2020 - 90705970-050.99).

**Informed Consent:** Participants were instructed on the purpose and design of the study, and the informed consents were obtained.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** The authors declare that there was no conflict of interest.

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